A survey of the perceptions of climate scientists 2013

Dennis Bray & Hans von Storch

Helmholtz Zentrum Geesthacht
Geestacht, Germany

Contents

Introduction

In 1996, with the assistance of funding from the Thyssen Stiftung, we set out to explore the perceptions that climate scientists held regarding climate change and climate science. The methodology was quite simple. We began with a series of interviews (43 in number) with climate scientists in three countries (USA, Canada and German). A brief account of the qualitative findings can be found in *Inside Science, A Preliminary Investigation of the Case of Global Warming*, (Bray and von Storch, 1996: available on-line at http://www.academia.edu/2369025/Inside_science_-_a_preliminary_investigation_of_the_case_of_global_warming). After analyzing the interviews, questions were formulated addressing key issues that seemed to prevail. These questions were then pretested to climate scientists and revised accordingly. Satisfied with the survey questionnaire, 500 hard copies were distributed to scientists in Germany, Denmark, Canada and the USA, each survey translated into the national language. Subsequently, it was requested that the survey be repeated in Italy and Taiwan.

The reception of the results of the 1996 survey was such that we were prompted to repeat the survey in 2003. In an effort to reach a larger sample of scientists we employed an on-line survey method. After the 2003 survey we decided perhaps it would be a good idea to repeat the survey approximately every five years to provide a view over time of how climate scientists felt about their science and the issue of global warming. To this extent, the survey was repeated again in 2008 and again in 2013. While a set of core questions was maintained, each survey subsequent to 1996 contained sets of questions addressing different specific topics.

The results of the 1996 survey and the 2003 survey are containing in "The Perspectives of Climate Scientists on Global Climate Change" (Bray and von-Storch 2011) available at http://www.academia.edu/3077309/The_Perspectives_of_Climate_Scientists_on_Global_Climate_Change_1996_and_2003 and the 2008 survey at http://www.hzg.de/imperia/md/content/gkss/zentrale_einrichtungen/bibliothek/berichte/gkss_berichte_2010/gkss_2010_9_.pdf

Each survey was not without critics, of the sampling, of the questions, and of the results. While some readers might find fault with some of the questions, please keep in mind that many of the questions were posed by climate scientists and pretested with climate scientists and revised with the aid of climate scientists. Some readers will also likely dispute the findings. We can only say that the opportunity was there for many scientists to participate. Those that chose not to participate should not then, be critical of the results.

Sampling

The survey employed a non-probability convenience sample. Convenience sampling provides an inexpensive approximation of truth. Quite simply, the sample is selected because it is convenient. The respondents were 'preselected' in as much as they were included as they met specific criteria, i.e. had authored papers concerning climate change and published them in significant climate science journals, were currently employed in climate research institutes or have previously been used as subjects in published results concerning climate change consensus among scientists.

In the 2008 climate survey of climate scientists, three lists were employed in constructing the sample. List one included a list of authors, affiliations and email addresses drawn from climate journals with the 10 highest ISI impact ratings for the last 10 years. These are authors of climate related papers in peer reviewed climate related journals. The second list was the list of authors who contributed to Oreskes' (2004) published conclusions concerning consensus in the climate change issue. A third list was drawn from readily available email lists on institute web sites (i.e. NCAR, MPI, AMS, etc.). Duplicates in the three lists were removed before distribution

In 2013 the survey used the same mailing list as in 2008 with the addition of the ClimList mailing list plus the IPCC list of contributors. After removing duplicates, this resulted in a list of 5947 email addresses. 1456 proved to be non-valid, making the total distribution 4491. Invitations to participate in the survey were distributed by email, providing a link to the on-line survey. Provisions were made so that should someone submit a duplicate form the form identifier resulted in the original being over written. Consequently, for each invitation it was only possible to have one completed survey written to the data set. There were 286 valid returns, for a return rate of approximately 7%. All responses were guaranteed anonymity.

Sampling and response rates were also not without criticism. As a general comment on sampling and response rates, sampling special groups (scientists) often results in a comparatively difficult sample selection and a comparatively low response rate. The difficulty of selecting such a sample is discussed in Committee on Assessing Fundamental Attitudes of Life Scientists as a Basis for Biosecurity Education, National Research Council's (2009) report 'A Survey of Attitudes and Actions on Dual Use Research in Life Sciences'. Here the target population was US life scientists. The report notes (as in the case of the Bray - von Storch surveys) no complete list of the population was available or even known. The alternative chosen was to find a sample through the use of professional societies.

Response rates for mail out hard copy surveys and on-line surveys also differ, with response number to mail out surveys typically being higher than on-line surveys. Hamilton (2010) produced a white paper that analyzed 199 surveys. The total response rate of these surveys, calculated using the total number of surveys sent out in the 199 surveys and the total number of responses for the 199 surveys, was 13.35%. He noted that large invitations list, >1000, tend to be associated with lower individual response rates.

Viser et al (1996) showed that surveys with lower response rates (near 20%) tended to produce more accurate results than surveys with higher response rates (although it is likely that this could

not be generalized to all surveys). However, Holbrook et al (2007) concluded that a low response rate does not necessarily equate to a lower level of accuracy but simply indicates a risk of lower accuracy.

Harris Interactive, a well-established organization specializing in web-based surveys, used a convenience sample of 70,932 California residents in a survey of attitudes towards healthcare. An email was sent to potential respondents with a link to a web survey and non-respondents received one reminder email. The response rate for the Harris Interactive survey was 2%.

Such response rates seem to be typical of on-line surveys of specialized populations. Similar surveys include the following: Stewart et al (1992), a SCIENCEnet electronic survey received 118 responses from "a computer-based network ... which has over 4000 subscribers"(p.2); the National Defense University Study (1978) based its conclusions on the responses from 21 experts; the Slade Survey (1989) based conclusions on responses from 21 respondents; the Global Environmental Change Report Survey (1990) had a response rate of approximately 20% from a sample 1500; the Science and Environmental Policy project (Singer 1991) received a 32% response rate from a sample of 102, and later a 58% response rate from another sample of 24; the Greenpeace International Survey received 113 responses from a sample of 400, and; Auer et al (1996) report that "about 250 questionnaire were distributed [by method of personal contact at conferences] and 101 were sent back". Morgan and Keith, (1995) employed the data drawn from a sample size of 16 US climate scientists. This list is by no means exhaustive of such surveys but is included for further reference should the reader be so inclined as to asses other perspectives.

Consequently the sampling method and the response rate for our survey of climate scientists do not appear distinct from other such undertakings. Response rates could likely be significantly increased if the survey was offered in a number of languages. However, such resources were not available.

References

Auer, I., R. Böhm, and R. Steinacker. (1996) 'An opinion poll among climatologists about climate change topics'. *Meteor. Z.*, **5**, 145–155.

Committee on Assessing Fundamental Attitudes of Life Scientists as a Basis for Biosecurity Education, National Research Council's Report (2009)'A Survey of Attitudes and Actions on Dual Use Research in Life Sciences'. Survey of Attitudes and Actions on Dual Use Research in Life Sciences.

Hamilton, Michael Braun. (2010)'Online Survey Response Rates and Times. Background and Guidance for Industry http://www.supersurvey.com/papers/supersurvey_white_paper_response_rates.pdf) accessed 12.02.2010).

Harris Interactive. (2008) 'Climate Scientists Agree on Warming, Disagree on Dangers, and Don't Trust Media's Coverage of Climate Change.' Statistical Assessment Service, George Mason University. (http://stats.org/stories/2008/global_warming_survey_apr23_08.html)

Stewart, T.R.,J.L. Mumpower and P.R. Cirincione (1992). "Scientists' agreement and disagreement about global climate change: Evidence from Surveys'. Research Report, Nelson A. Rockerfeller College of Public Affairs and Policy.

Holbrook, Allyson, Jon Krosnick and Alison Pfent (2007) 'The Causes and Consequences of Response Rates in Surveys by the New Media and Government Contractor Survey Research Firms' in Advances in telephone survey methodology. ed. James M. Lepkowski, N. Clyde Tucker, J. Michale Brick, Edith D. DeLeeuw, Lilli Japec, Paul J. Lavrakas, Michael W. Link, and Roberta L. Sangster. New York: Wiley.

Morgan, M. G., and D. W. Keith. (1995). 'Subjective judgements by climate experts'. *Environmental Science and Technology.,* 29**,** 468A–476A.

National Defense University (NDU). (1978) 'Climate Change To The Year 2000: A Survey of Expert Opinion'. National Defense University, 109 pp.

National Research Council (2009). The difficulty of selecting such a sample is discussed in Committee on Assessing Fundamental Attitudes of Life Scientists as a Basis for Biosecurity Education. 'A Survey of Attitudes and Actions on Dual Use Research in Life Sciences'.

Oreskes, Naomi. (2004) 'Beyond the Ivory Tower: The Scientific Consensus on Climate Change.' *Science,* 3 December 2004:Vol. 306. no. 5702, p. 1686.

Singer, S. F., and J. S. Winston. (1991) IPCC Report: Survey, Science and Environmental Policy Project. *IPCC.*Greenpeace International Survey.

Slade, D. H. (1990) 'A Survey of Informed Opinion Regarding the Nature and Reality of a Global "Greenhouse" Warming'. *Climatic Change* vol. 16 no. 1Global Environmental Change Report Survey.

Viser, Penny S., Jon A. Krosnick, Jesse Marquette and Michael Curtin (1996) 'Mail Surveys for Election Forecasting? An Evaluation of the Columbian Dispatch Poll.' Public Opinion Quarterly 60: 181-227.

Questions

Most questions were designed on a seven point rating scale. A set of statements was presented to which the respondent was asked to indicate his or her level of agreement or disagreement, for example, 1 = strongly agree, 7 = strongly disagree. The value of 4 can be considered as an expression of ambivalence or impartiality or, depending on the nature of the question posed, for example, in a question posed as a subjective rating such as "How much do you think climate scientists are aware of the information that policy makers incorporate into their decision making process?", a value of 4 is no longer a measure of ambivalence, but rather a metric.

The validity of some of the questions was disputed by some critics of the surveys. However, as mentioned above, most questions were developed with the assistance of climate scientists and were pretested and revised accordingly.

Presentation of Data

Data is presented as descriptive statistics, including histograms and box plots, where applicable. Descriptive statistics include number of observations, means and 95% confidence intervals. Histograms are presented as percent of observations. Boxplots were chosen as a mode of presentations as they illustrate the median, spread and data values, providing a visual assessment of the degree of consensus. Lowest and highest values are indicated by 'whiskers' extending from the boxes. Outliers are identified as dots. The boxes contain the 50% of total values falling between the 25th and 75th percentile, meaning that 50% of the cases have values within the box, 25% have values larger than the upper boundary and 25% have values less than the lower boundary. The length of the box indicates how much spread there is in the data values within the middle 50 percentile. If, for example, one box is much longer than another then the data values in the longer box have more variability. The length of the box is considered to suggest scientific consensus and the location of the box to represent scientific assessment. The median is in the middle of the box only if the distribution is symmetric. If the median line is closer to the left of the box than to the right of the box the data are skewed in that direction, meaning that there are more cases towards that end of the distribution. If the median is closer to the right of the box then tail of the distribution is towards those values.

Within each figure, reference is provided as to the location of the question in previous surveys. In the 2013 survey some issues were explored in more detail and one question in the previous surveys is posed as a series of questions in the 2013 survey. These are not given the equivalent question number from previous surveys. *Also note that question wording and values labels in previous surveys might not be exact and on occasion, value labels might be reversed.*

Demographics

Responses were forthcoming from some 35 countries. The majority of respondents claimed to have worked in climate science for more than 15 years, suggesting a sample with considerable experience with working in climate science. Slightly less than half of the respondents claimed to have, at one time or another, been involved with the IPCC. A large majority of the respondents claimed to be employed in an academic degree granting institute or a publicly funded non-degree granting research institute.

1. The country in which you conduct most of your work is

Country	
1 Argentina	1
2 Australia	8
3 Austria	2
4 Brazil	1
5 Canada	15
6 Chile	1
7 China	2
8 Croatia	1
9 Cyprus	1
10 Czech Republic	1
11 Denmark	2
12 Finland	2
13 France	7
14 Germany	28
15 Greece	1
16 Iceland	2
17 India	1
18 Iran	1
19 Italy	6
20 Japan	1
21 Netherlands	3
22 New Zealand	2
23 Norway	4
24 Oman	1
25 Pacific Islands	1
26 Poland	1
27 Russia	1
28 South Africa	1
29 Spain	1
30 Switzerland	2
31 Taiwan	1
32 UK	26
33 USA	148
34 Zambia	2
35 Other*	4
Total	283

	1996	**2003**	**2008**
Question #	**1**	**1**	**1**

2. The approximate number of years that you have worked in climate science is

No. of years	*0-5*	*6-10*	*11-15*	*>15*	*Total*
	19	35	44	185	283

	1996	**2003**	**2008**
Question #	**2**	**2**	**3**

3. Have you ever been involved (in any way, author, reviewer, etc,) with an IPCC report?

1 – yes
2 -- no

yes	135
no	151

	1996	**2003**	**2008**
Question #	**-**	**-**	**6**

4. What best describes the institute in which you work?

Academic/degree granting	164
Privately funded research/non-degree granting	5
Publicly funded research/non-degree granting	107
NGO	0
Corporate	3
other	5

	1996	**2003**	**2008**
Question #	**-**	**-**	**7**

Confidence in Climate Science

In this section the respondent was asked about his or her level of general confidence in climate science. Approximately 31% said that his or her level of confidence had not changed in the last 5 years; approximately 61% claimed the level of confidence had increased, and approximately 8% claimed his or her level of confidence had decreased. When asked if climate science has remained a value neutral science, there is still evidence that the majority of climate scientists express some levels of doubt, although not as much as indicated in the survey of 2008. Since the IPCC's statement in the 2007 IPCC AR4 concerning attribution of warming to GHS, approximately 66% of the respondents felt more confident that most of the observed increase in global average temperatures since the mid-20th century is very likely due to observed increases in anthropogenic GHG concentrations.

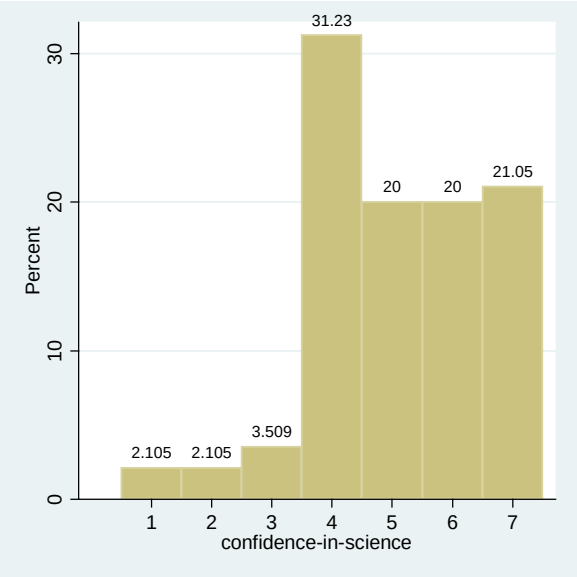
Relevant papers based on precious surveys

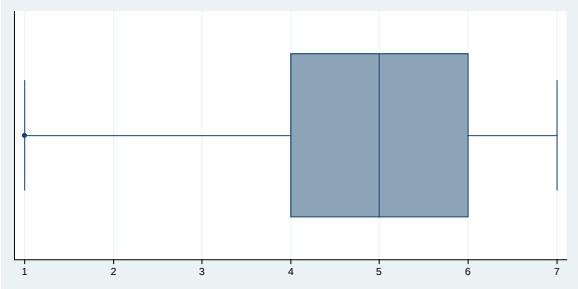
Bray, Dennis and Hans von Storch
The Role of Trans-Science in the Acceptance of the IPCC as an Expression of Consensus
Working paper 2008, Unpublished http://www.academia.edu/4783953/The_Role_of_Trans-Science_in_the_Acceptance_of_the_IPCC_as_an_Expression_of_Consensus

Bray, Dennis
The Scientific Consensus of Climate Change Revisited
Environmental Science & Policy 13 (2010) 340-350, 2011
Note: This version differs slightly from the published version
http://www.academia.edu/3077313/The_Scientific_Consensus_of_Climate_Change_Revisited

5. In the last 5 years, your confidence in the findings of climate science has

decreased significantly			*has not changed*			*increased significantly*
1	*2*	*3*	*4*	*5*	*6*	*7*



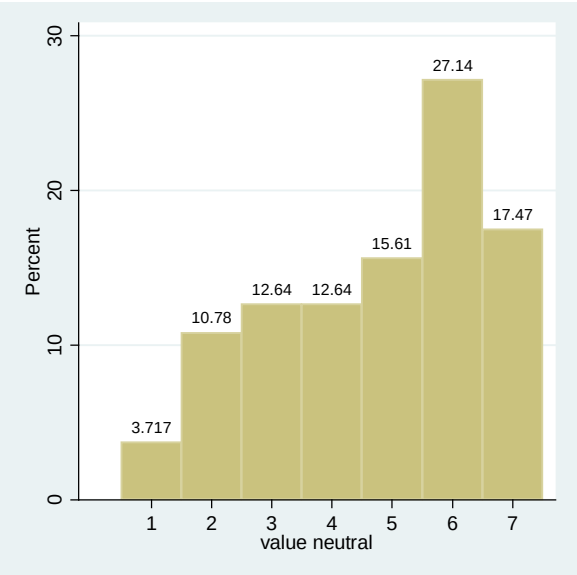


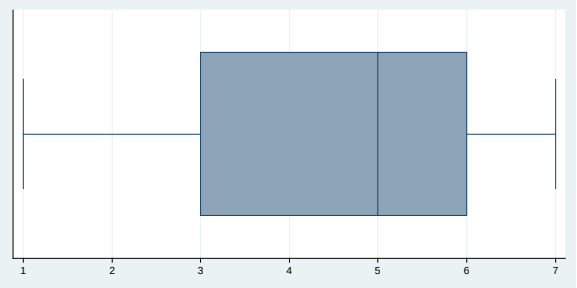
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var5	285	5.09	0.08	4.93	5.26

	1996	2003	2008
Question #	-	-	-

6. To what degree do you think climate science has remained a value-neutral science?

not at all						*a great degree*
1	*2*	*3*	*4*	*5*	*6*	*7*



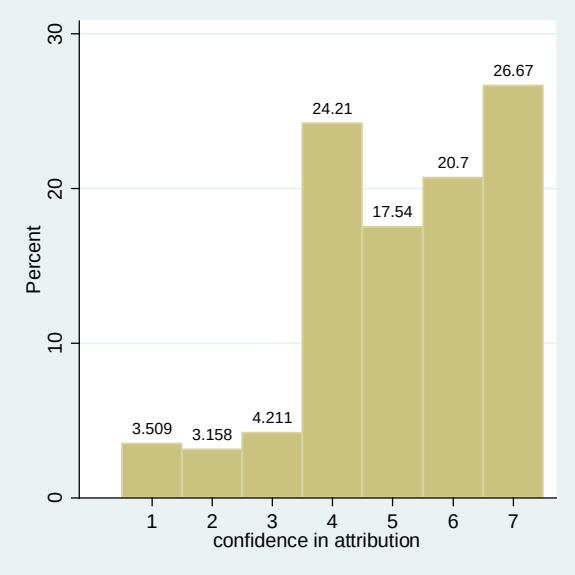


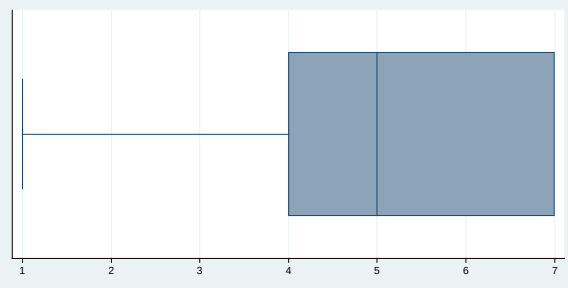
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var6	269	4.77	0.11	4.56	4.98

	1996	2003	2008
Question #	66	66	10

7. Since the 2007 IPCC AR4 to now, do you feel more confident or less confident concerning the IPCC's attribution of warming to GHS? (That is, that most of the observed increase in global average temperatures since the mid-20th century is very likely due to observed increases in anthropogenic GHG concentrations?)

much less confident			*no change in confidence*			*much more confident*
1	*2*	*3*	*4*	*5*	*6*	*7*





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var7	285	5.18	0.09	4.99	5.36

	1996	2003	2008
Question #	-	-	-

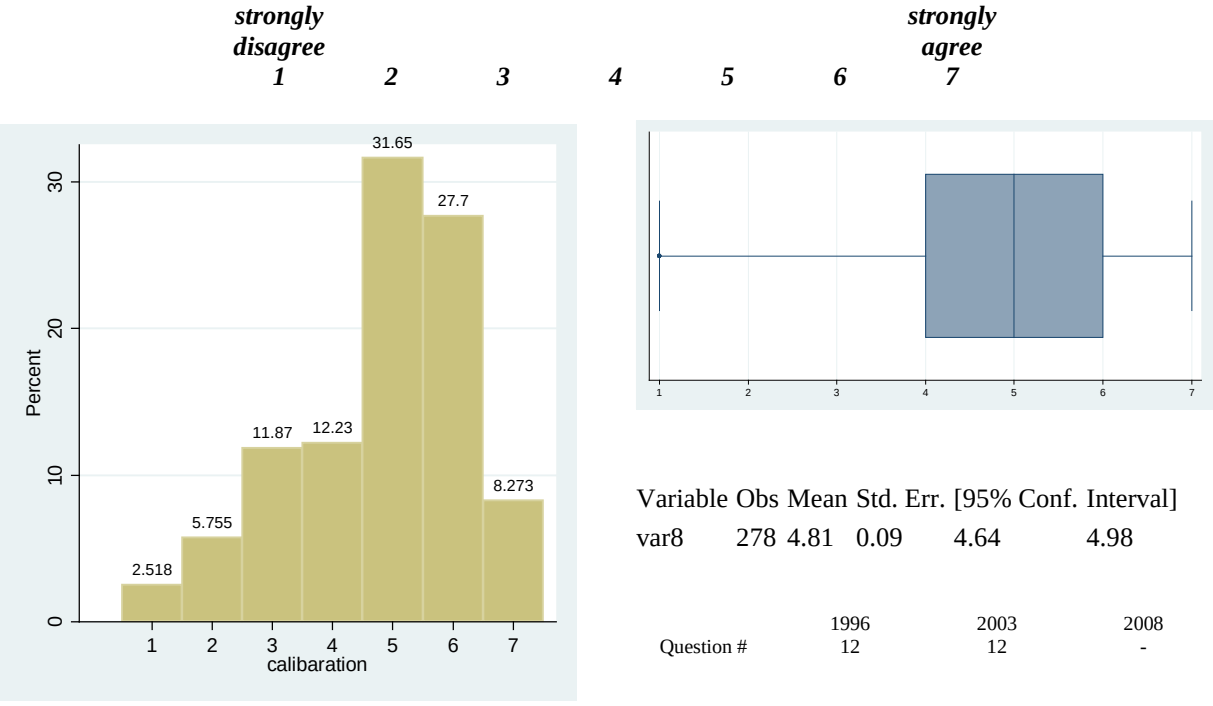
Climate Models

This block of questions consists of the core questions consistently presented throughout the history of the surveys. Basically it represents climate scientists' expert assessment of the work in their field. Among the responding scientists there were still discrepant views concerning the ability of climate models to accurately simulate the climatic conditions for which they are calibrated. After this introductory question, the survey focuses on two distinct activities within climate science, namely global modeling and regional modeling. These are presented as separate section.

Relevant papers based on precious surveys

Bray, Dennis and H. von Storch
An Alternative Means of Assessing Climate Models
Journal of Environmental Science and Engineering, 5 (2011) 1053-1062
http://www.academia.edu/4929792/An_Alternative_Means_of_Assessing_Climate_Models

8. Climate models accurately simulate the climatic conditions for which they are calibrated?



Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var8	278	4.81	0.09	4.64	4.98

	1996	2003	2008
Question #	12	12	-

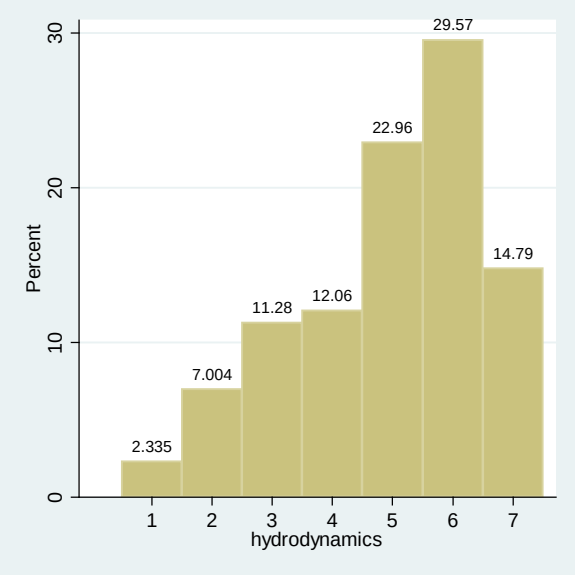
Atmospheric Processes

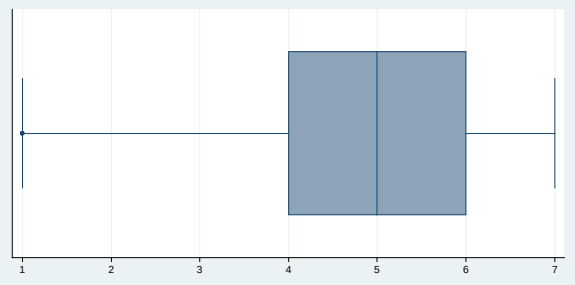
In the first set of questions climate scientists were asked how well atmospheric model dealt with a number of atmospheric processes. In rank order, from best to worst, the processes were radiation, hydrodynamics, atmospheric vapour, precipitation, atmospheric convection and clouds.

9. How well do you think atmospheric models can deal with

very inadequate						*very adequate*
1	*2*	*3*	*4*	*5*	*6*	*7*

9.a. hydrodynamics

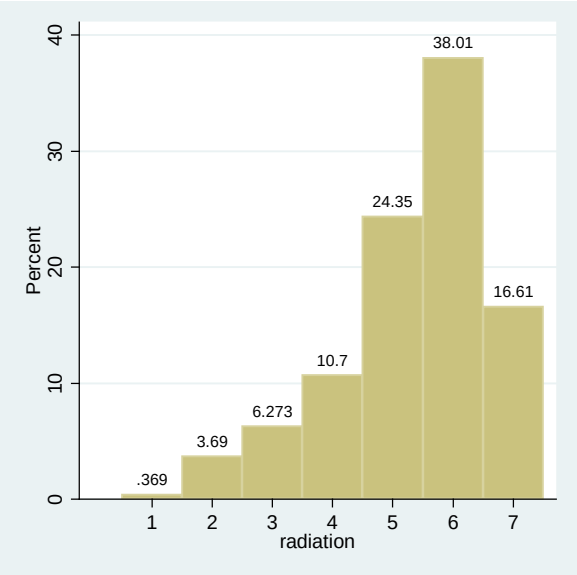


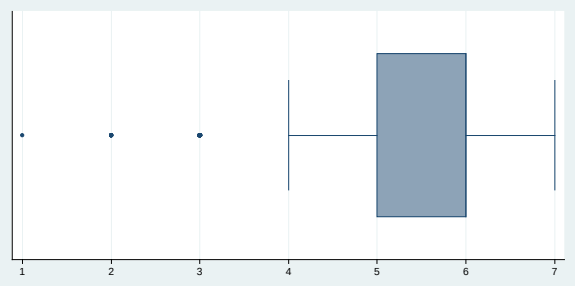


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var9a	257	4.94	0.10	4.75	5.13

	1996	2003	2008
Question #	14	14	12a

9.b. radiation

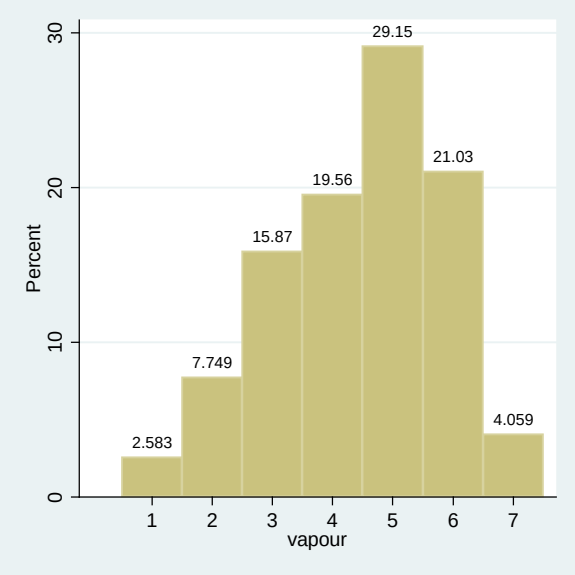


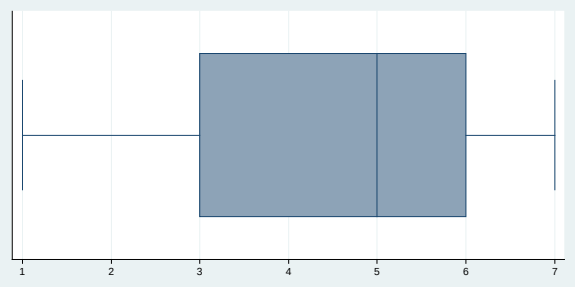


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var9b	271	5.35	0.08	5.20	5.51

	1996	2003	2008
Question #	15	15	12b

9.c. vapour in the atmosphere

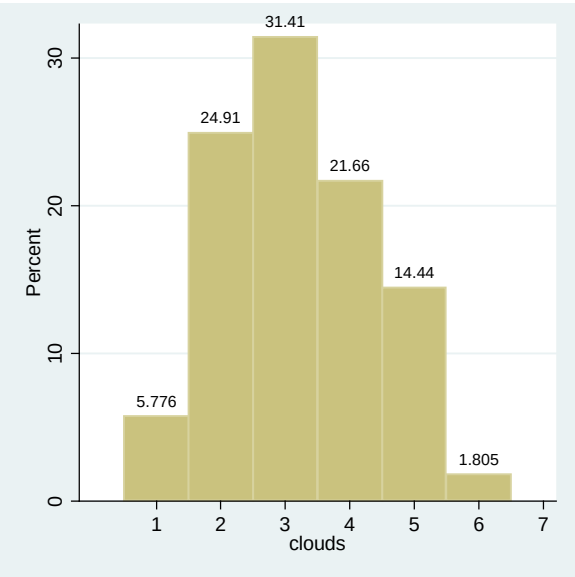


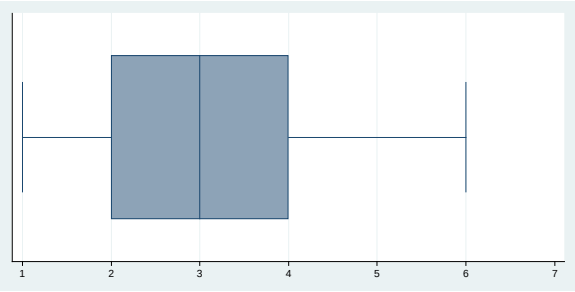


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var9c	271	4.44	0.09	4.27	4.61

	1996	2003	2008
Question #	16	16	12c

9.d. the influence of clouds

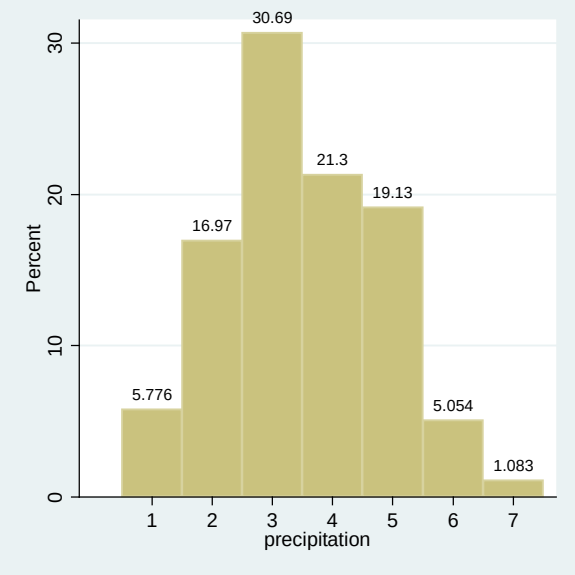


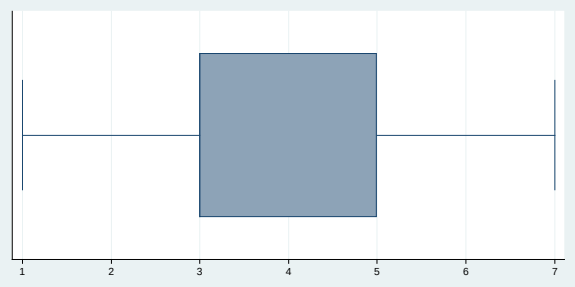


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var9d	277	3.19	0.07	3.05	3.34

	1996	2003	2008
Question #	17	17	12d

9.e. precipitation

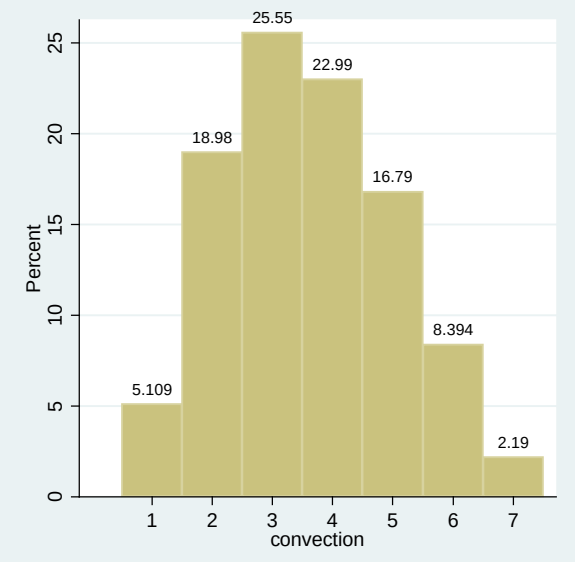


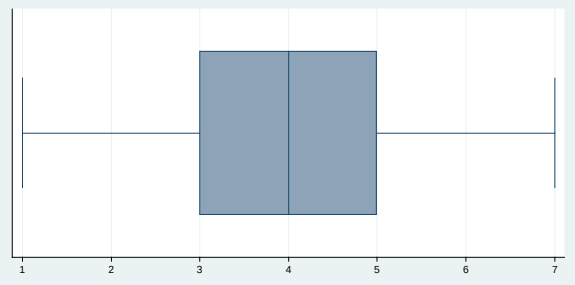


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var9e	277	3.51	0.08	3.35	3.66

	1996	2003	2008
Question #	18	18	12e

9.f. atmospheric convection





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var9f	274	3.61	0.09	3.44	3.78

	1996	2003	2008
Question #	19	19	12f

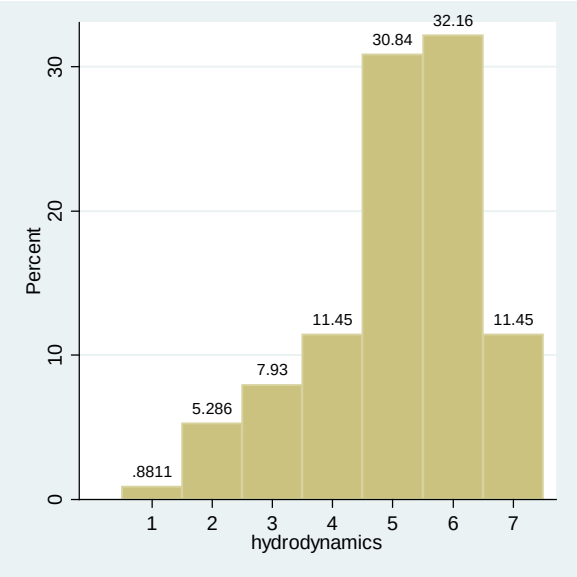
Ocean Processes

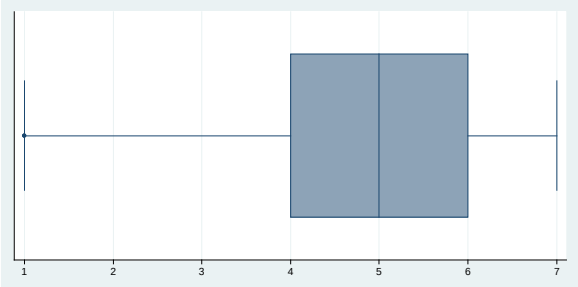
Overall, scientists see ocean models as being less problematic than atmospheric models and the ability to couple ocean and atmospheric models is perceived of as being reasonably adequate.

10. How well do you think ocean models can deal with

very inadequate						*very adequate*
1	*2*	*3*	*4*	*5*	*6*	*7*

10.a. hydrodynamics

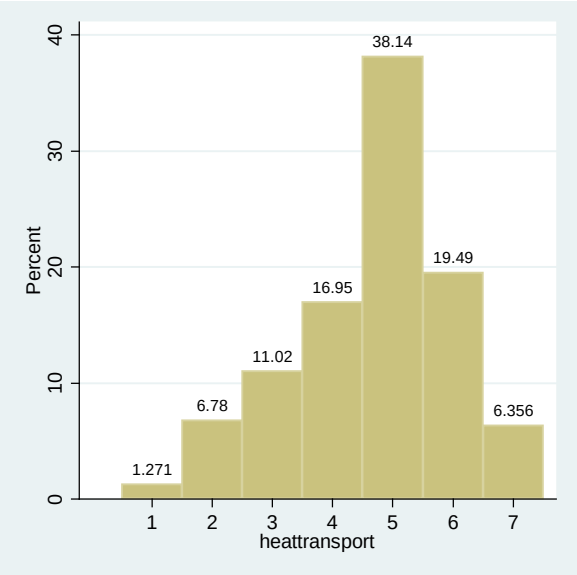


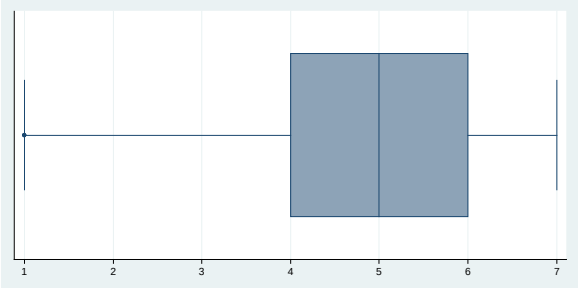


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var10a	227	5.08	0.09	4.91	5.26

	1996	2003	2008
Question #	20	20	13a

10.b. heat transport in the ocean

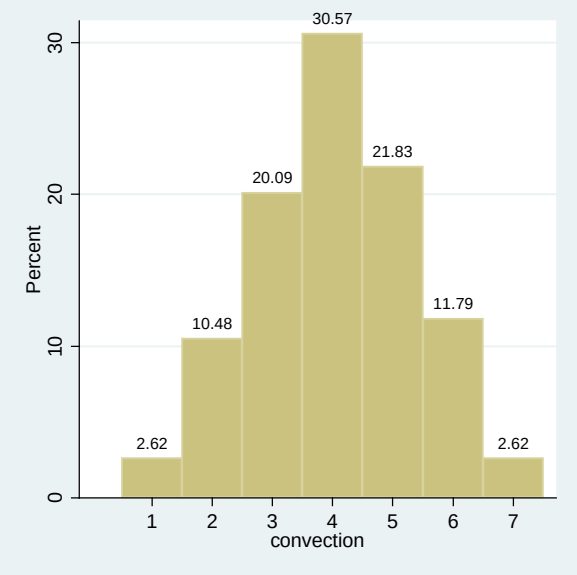


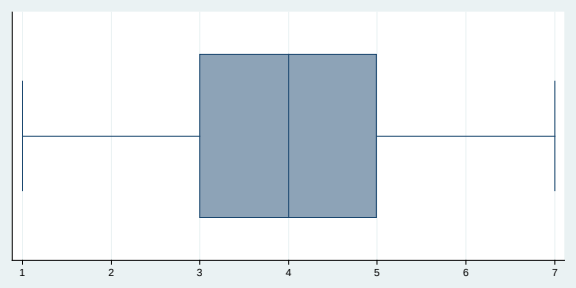


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var10b	236	4.68	0.09	4.51	4.85

	1996	2003	2008
Question #	21	21	13b

10.c. oceanic convection



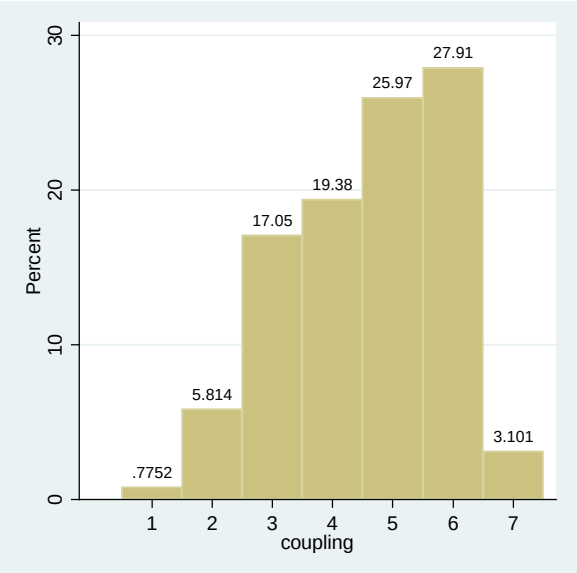


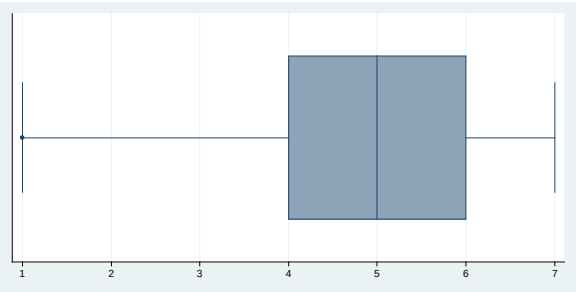
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var10c	229	4.04	0.09	3.87	4.22

	1996	2003	2008
Question #	22	22	13c

11. How adequate is the ability to couple atmospheric and ocean models?

very inadequate						***very adequate***
1	***2***	***3***	***4***	***5***	***6***	***7***





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var11	258	4.60	0.08	4.44	4.76

	1996	2003	2008
Question #	23	23	14

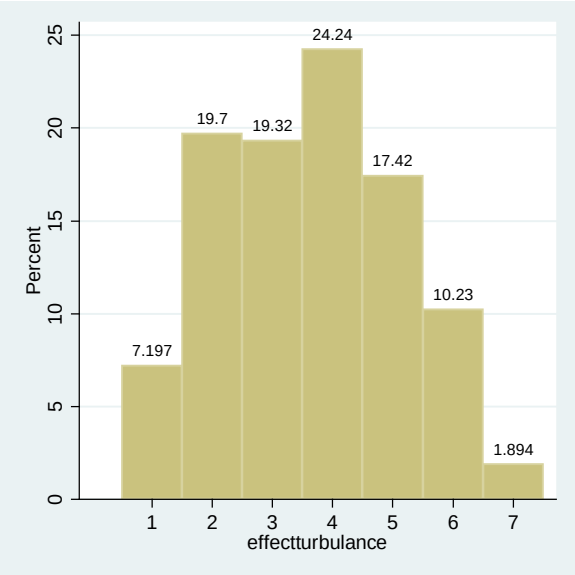
Physics of Climate

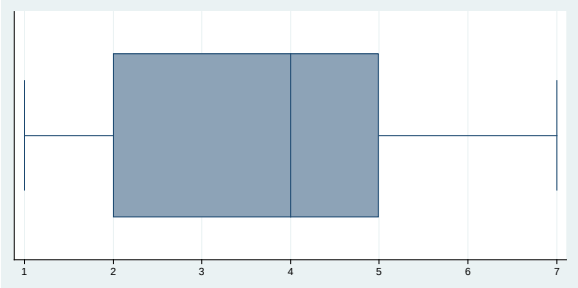
In this section climate scientists were asked to assess the state of scientific knowledge related to components of the physical system of climate. The highest and most consensual estimate of understanding was assigned greenhouse gases emitted from anthropogenic sources. The level of least understanding was assigned to knowledge of turbulence.

12. The current state of scientific knowledge is developed well enough to allow for a reasonable estimate of the effects on climate of

strongly disagree						*strongly agree*
1	*2*	*3*	*4*	*5*	*6*	*7*

12.a. turbulence

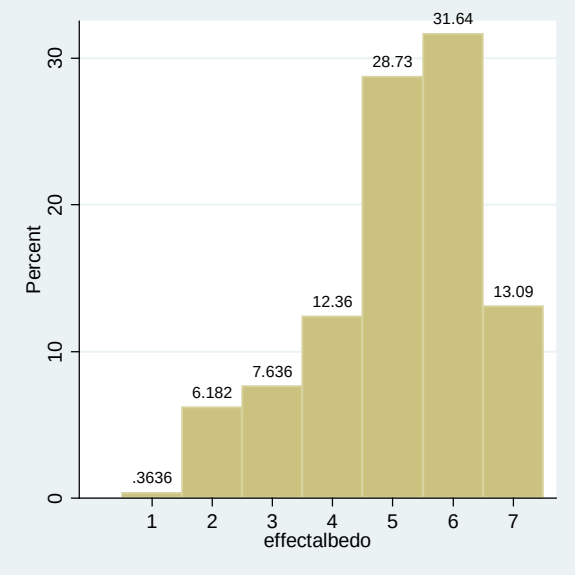


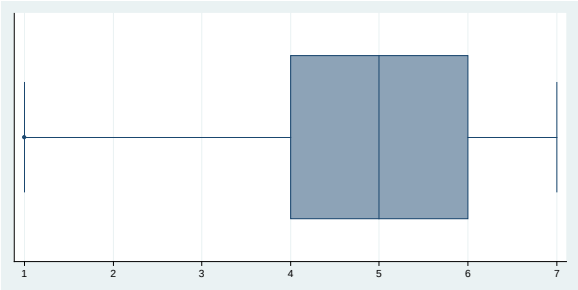


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var12a	264	3.63	0.09	3.45	3.81

	1996	2003	2008
Question #	24	24	15a

12.b. surface albedo

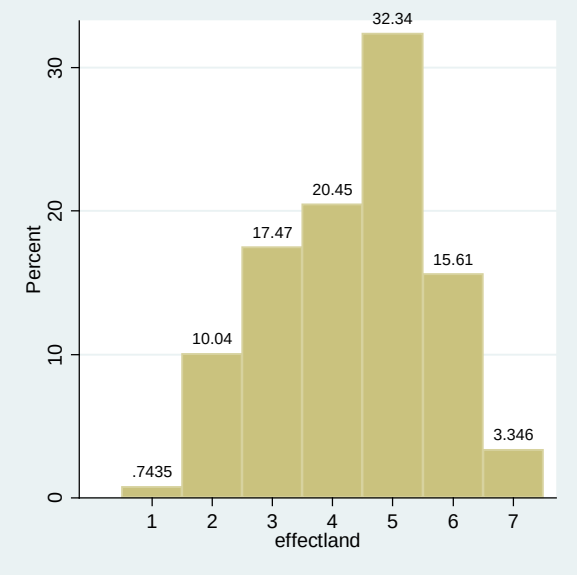


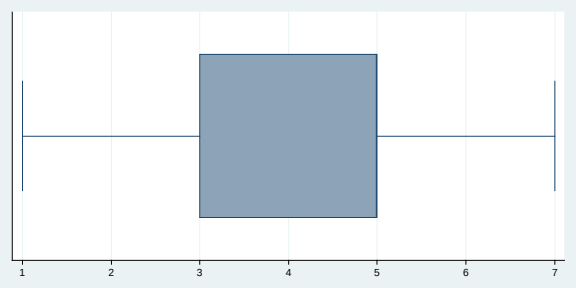


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var12b	275	5.10	0.08	4.94	5.26

	1996	2003	2008
Question #	25	25	12b

12.c. land surface processes

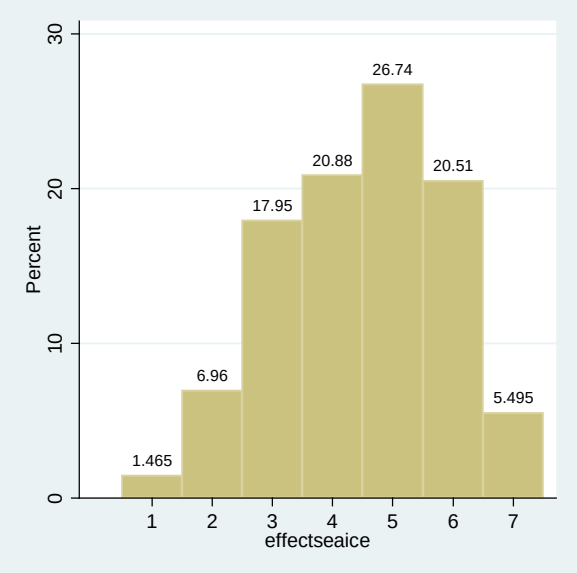


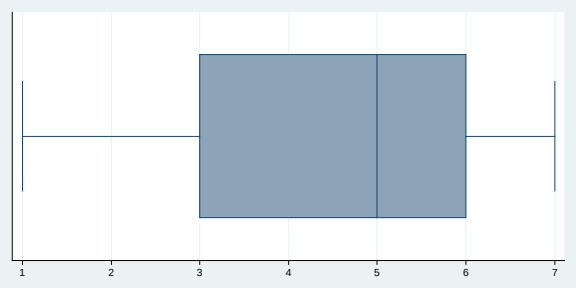


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var12c	269	4.34	0.08	4.18	4.50

	1996	2003	2008
Question #	26	26	15c

12.d. sea ice

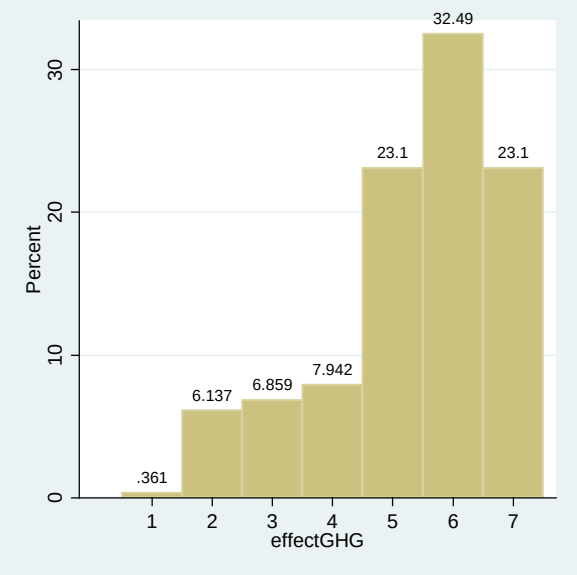


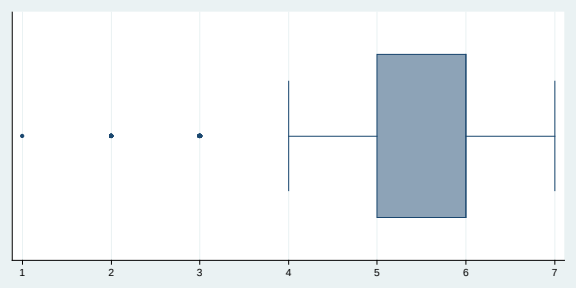


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var12d	273	4.48	0.08	4.31	4.65

	1996	2003	2008
Question #	27	27	15d

12.e. green house gases emitted from anthropogenic sources





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var12e	277	5.37	0.09	5.20	5.54

	1996	2003	2008
Question #	28	28	16d

Ability of Global Models

This section looks at climate scientists' assessments of the ability of global models. The ability of models to reproduce temperature mean values, trends and variability for the last 50 years is rated reasonably well. The assessment of global models to reproduce precipitation observations is rated considerable worse.

When considering the future, the assessment of the ability of models to simulate mean temperature values for the next 10 years and the next 50 years is the same. As for trends, the 10 year ability is rated slightly better than the 50 year ability, a pattern which is also repeated for temperature variability. Overall, the ability to reproduce the past is rated slightly higher than the ability to simulate the future, as would be expected.

In every measure, the ability to simulate precipitation values is less than that of temperature. The ability to deal with precipitation, both past and future is assessed as being more difficult.

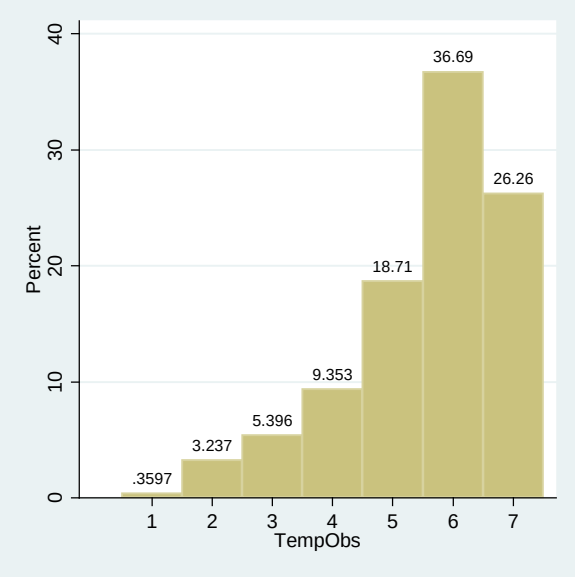
Concerning sea level rise, scientists perceive the ability of models to be better when assessing the next 10 years and reasonably poor when assessing the next 50 years.

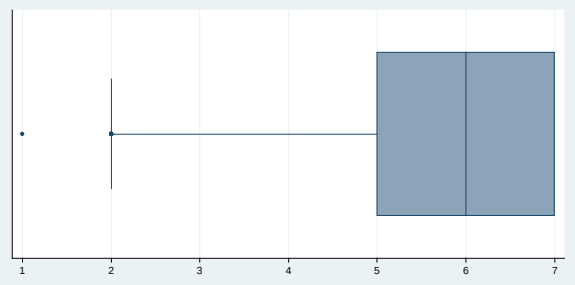
The ability of models to simulate extreme events is the most problematic aspect included in the survey, with models assessed as having very limited abilities to simulate mean values, trends or variability for the next 10 years and for the next 50 years.

13. Concerning *TEMPERATURE OBSERVATIONS,* how would you rate the ability of *global* models to reproduce

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

13.a. mean values for the last 50 years

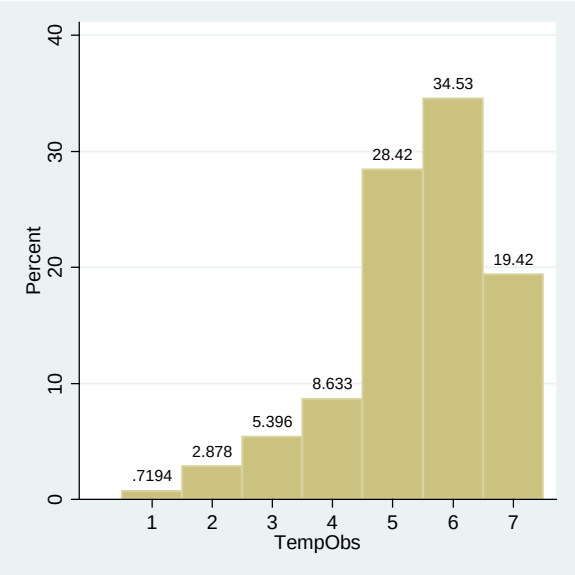


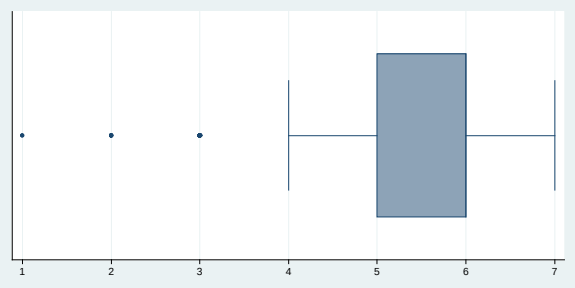


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var13a	278	5.58	0.08	5.42	5.74

Question #	1996	2003	2008
	-	-	-

13.b. trends for the last 50 years

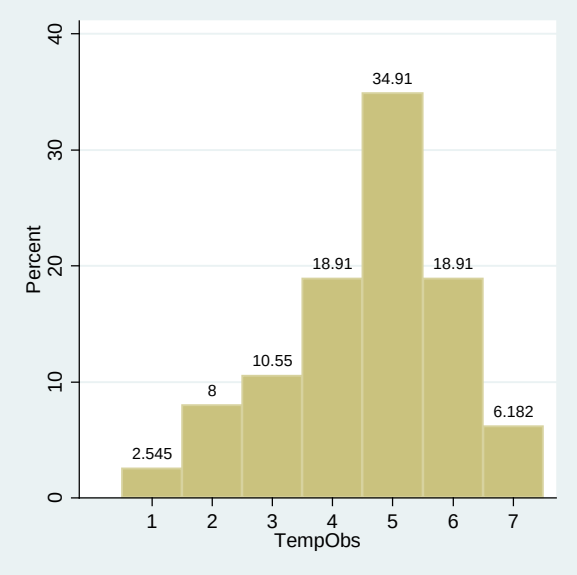


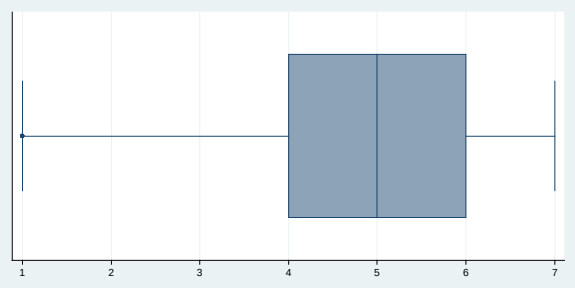


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var13b	278	5.42	0.08	5.27	5.57

Question #	1996	2003	2008
	-	-	-

13.c. variability for the last 50 years





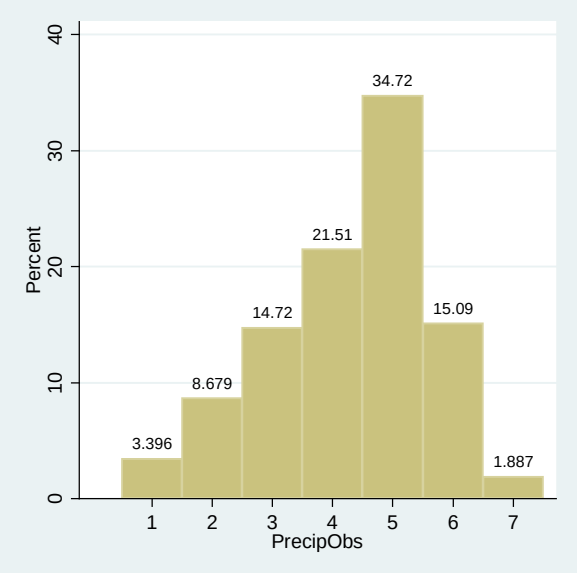
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var13c	275	4.57	0.09	4.40	4.74

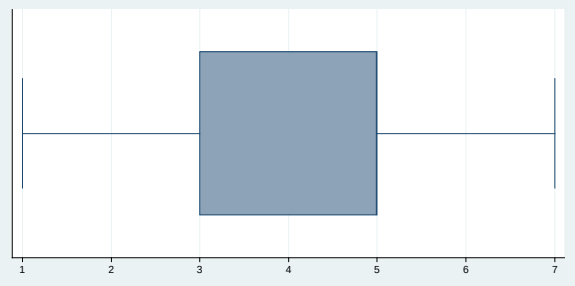
Question #	1996	2003	2008
	-	-	-

14. Concerning *PRECIPITATION OBSERVATIONS*, how would you rate the ability of *GLOBAL* models to reproduce

very poor						*very good*
1	***2***	***3***	***4***	***5***	***6***	***7***

14.a. mean values for the last 50 years

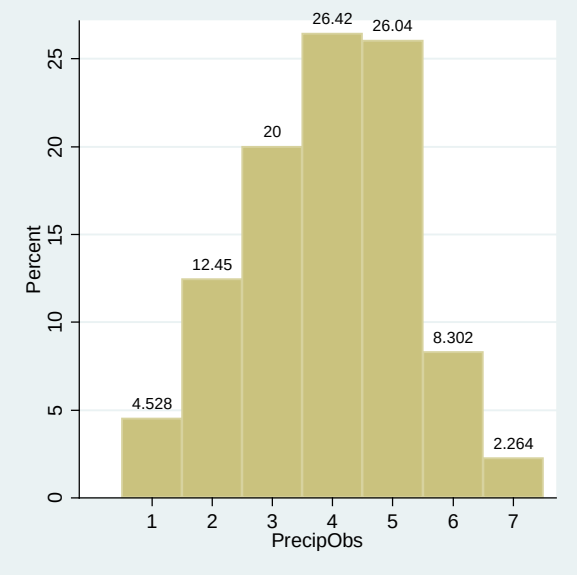


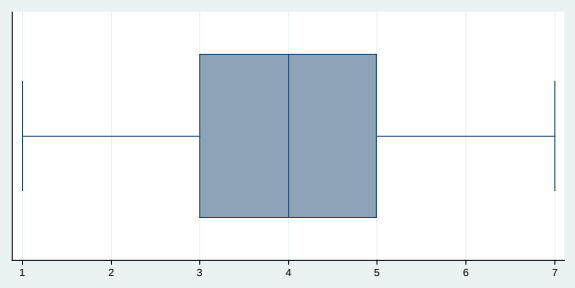


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var14a	265	4.28	0.08	4.12	4.45

Question #	1996	2003	2008
	-	-	-

14.b. trends for the last 50 years

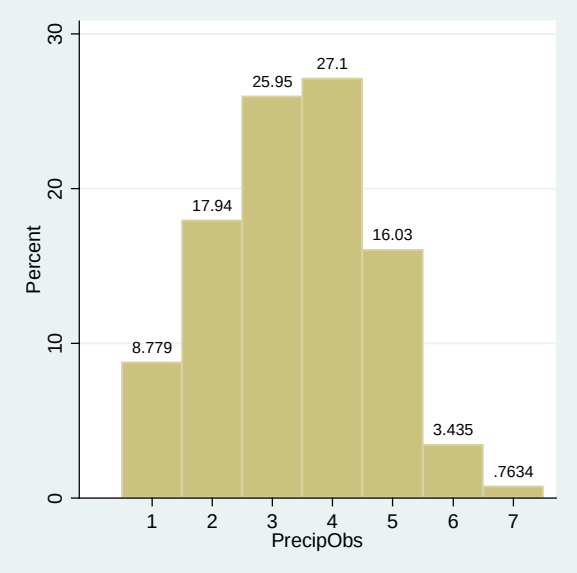


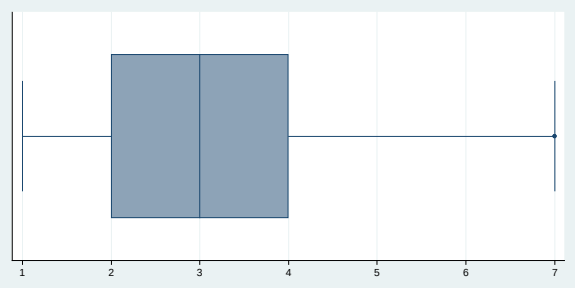


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var14b	265	3.91	0.08	3.74	4.08

Question #	1996	2003	2008
	-	-	-

14.c. variability for the last 50 years





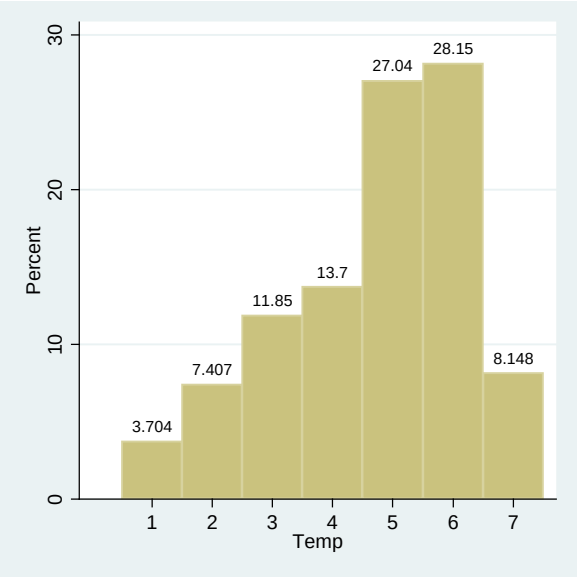
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var14c	262	3.37	0.08	3.21	3.53

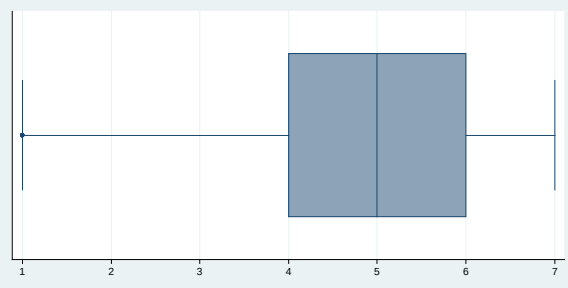
Question #	1996	2003	2008
	-	-	-

15. Concerning *TEMPERATURE VALUES*, how would you rate the ability of *GLOBAL* models to simulate

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

15.a. mean values for the *next 10 years*

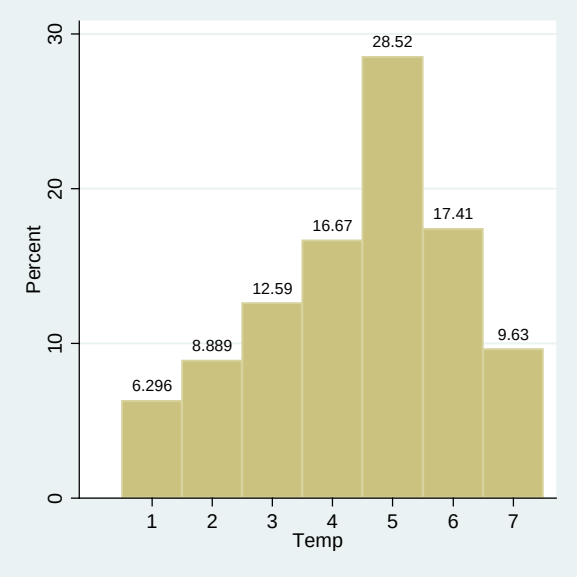


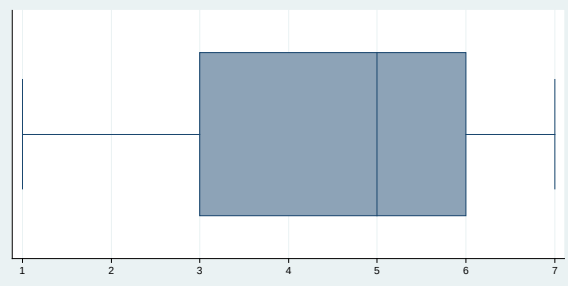


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var15a	270	4.70	0.09	4.51	4.89

Question #	1996	2003	2008
	-	-	16d

15.b. trends for the *next 10 years*

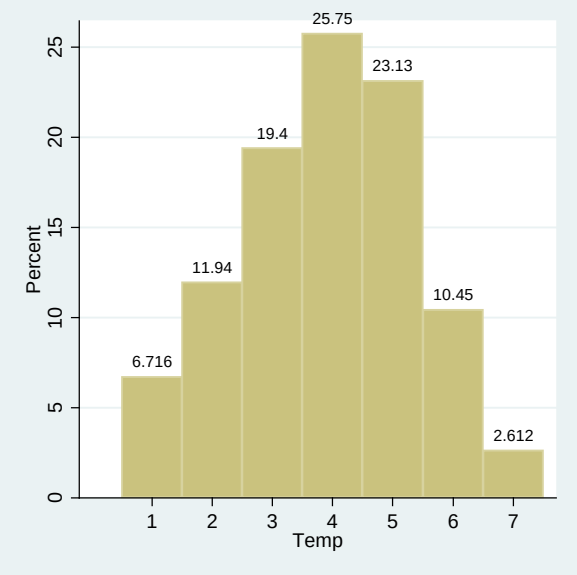


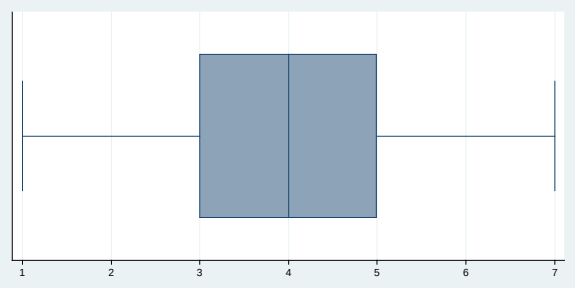


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var15b	270	4.43	0.10	4.23	4.63

Question #	1996	2003	2008
	-	-	-

15.c. variability for the *next 10 years*

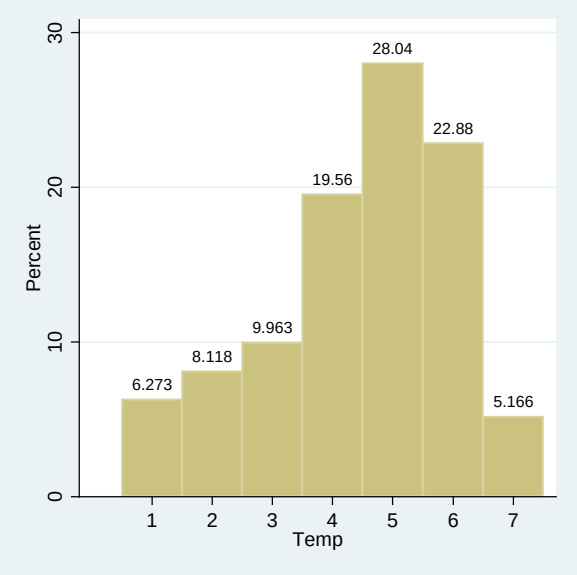


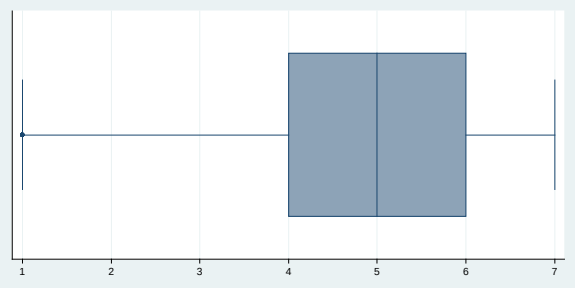


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var15c	268	3.88	0.09	3.71	4.06

Question #	1996	2003	2008
	-	-	-

15.d. mean values for the *next 50 years*

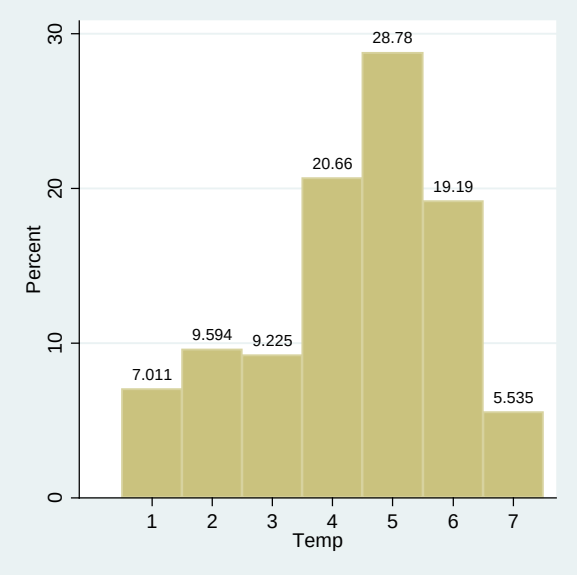


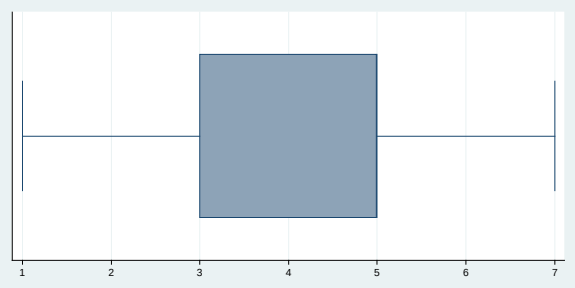


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var15d	271	4.44	0.10	4.26	4.63

Question #	1996	2003	2008
	-	-	16e

15.e. trends for the *next 50 years*

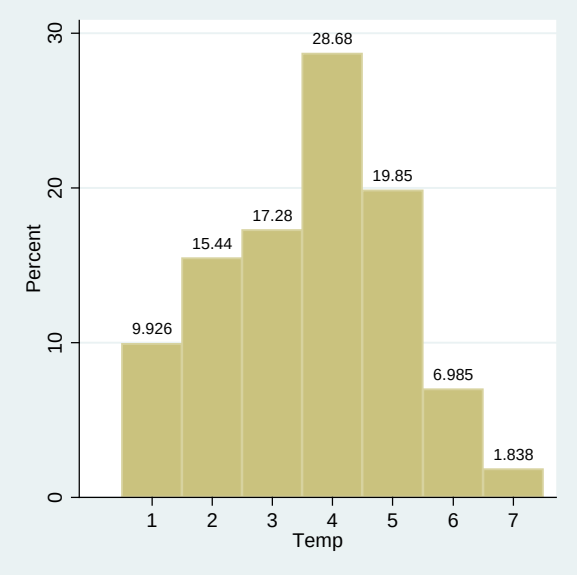


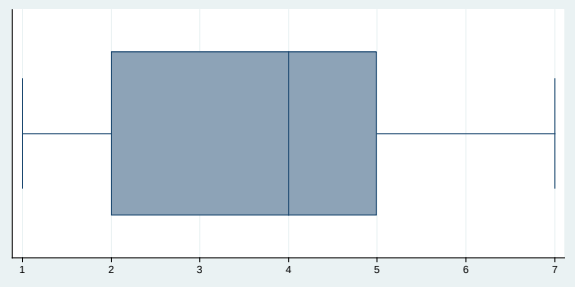


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var15e	271	4.34	0.10	4.15	4.53

Question #	1996	2003	2008
	-	-	-

15.f. variability for the *next 50 years*





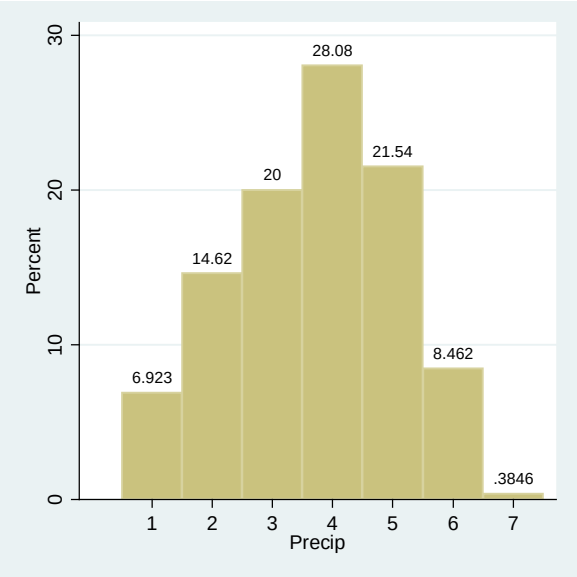
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var15f	272	3.61	0.09	3.44	3.79

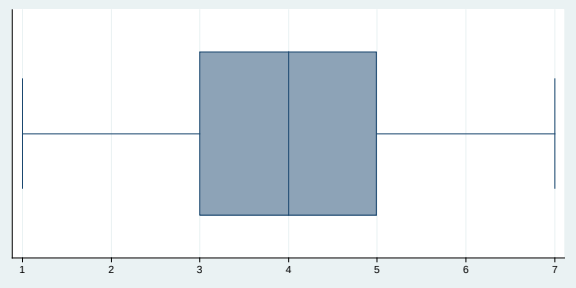
Question #	1996	2003	2008
	-	-	-

16. Concerning PRECIPITATION VALUES, how would you rate the ability of GLOBAL models to simulate

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

16.a. mean values for the *next 10 years*

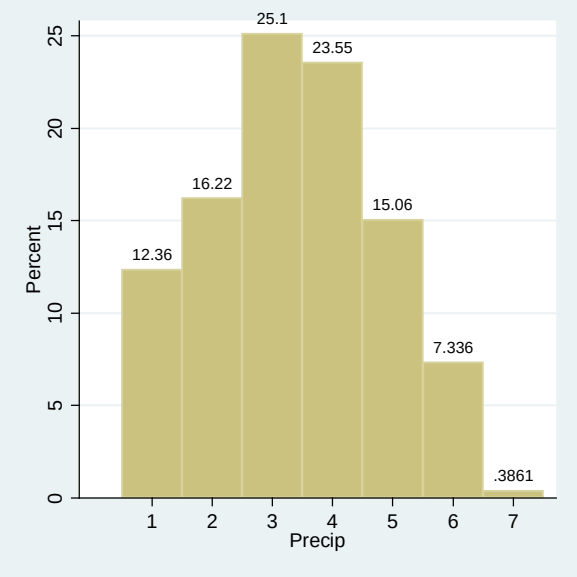


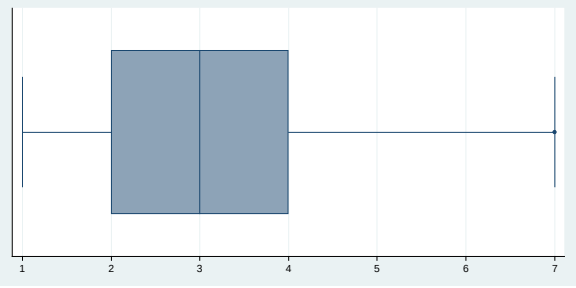


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var16a	260	3.70	0.09	3.53	3.86

Question #	1996	2003	2008
	-	-	16e

16.b. trends for the *next 10 years*

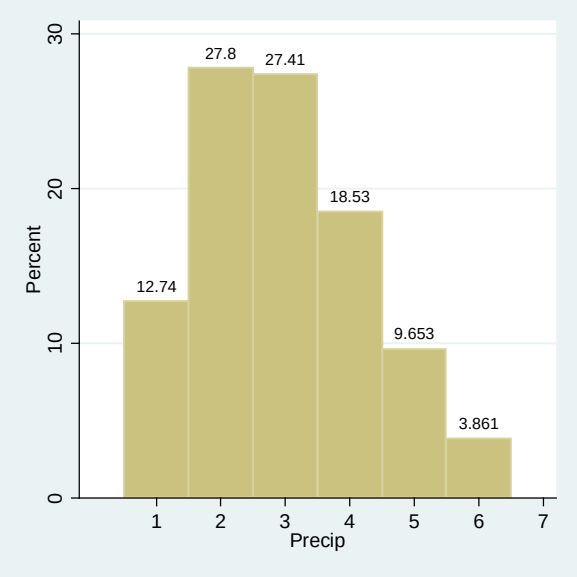


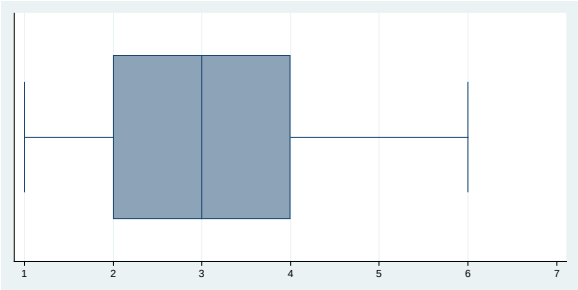


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var16b	259	3.36	0.09	3.19	3.54

Question #	1996	2003	2008
	-	-	-

16.c. variability for the *next 10 years*

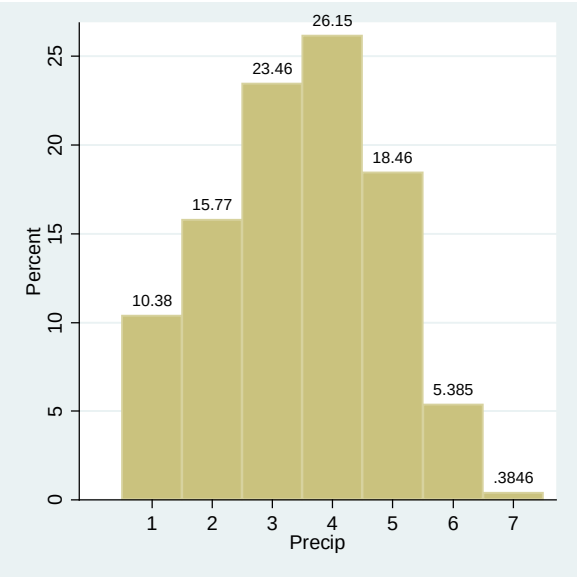


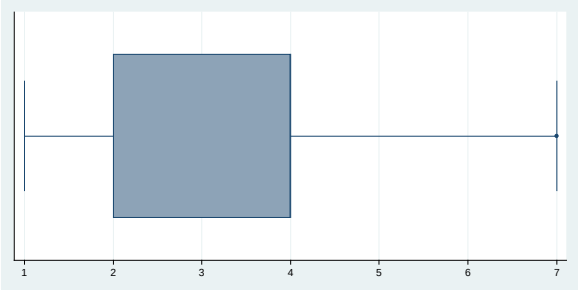


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var16c	259	2.96	0.08	2.80	3.12

	1996	2003	2008
Question #	-	-	-

16.d. mean values for the *next 50 years*

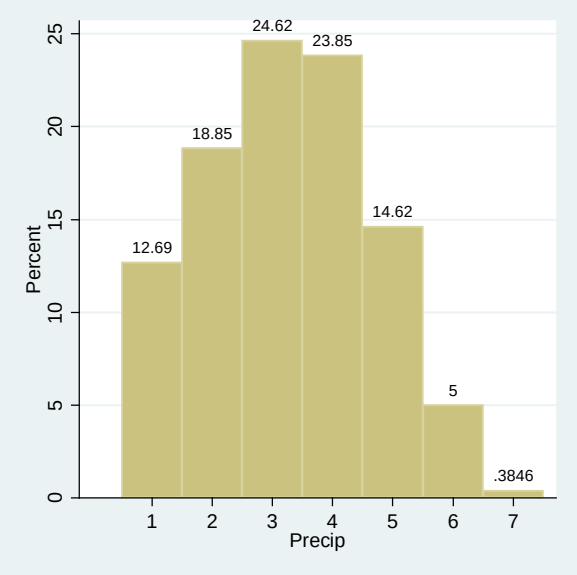


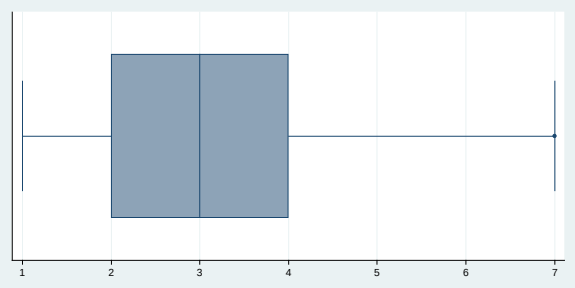


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var16d	260	3.44	0.09	3.27	3.61

	1996	2003	2008
Question #	-	-	16f

16.e. trends for the *next 50 years*

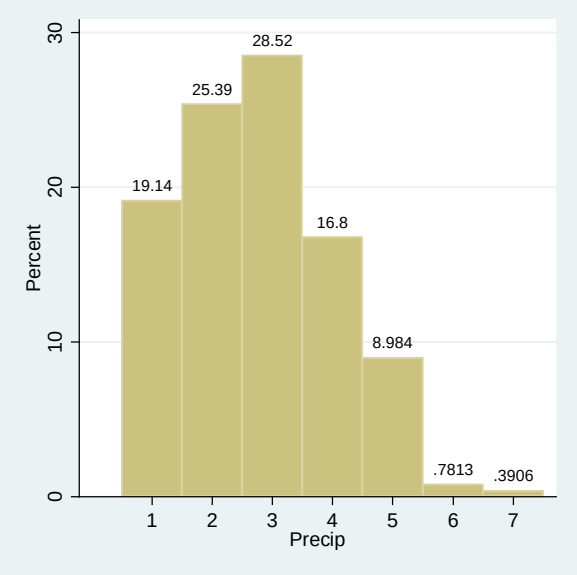


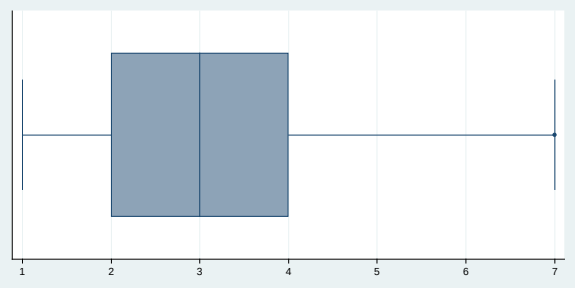


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var16e	260	3.25	0.09	3.08	3.43

Question #	1996	2003	2008
	-	-	-

16.f. variability for the *next 50 years*





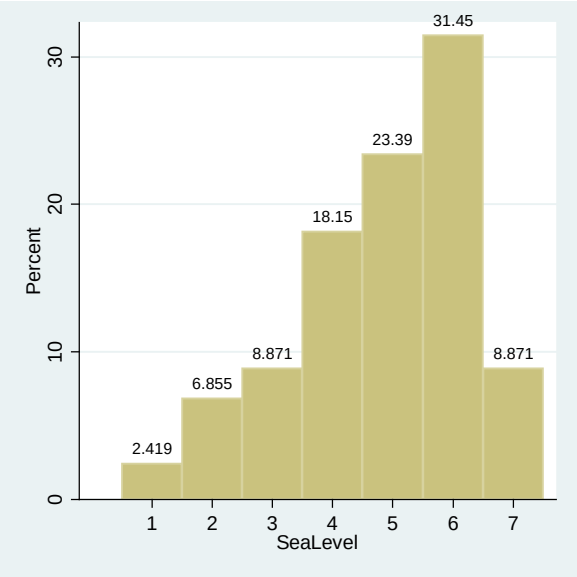
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var16f	256	2.75	0.08	2.59	2.91

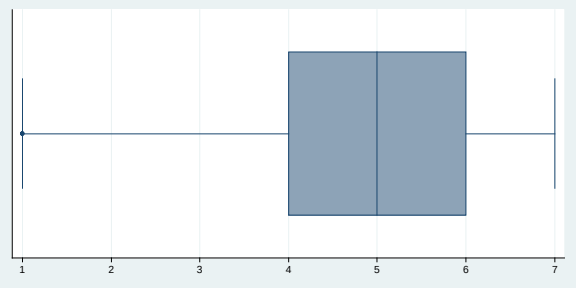
Question #	1996	2003	2008
	-	-	-

17. Concerning *SEA LEVEL RISE*, how would you rate the ability of *GLOBAL* models to simulate

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

17.a. mean values for the *next 10 years*

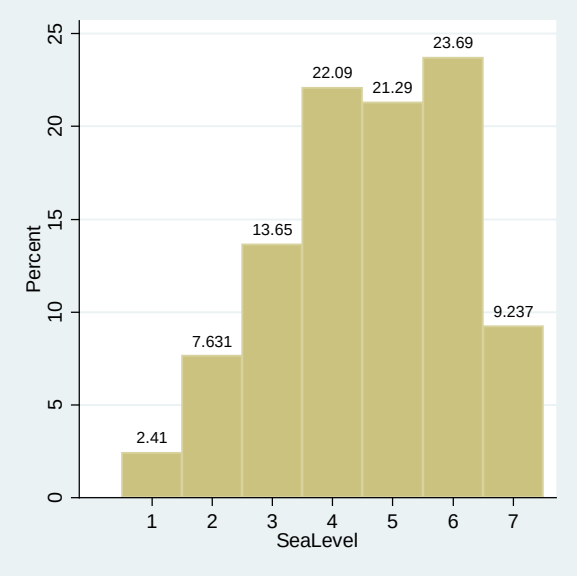


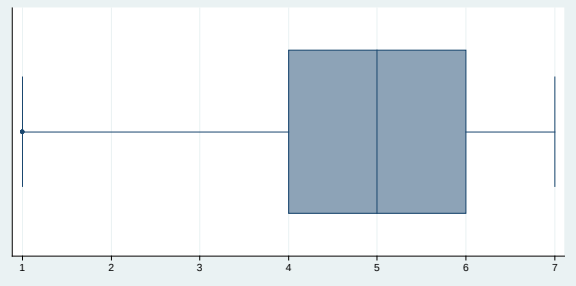


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var17a	248	4.83	0.09	4.65	5.02

Question #	1996	2003	2008
	-	-	16g

17.b. trends for the *next 10 years*

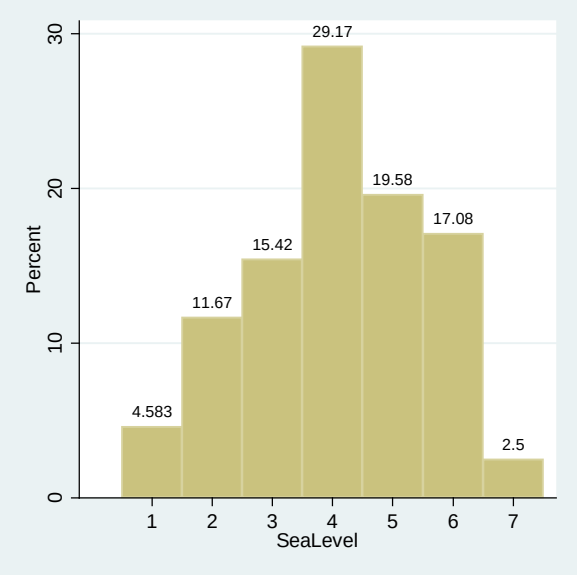


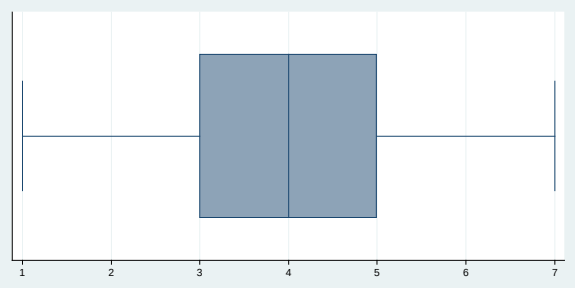


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var17b	249	4.60	0.10	4.41	4.79

Question #	1996	2003	2008
	-	-	-

17.c. variability for the *next 10 years*

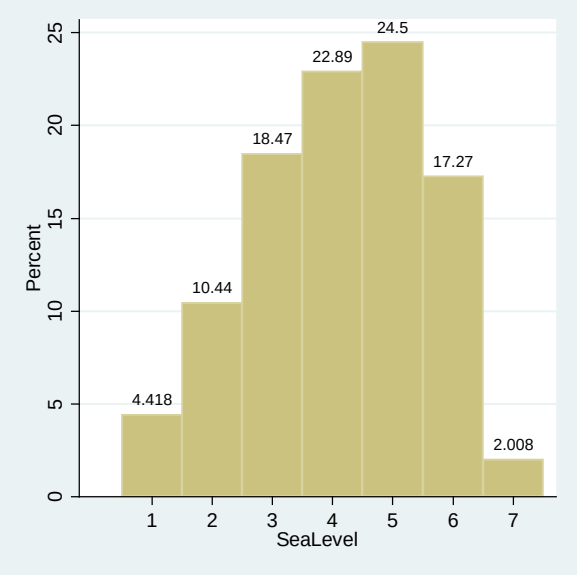


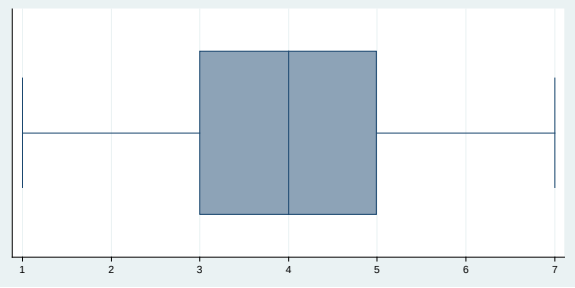


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var17c	240	4.09	0.09	3.90	4.27

Question #	1996	2003	2008
	-	-	-

17.d. mean values for the *next 50 years*

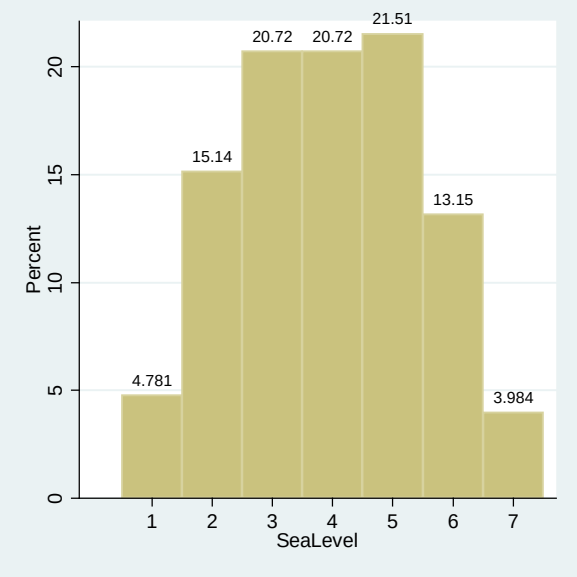


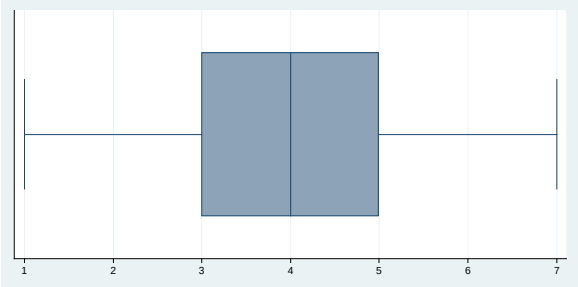


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var17d	249	4.12	0.09	3.94	4.31

Question #	1996	2003	2008
	-	-	16h

17.e. trends for the *next 50 years*

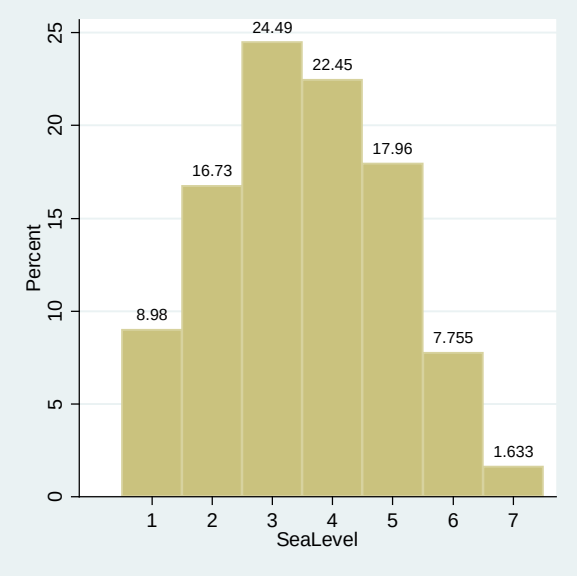


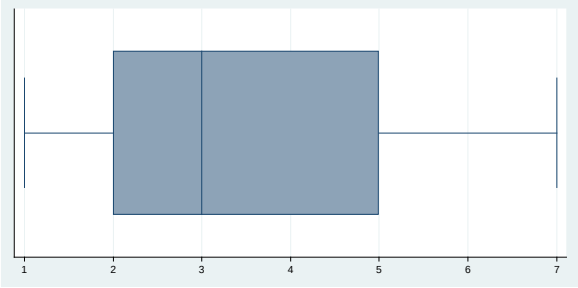


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var17e	251	3.94	0.10	3.75	4.13

Question #	1996	2003	2008
	-	-	-

17.f. variability for the *next 50 years*





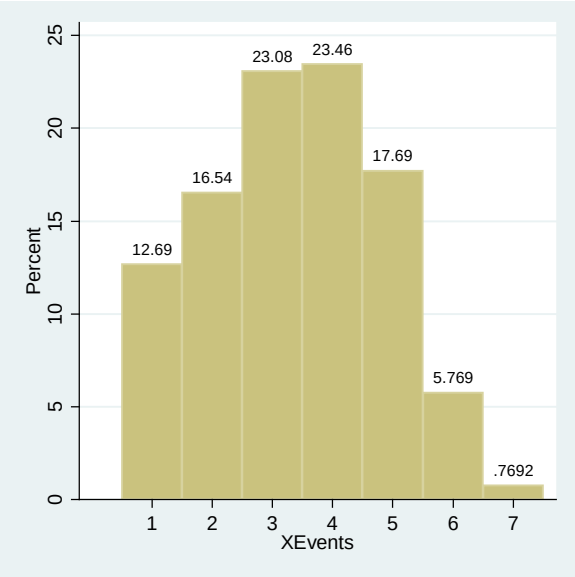
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var17f	245	3.53	0.09	3.35	3.72

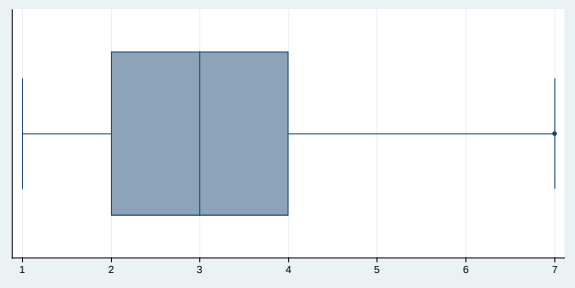
Question #	1996	2003	2008
	-	-	-

18. Concerning *EXTREME EVENTS*, how would you rate the ability of *GLOBAL* models to simulate

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

18.a. mean values for the *next 10 years*

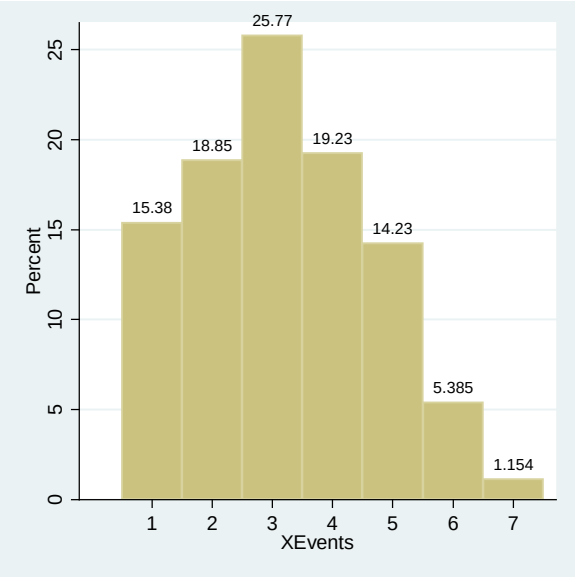


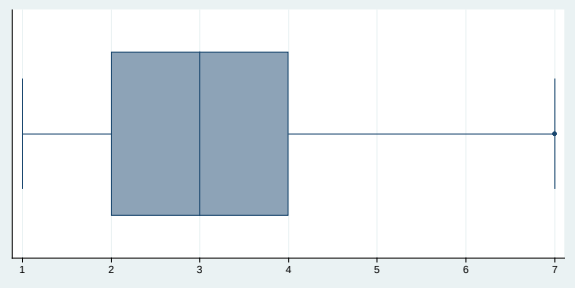


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var18a	260	3.37	0.09	3.19	3.55

Question #	1996	2003	2008
	-	-	16i

18.b. trends for the *next 10 years*

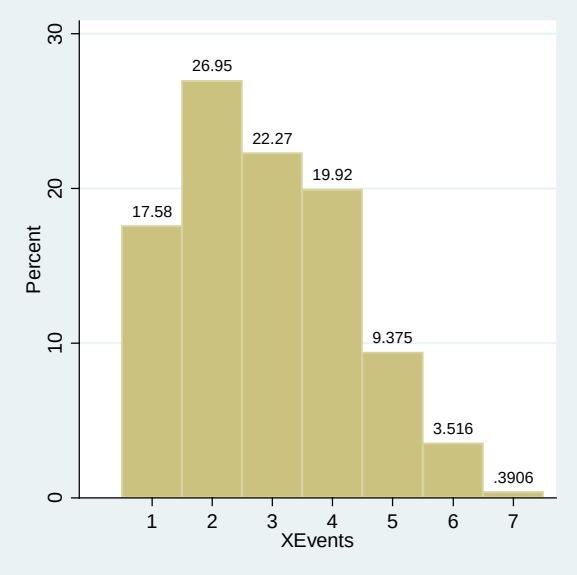


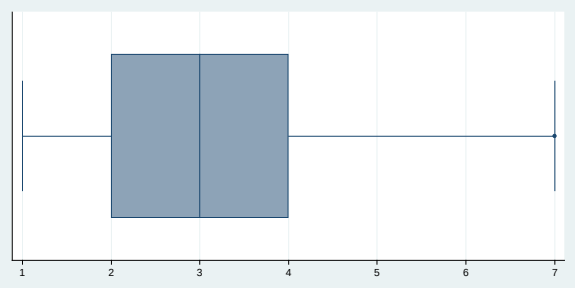


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var18b	260	3.19	0.09	3.01	3.37

Question #	1996	2003	2008
	-	-	-

18.c. variability for the *next 10 years*

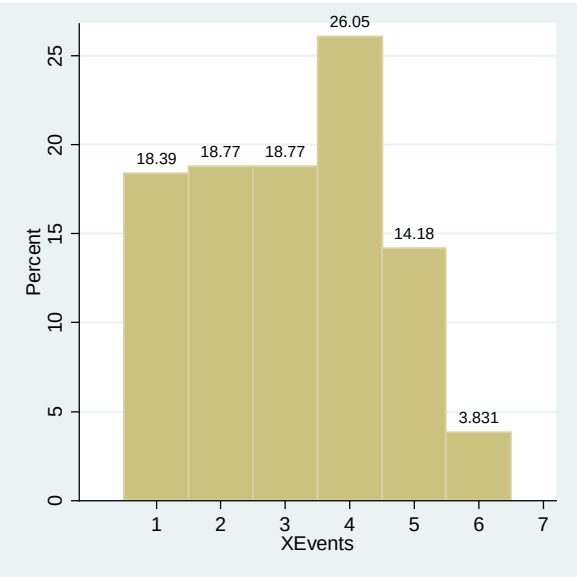


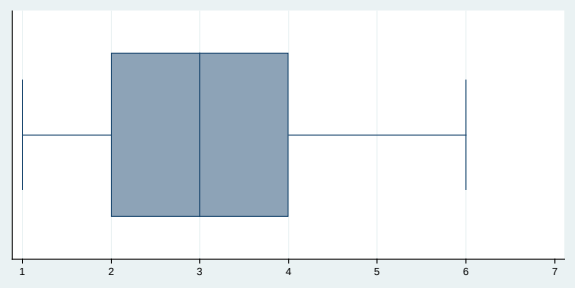


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var18c	256	2.89	0.09	2.72	3.06

Question #	1996	2003	2008
	-	-	-

18.d. mean values for the *next 50 years*

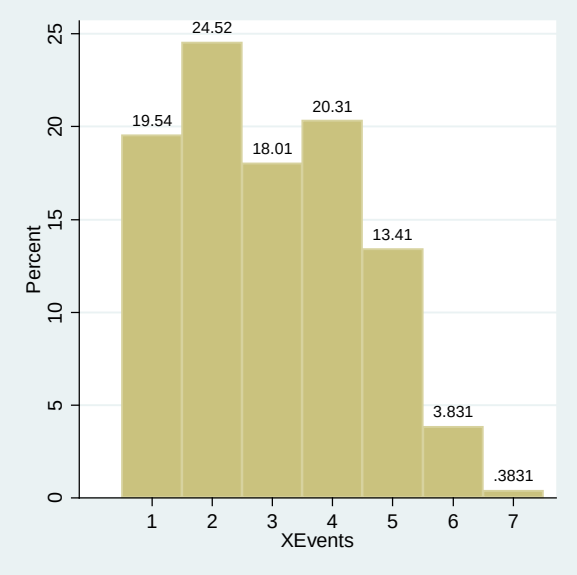


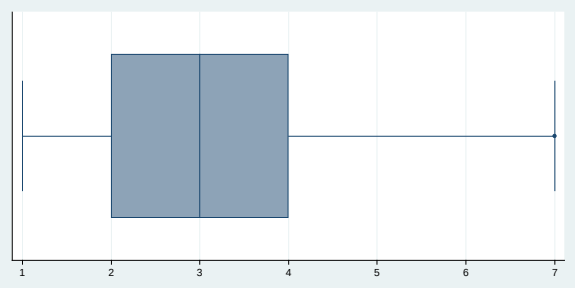


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var18d	261	3.10	0.09	2.93	3.28

Question #	1996	2003	2008
	-	-	16j

18.e. trends for the *next 50 years*

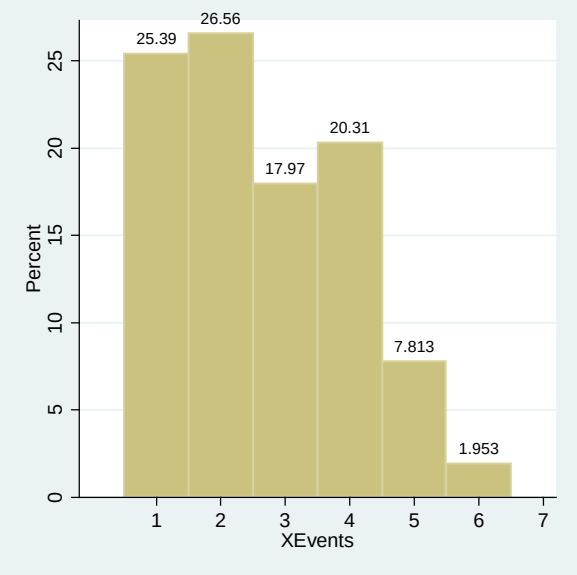


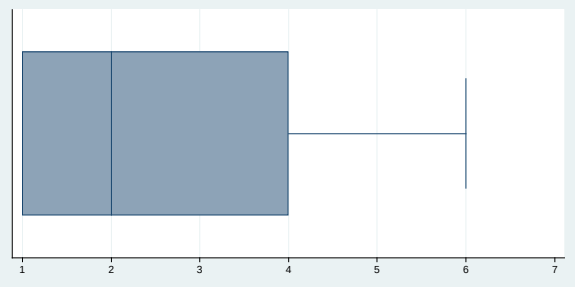


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var18e	261	2.97	0.09	2.79	3.15

Question #	1996	2003	2008
	-	-	-

18.f. variability for the *next 50 years*





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var18f	256	2.64	0.09	2.48	2.81

Question #	1996	2003	2008
	-	-	-

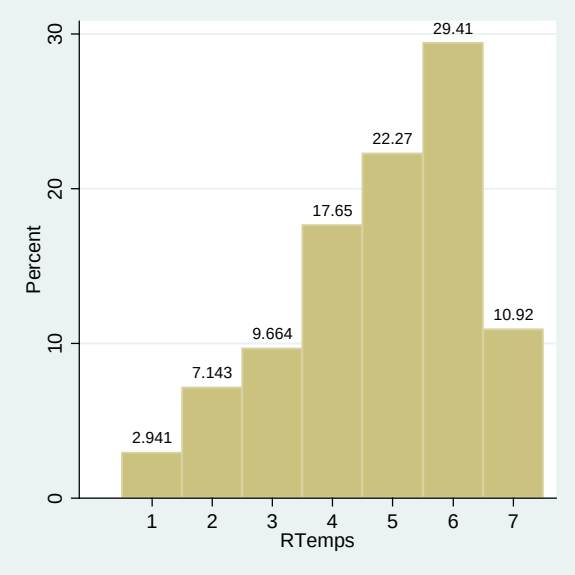
Ability of Regional Models

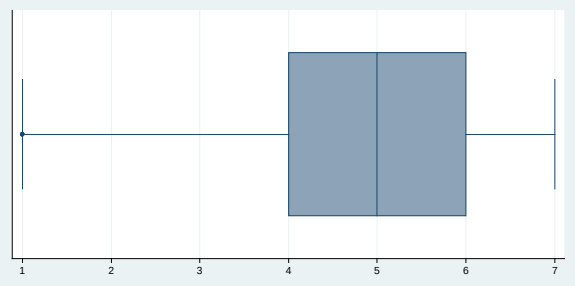
With the emphasis on regional adaptation comes the need for regional models. The same set of questions as asked concerning the abilities of global models was also asked for regional models. The assessment of regional model ability to simulate aspects of temperature for the next 10 and the next 50 years is only marginally lower than the assessment given for global models. Concerning precipitation, the assessments almost duplicate each other. Concerning sea level rise, the regional model ability to simulate 10 and 50 year projections of regional sea level rise is estimated to be much worse than the ability of the global model. The assessment of ability to simulate extreme events is all but equal for global and regional models. Finally, climate scientists expressed an opinion on the difficulty of determining local climate change, suggesting that it is not very easy.

19. Concerning *TEMPERATURE OBSERVATION*, how would you rate the ability of *REGIONAL* models to reproduce

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

19.a. mean values for the last 50 years

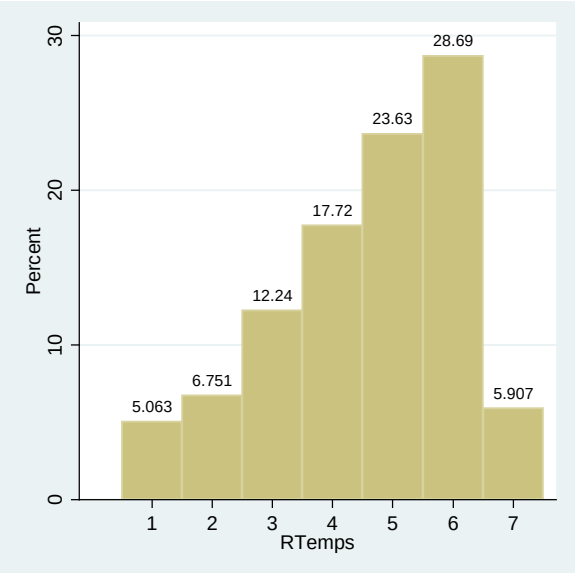


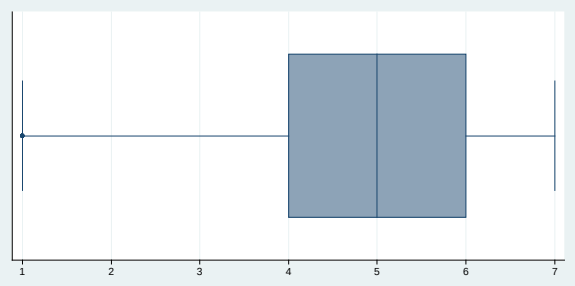


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var19a	238	4.81	0.10	4.61	5.01

Question #	1996	2003	2008
	-	-	-

19.b. trends for the last 50 years

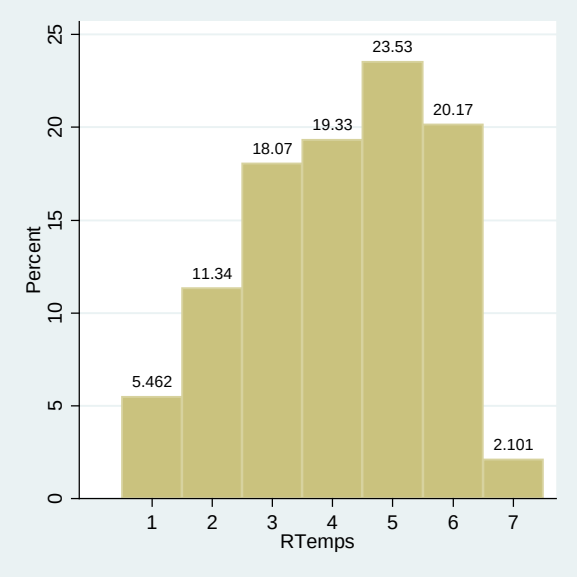


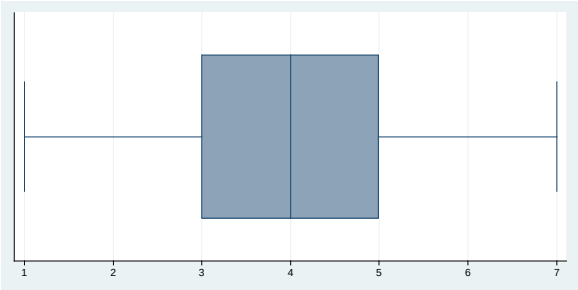


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var19b	237	4.58	0.10	4.38	4.78

Question #	1996	2003	2008
	-	-	-

19.c. variability for the last 50 years





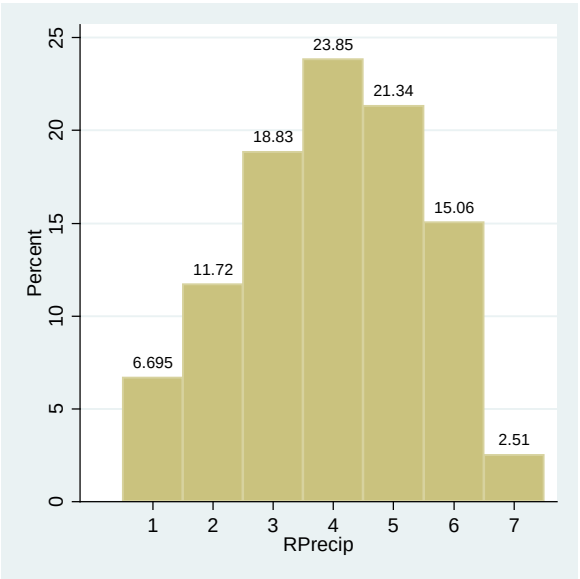
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var19c	238	4.13	0.10	3.93	4.33

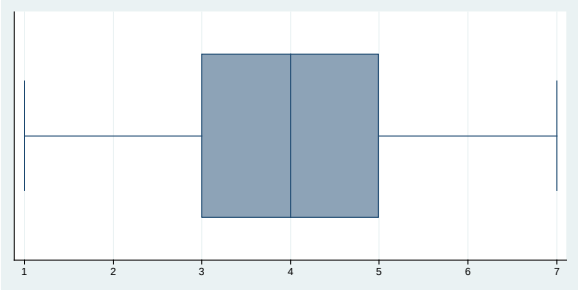
Question #	1996	2003	2008
	-	-	-

20. Concerning *PRECIPITATION OBSERVATION*, how would you rate the ability of *REGIONAL* models to reproduce

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

20.a. mean values for the last 50 years

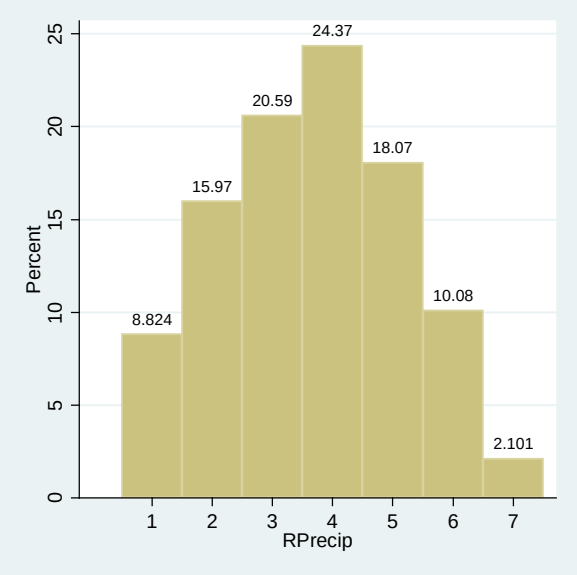


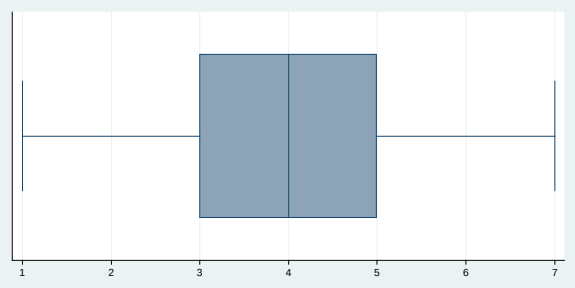


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var20a	239	3.97	0.10	3.77	4.16

Question #	1996	2003	2008
	-	-	-

20.b. trends for the last 50 years

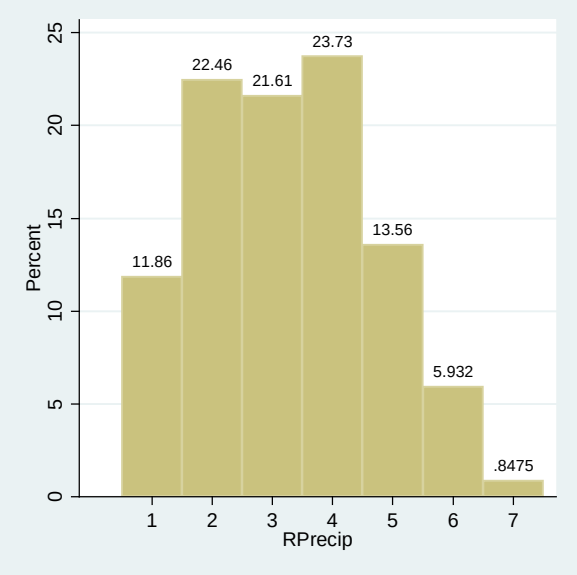


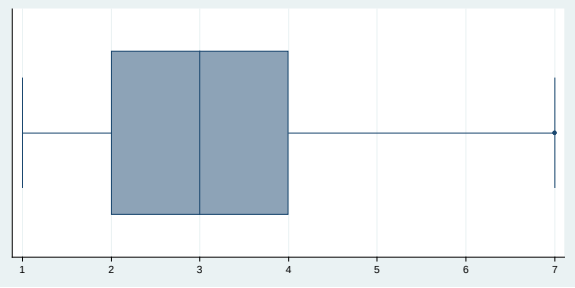


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var20b	238	3.66	0.10	3.46	3.85

Question #	1996	2003	2008
	-	-	-

20.c. variability for the last 50 years





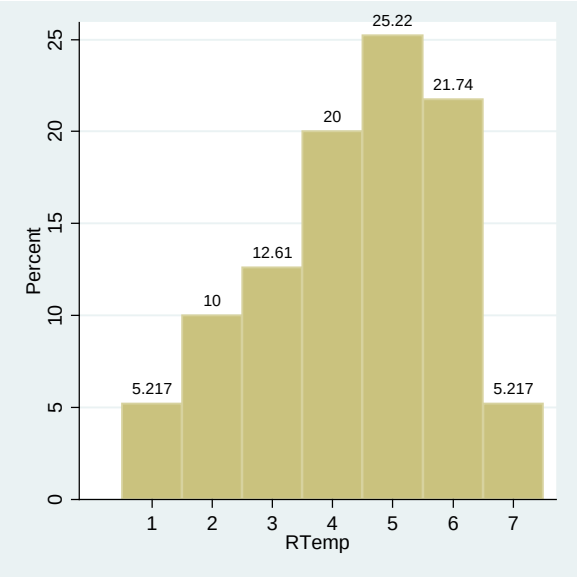
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var20c	236	3.26	0.09	3.07	3.44

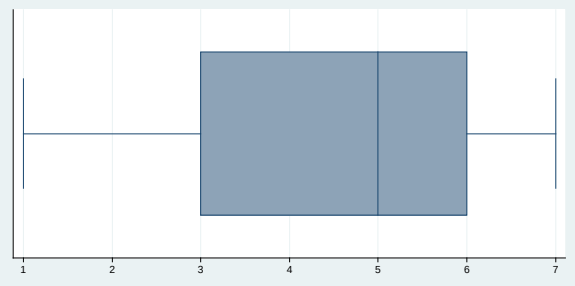
Question #	1996	2003	2008
	-	-	-

21. Concerning *TEMPERATURE*, how would you rate the ability of *REGIONAL* models to simulate

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

21.a. mean values for the *next 10 years*

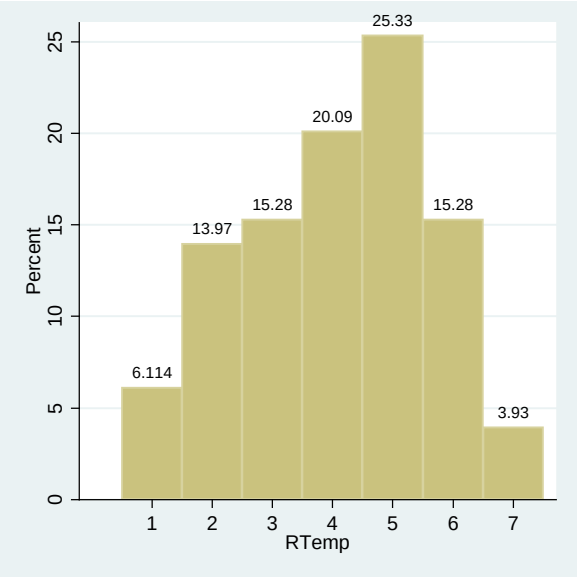


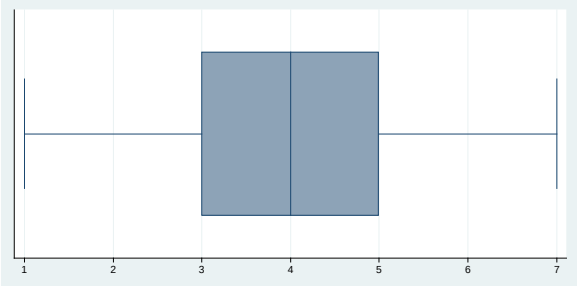


Mean	Variable	Obs	Std. Err.	[95% Conf.	Interval]
4.36	var21a	230	0.10	4.16	4.56

Question #	1996	2003	2008
	-	-	-

21.b. trends for the *next 10 years*

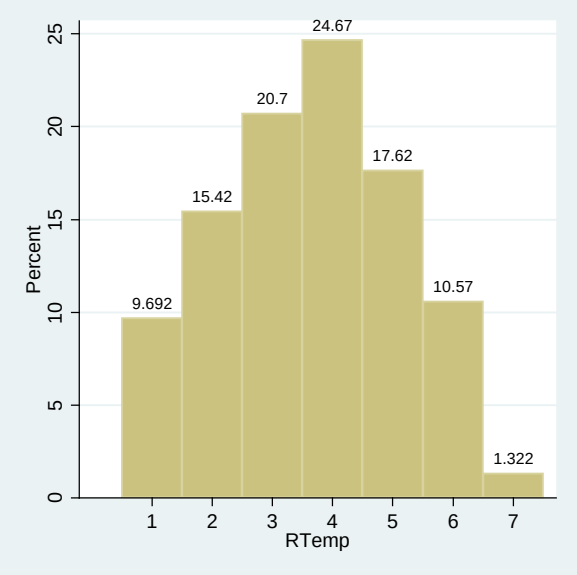


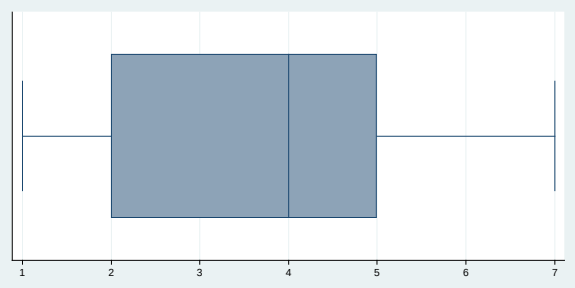


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var21b	229	4.06	0.10	3.86	4.27

Question #	1996	2003	2008
	-	-	-

21.c. variability for the *next 10 years*

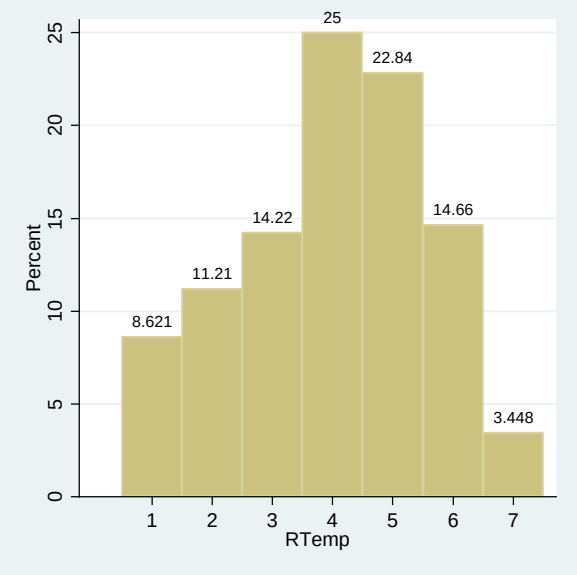


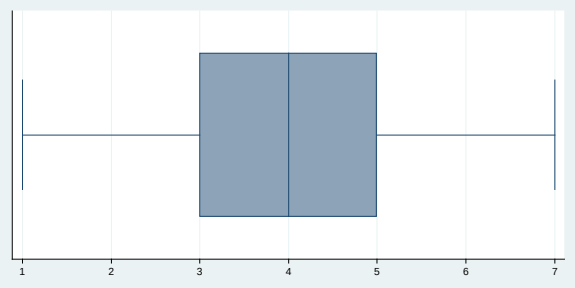


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var21c	227	3.62	0.10	3.42	3.82

Question #	1996	2003	2008
	-	-	-

21.d. mean values for the *next 50 years*

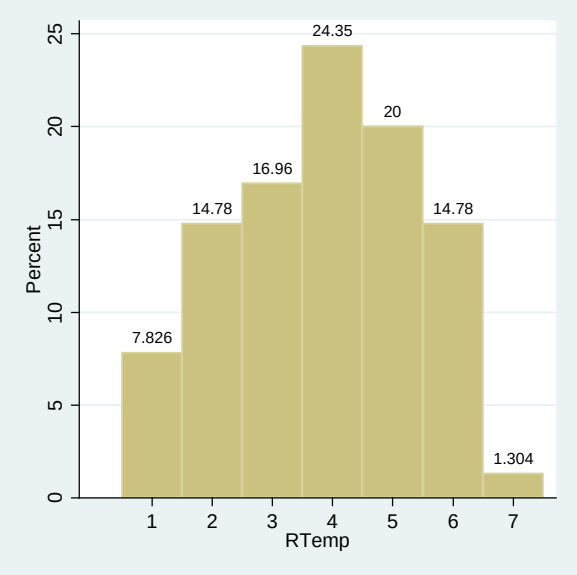


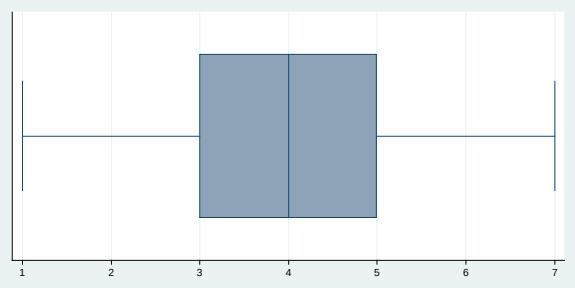


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var21d	232	4.00	0.10	3.80	4.20

Question #	1996	2003	2008
	-	-	-

21.e. trends for the *next 50 years*

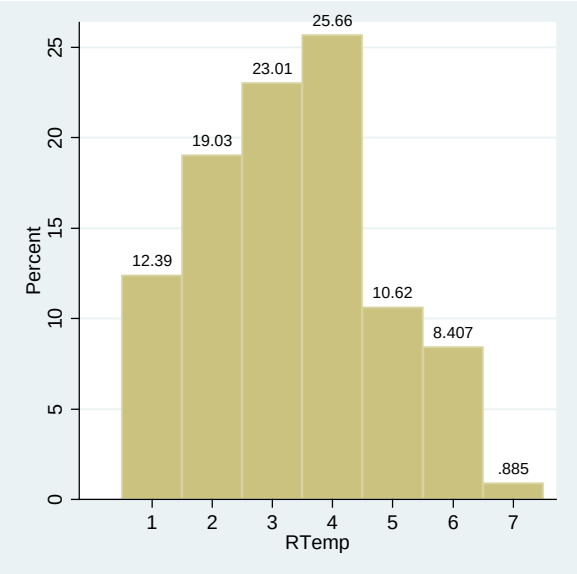


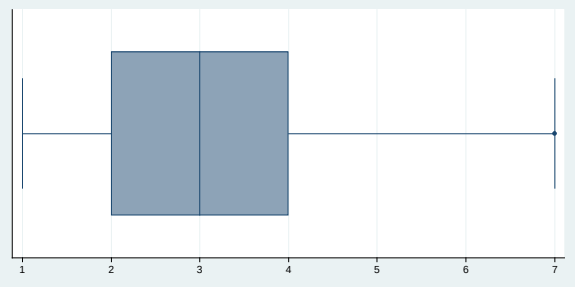


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var21e	230	3.83	0.10	3.64	4.03

Question #	1996	2003	2008
	-	-	-

21.f. variability for the *next 50 years*





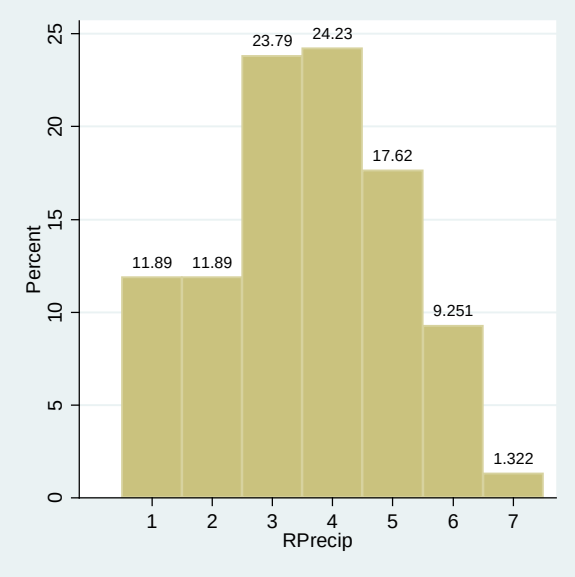
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var21f	226	3.32	0.10	3.13	3.51

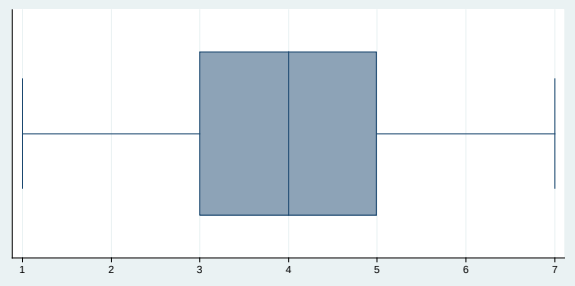
Question #	1996	2003	2008
	-	-	-

22. Concerning *PRECIPITATION*, how would you rate the ability of *REGIONAL* models to simulate

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

22.a. mean values for the *next 10 years*

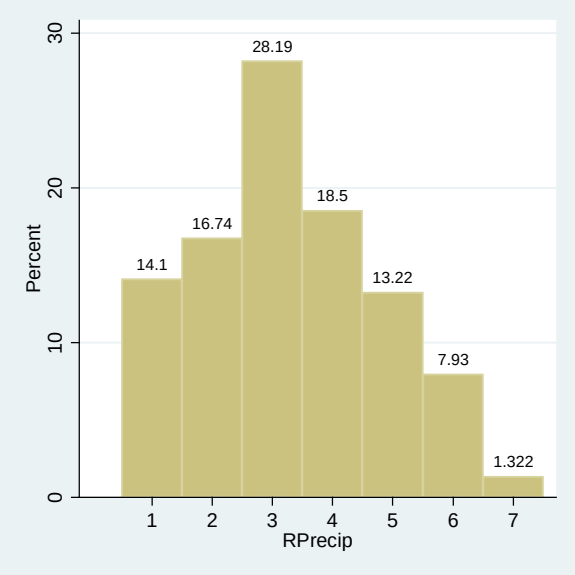


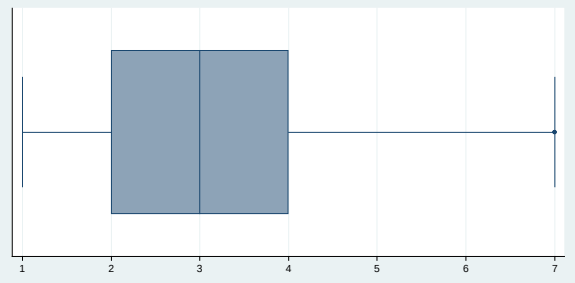


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var22a	227	3.57	0.10	3.37	3.77

Question #	1996	2003	2008
	-	-	-

22.b. trends for the *next 10 years*

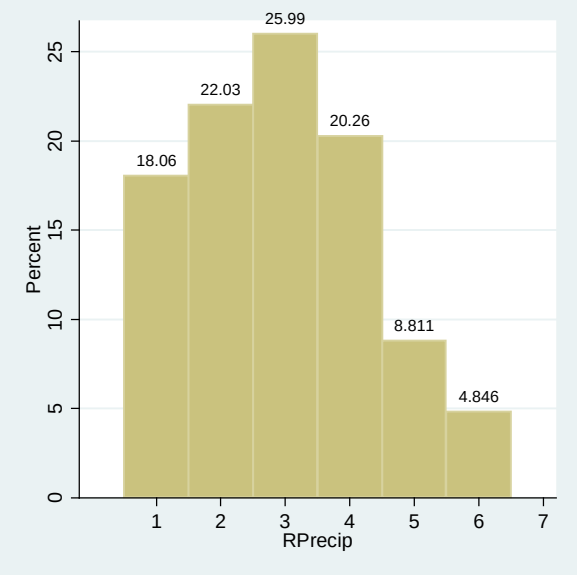


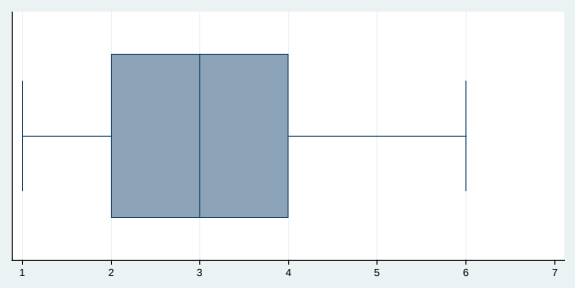


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var22b	227	3.29	0.10	3.09	3.49

Question #	1996	2003	2008
	-	-	-

22.c. variability for the *next 10 years*

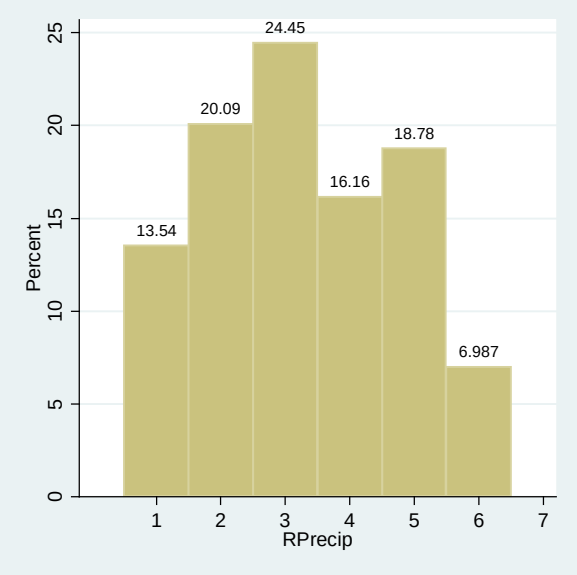


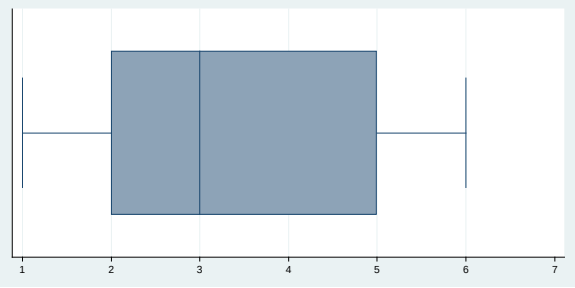


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var22c	227	2.94	0.09	2.76	3.12

Question #	1996	2003	2008
	-	-	-

22.d. mean values for the *next 50 years*

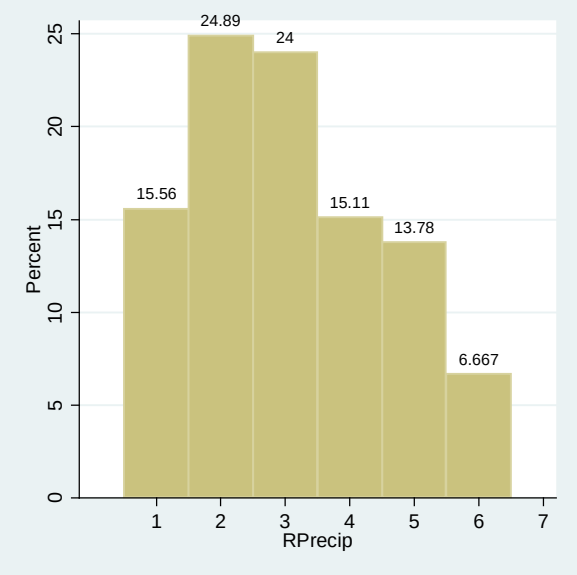


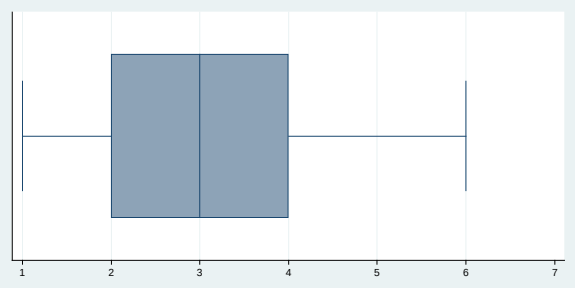


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var22d	229	3.28	0.10	3.08	3.47

Question #	1996	2003	2008
	-	-	-

22.e. trends for the *next 50 years*

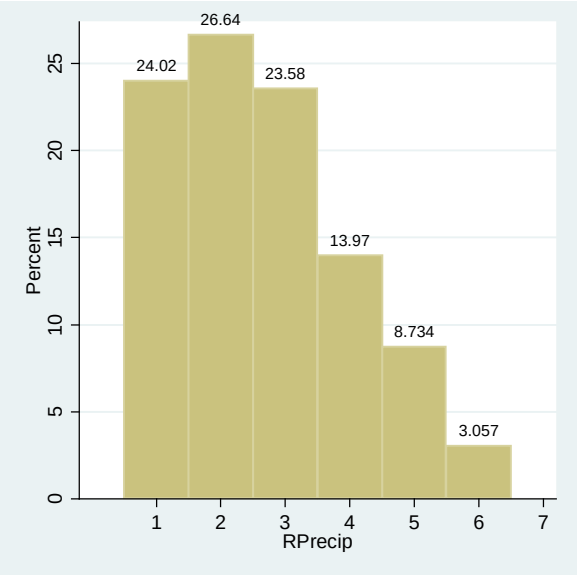


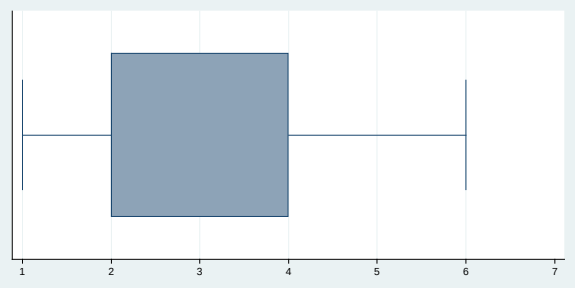


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var22e	225	3.07	0.10	2.87	3.26

Question #	1996	2003	2008
	-	-	-

22.f. variability for the next 50 years





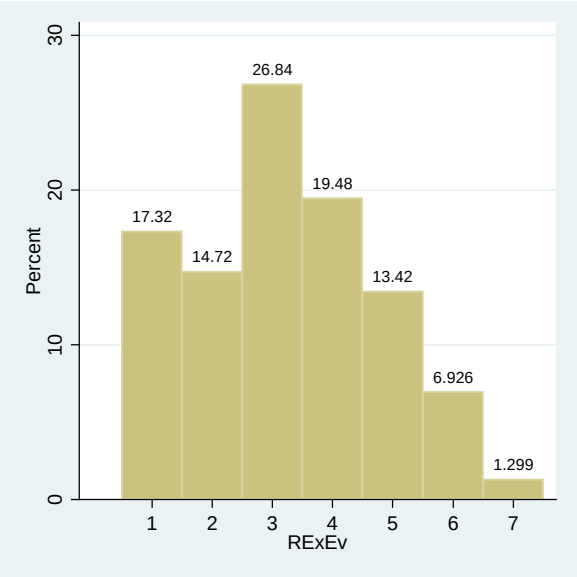
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var22f	229	2.66	0.09	2.48	2.84

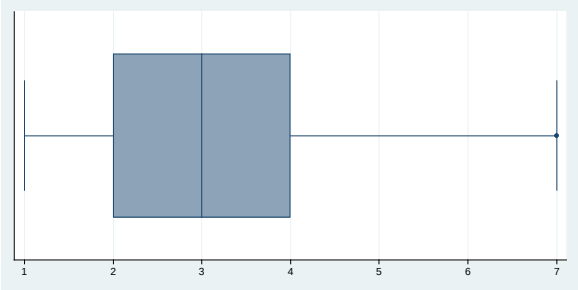
Question #	1996	2003	2008
	-	-	-

23. Concerning *EXTREME EVENTS*, how would you rate the ability of *REGIONAL* models to simulate

very poor						*very good*
1	*2*	*3*	*4*	*5*	*6*	*7*

23.a. mean values for the *next 10 years*

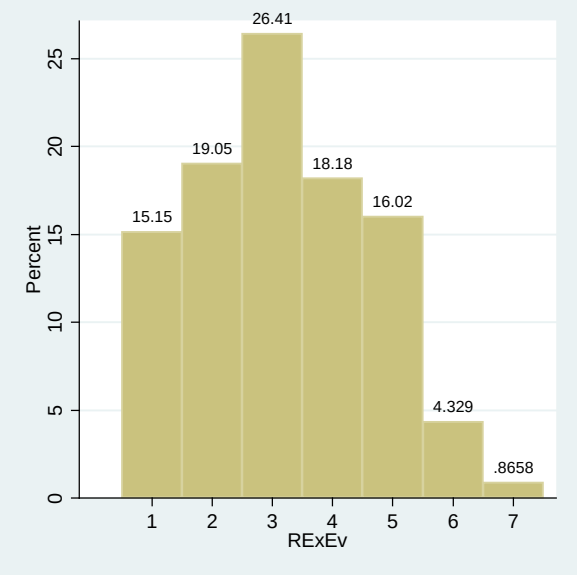


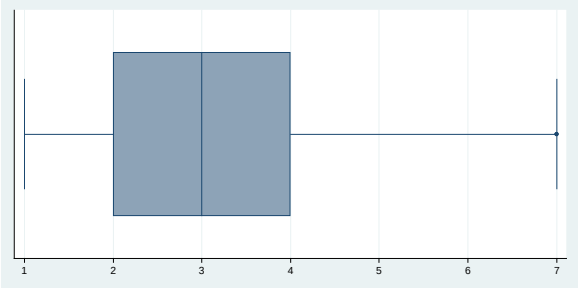


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var23a	231	3.23	0.10	3.03	3.43

Question #	1996	2003	2008
	-	-	-

23.b. trends for the *next 10 years*

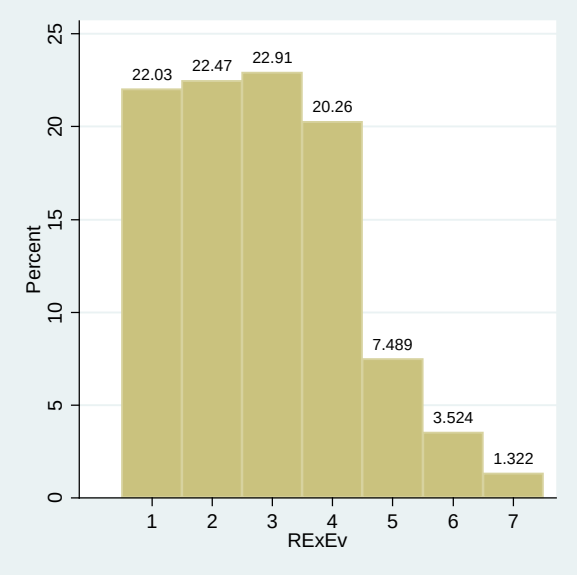


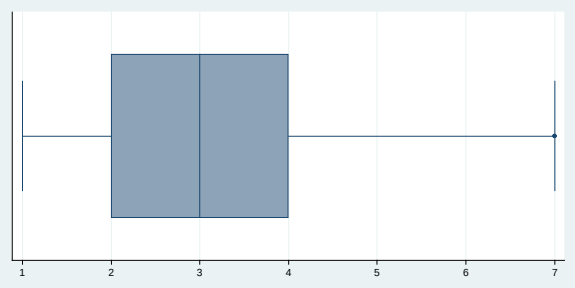


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var23b	231	3.17	0.10	2.98	3.36

Question #	1996	2003	2008
	-	-	-

23.c. variability for the *next 10 years*

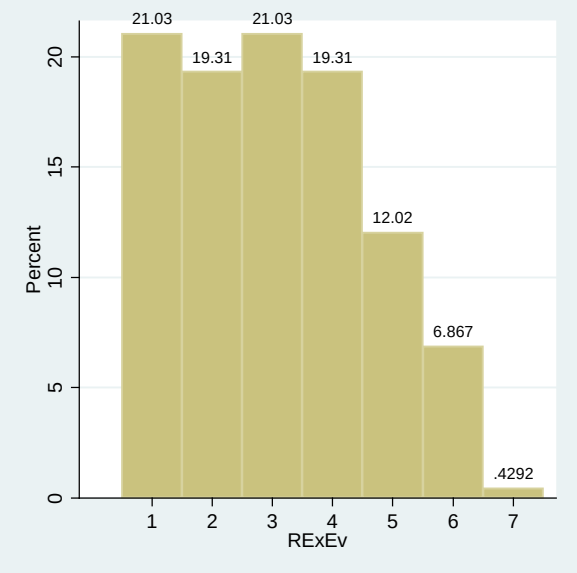


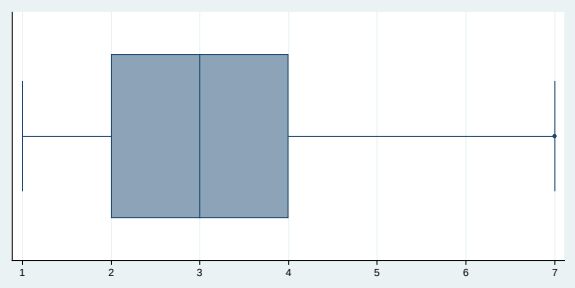


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var23c	227	2.85	0.10	2.66	3.04

Question #	1996	2003	2008
	-	-	-

23.d. mean values for the *next 50 years*

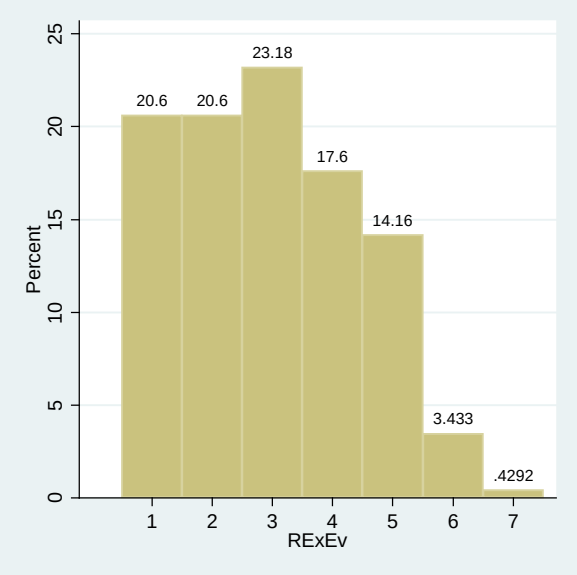


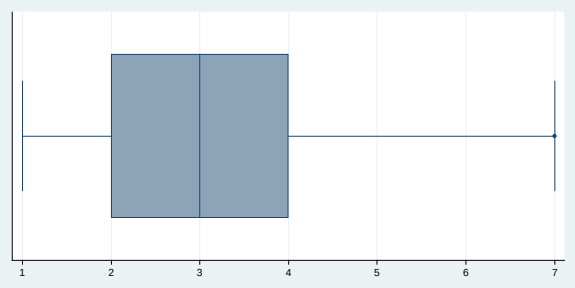


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var23d	233	3.04	0.10	2.84	3.24

Question #	1996	2003	2008
	-	-	-

23.e. trends for the *next 50 years*

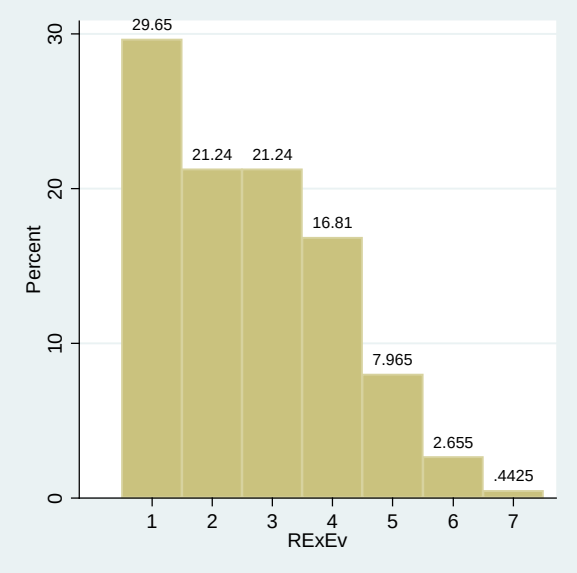


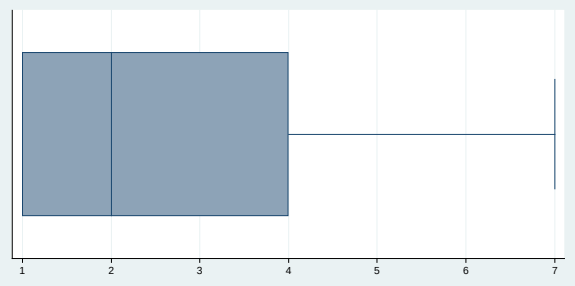


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var23e	233	2.96	0.10	2.77	3.15

Question #	1996	2003	2008
	-	-	-

23.f. variability for the *next 50 years*



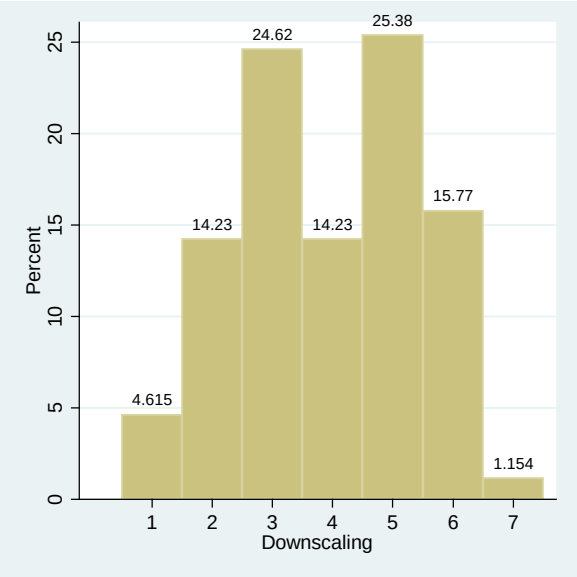


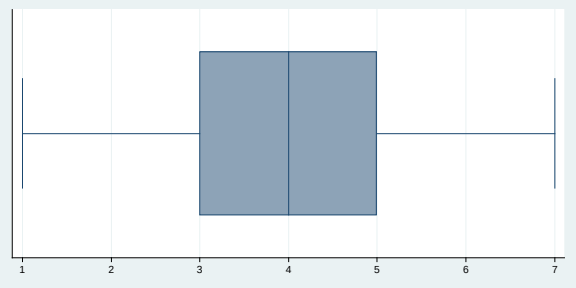
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var23f	226	2.62	0.10	2.43	2.81

Question #	1996	2003	2008
	-	-	-

24. To what degree do you think that, through the process of downscaling, it is possible to determine local climate change?

not at all						*very much*
1	*2*	*3*	*4*	*5*	*6*	*7*





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var24	260	3.93	0.09	3.75	4.12

Question #	1996	2003	2008
	-	-	-

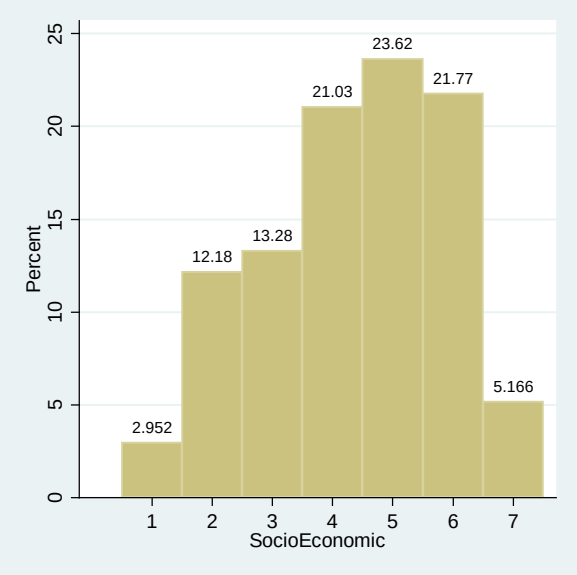
Timing and Impacts

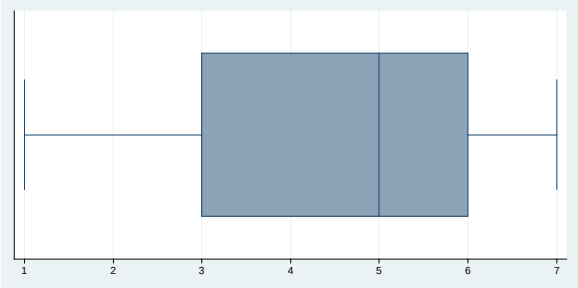
In this section, some of the questions are beyond the expertise of climate scientists and so, simply represent their subjective opinion. Most climate scientists who responded, for example think that a fairly explicit account of the detrimental effects that climate change will have on society is possible. More in their realm of expertise nearly all climate scientists, with the exception of a few outliers, are convinced that climate change, whether attributed to natural phenomena or anthropogenic causes, is happening now, and they are convinced that future or near future climate change is, or will be, a result of anthropogenic causes. The reader should keep in mind that this survey was conducted prior to the reports of the hiatus in warming temperatures. Again, exceeding their area of expertise, climate scientists were in almost unanimous agreement that climate change poses a very serious and dangerous threat to humanity and that we are now beginning to experience the more gradual impacts of climate change. (In previous surveys scientist were asked to distinguish if the same danger existed for the region in which they lived and the results indicated that the danger was always greater somewhere else.) Given that the more gradual impacts of climate change are perceived of as being currently evident, the same climate scientists were much less confident that it is possible to attribute recent climate related disasters to climate change, anthropogenic or otherwise. However, the majority of climate scientists participating in the survey would, to some degree, attribute human causes as the reason for rising temperatures.

25. To what degree can we explicitly state the detrimental effects that climate change will have on society?

not at all ***very much***

1 2 3 4 5 6 7





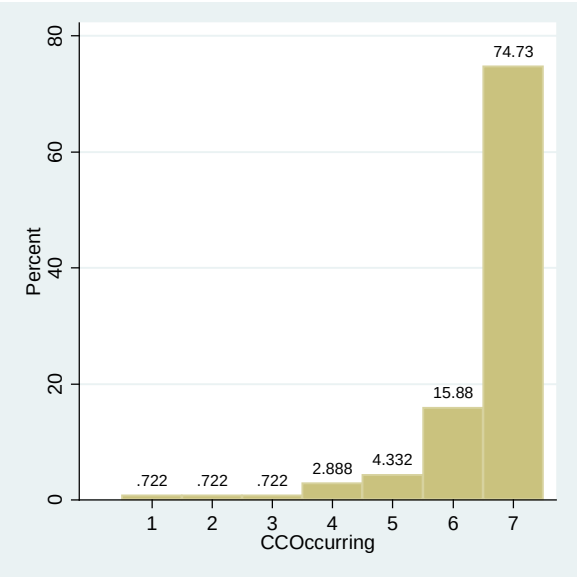
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var25	271	4.36	0.09	4.18	4.54

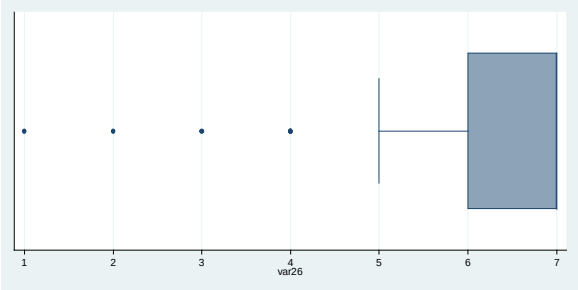
Question #	1996	2003	2008

26. How convinced are you that climate change, whether natural or anthropogenic, is occurring now?

not at all ***very much***

1 2 3 4 5 6 7





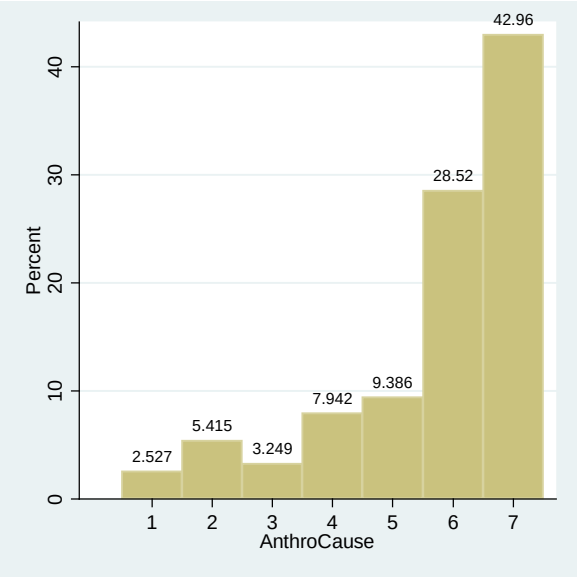
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var26	277	6.56	0.06	6.44	6.68

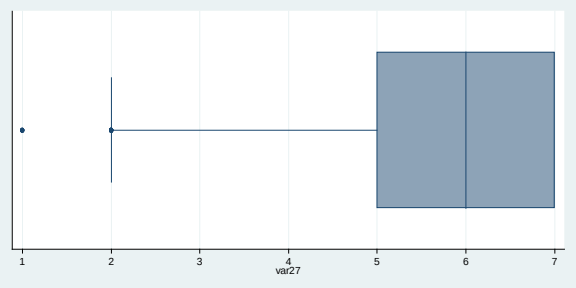
Question #	1996	2003	2008
	-	-	20

27. How convinced are you that most of recent or near future climate change is, or will be, a result of anthropogenic causes?

not at all ***very much***

1 2 3 4 5 6 7





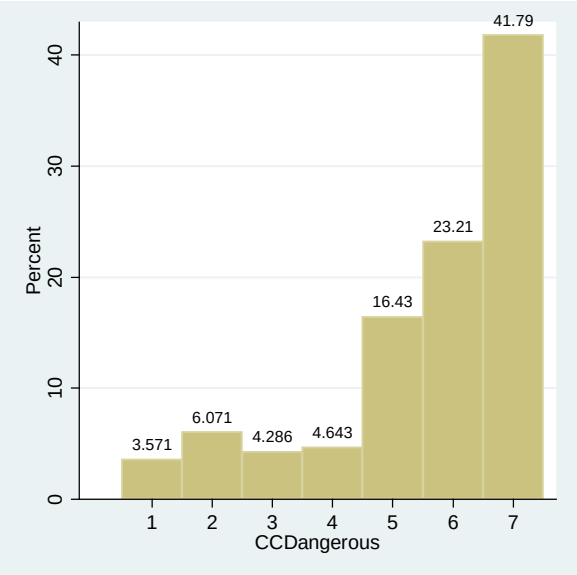
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var27	277	5.74	0.10	5.55	5.93

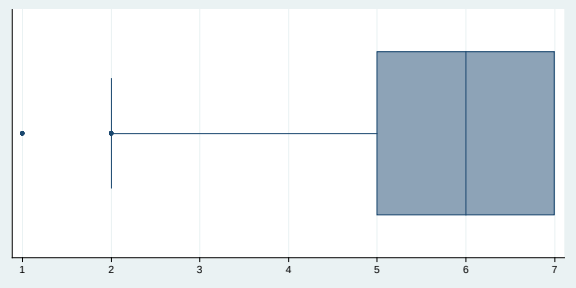
Question #	1996	2003	2008
	-	-	21

28. How convinced are you that climate change poses a very serious and dangerous threat to humanity?

not at all ***very much***

1 2 3 4 5 6 7





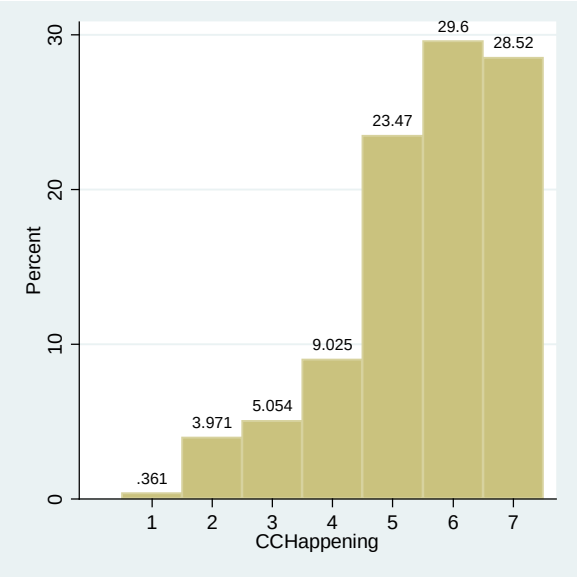
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var28	280	5.61	0.10	5.41	5.81

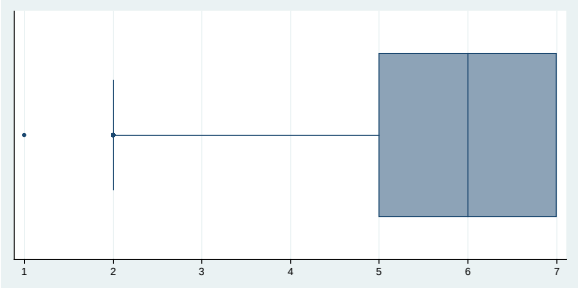
Question #	1996	2003	2008
	-	-	-

29. How much are we beginning to experience the more gradual impacts of climate change, anthropogenic or otherwise?

not at all ***very much***

1 2 3 4 5 6 7





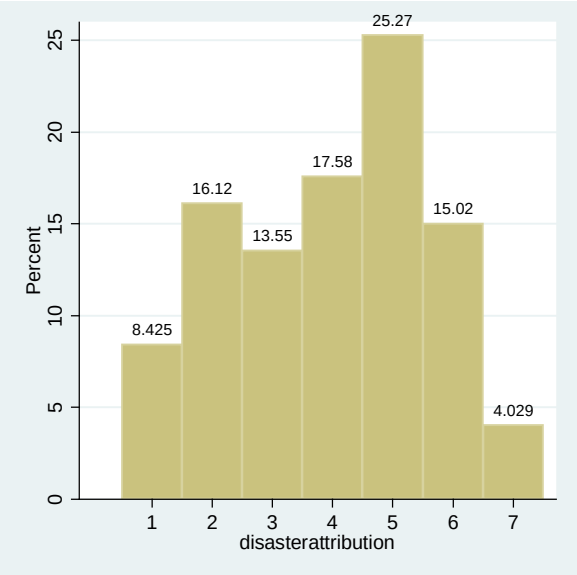
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var29	277	5.54	0.08	5.38	5.70

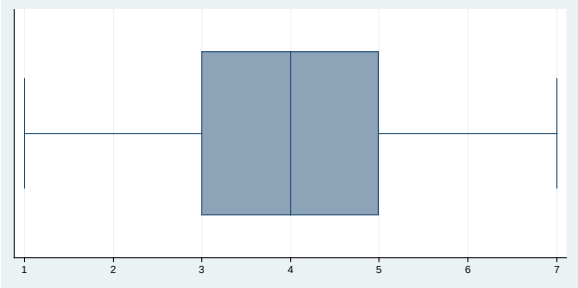
Question #	1996	2003	2008
	7	7	23

30. With how much certainty can we attribute recent climate related disasters to climate change (anthropogenic or otherwise)?

none ***very much***

1 2 3 4 5 6 7



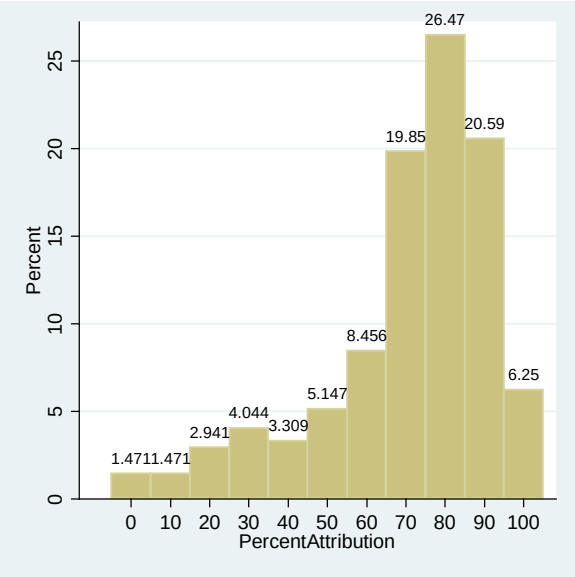


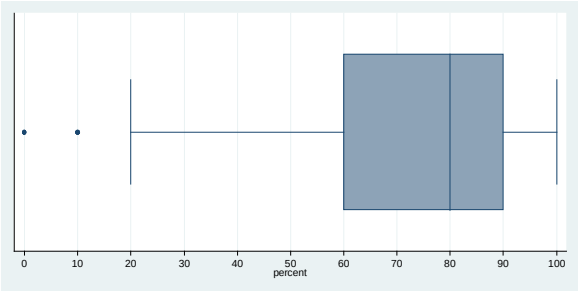
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var30	273	3.96	0.10	3.77	4.16

Question #	1996	2003	2008
	-	-	-

31. Since 1850, it is estimated that the world has warmed by 0.7 degrees C. Approximately what percent would you attribute to *human* causes?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% !00%





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var31	272	70.77	1.34	68.13	73.41

	1996	2003	2008
Question #	-	-	-

Climate Change, Climate Scientists and the Public and Politics

This section begins with some aspects of communications. Quite often it seems that climate scientists and people working in other disciplines with a focus on climate change seem to be under the impression that the rest of the population constantly has climate change on their minds. To this extent, the survey respondents were asked how often they overheard conversations about climate change being held in public places. The responses ranged from never to every day, with the majority of responses falling somewhere in between. When asked how often they overhear conversation about climate *science*, while no one claimed every day, the reported frequencies are not that much different from frequency of conversations about climate *change*. When asked how often he or she participates in a casual conversation with lay people about climate change or climate science, it seems that most respondents were very active.

In these conversations, likely one of the most common questions to arise is how to deal with climate change. When asked the best approach the respondents to the survey provided somewhat of mixed advice, some claiming only adaptation as the best approach, other only mitigation, the majority falling somewhere in between.

When talking to lay people most respondents thought that it was still agreeable to some degree to present extreme accounts of catastrophic impacts of climate change, so as to alert the public and thought that climate scientists should be directly involved in alerting the public about possible socio-economic consequences, an area well beyond a climate scientist's area of expertise. Climate scientists were even more convinced that they should be directly involved in the provision of climate change information to the public about impacts to the natural world. Overall, over the issue of climate change, the respondents to the survey thought the general public should told to be quite worried. Climate scientists, almost unanimously, thought there is a need for immediate adaptations and mitigation strategies, and that over the last five years climate change has become a much more urgent global issue. Given the generation of new knowledge in the last 5 years, the survey respondents estimated the negative impacts of climate change and sea level rise to be greater than they thought five years ago.

Relevant papers based on previous surveys

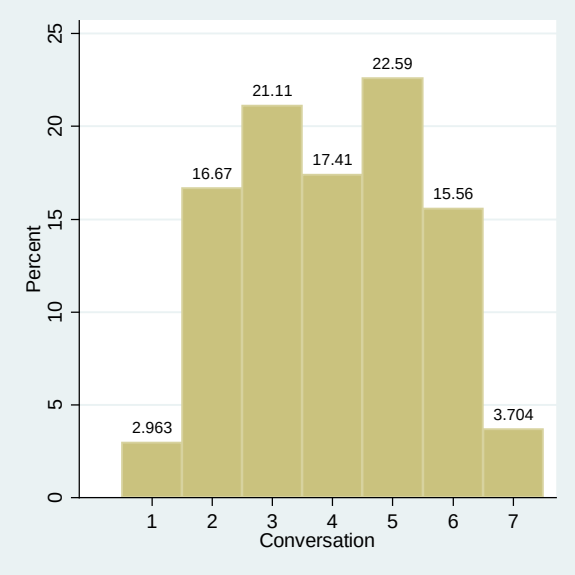
Bray, D. and H. von Storch, 1999.
Climate Science and the transfer of knowledge to public and political realms
In: H. von Storch and G. Flöser: Anthropogenic Climate Change, Springer Verlag, ISBN 3-540-65033-4, 287-328
http://www.academia.edu/4718367/Climate_Science_and_the_Transfer_of_Knowledge_to_Public_and_Political_Realms

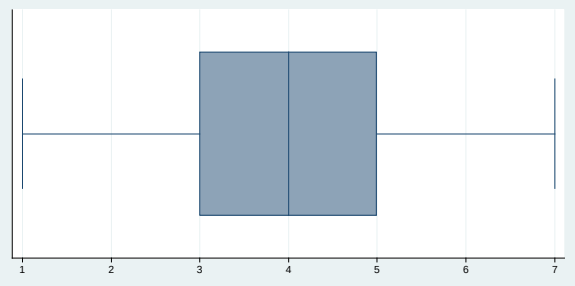
Bray, D and Carsten Krück
Some Patterns of Interaction Between Science and Policy:Germany and Climate Change
Climate Research, November Vol. 19: 69 – 90, 2001

32.In the last year, about how often have you overheard , but not participated in, conversations in public places (buses, trains, restaurants, etc.) in which the people were talking about the climate change/global warming issue?

never ***almost every day***

1 2 3 4 5 6 7





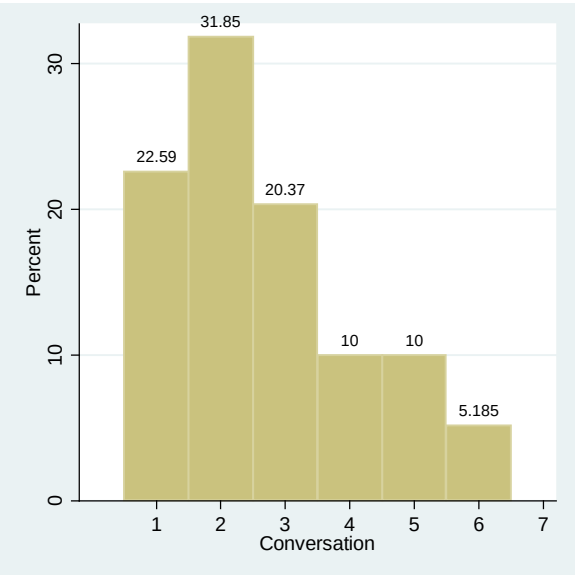
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var32	270	4.01	0.09	3.83	4.20

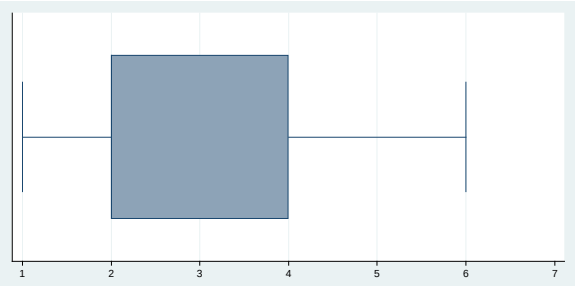
Question #	1996	2003	2008
	-	-	-

33. In the last year about how often have you overheard, but not participated in, conversations in public places (buses, trains, restaurants, etc.) in which the people were talking about the climate change *science*?

never ***almost every day***

1 2 3 4 5 6 7





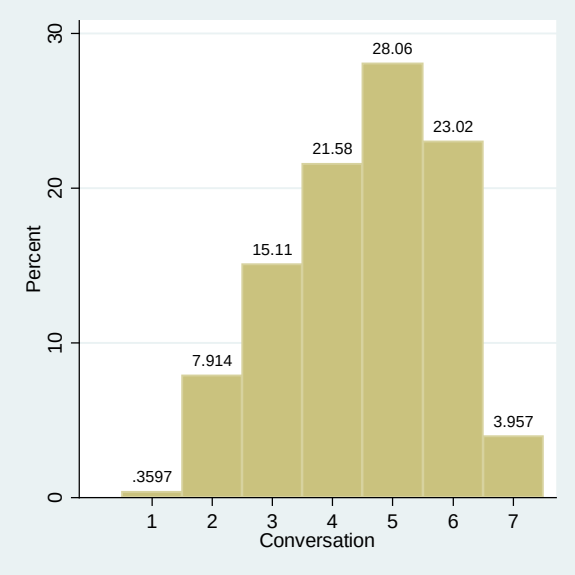
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var33	270	2.69	0.09	2.51	2.86

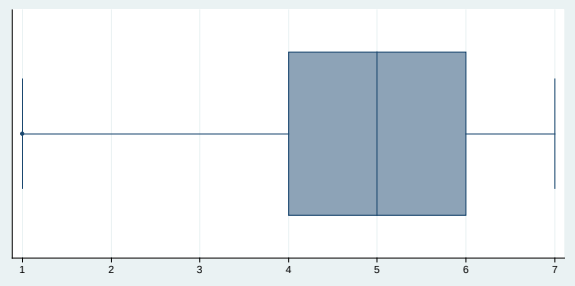
Question #	1996	2003	2008
	-	-	-

34. In the last year about how often have you participated in casual conversations about climate change or climate science with lay people in a non-formal setting?

never ***almost every day***

1 2 3 4 5 6 7





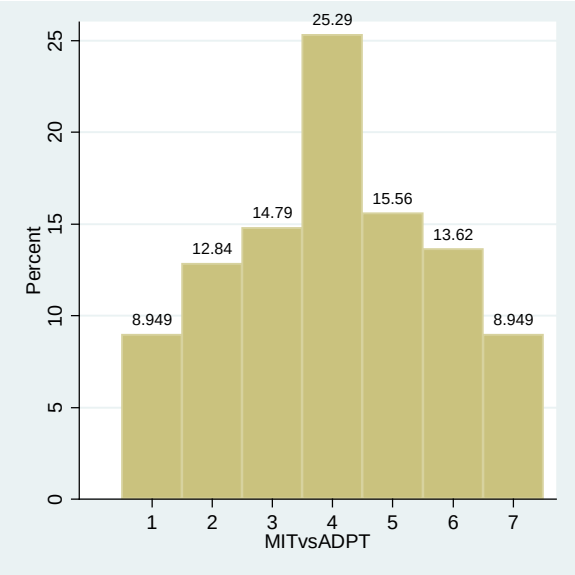
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var34	278	4.54	0.08	4.38	4.70

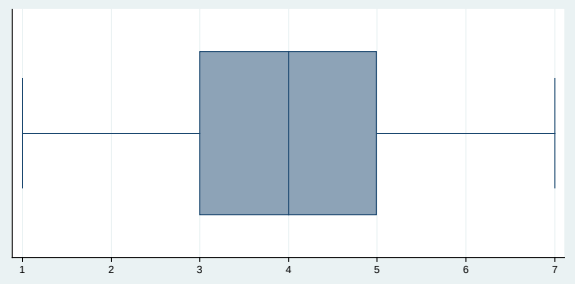
Question #	1996	2003	2008
	-	-	-

35. The best approach to deal with the problems related to climate change is

mitigation ***adaptation***

1 2 3 4 5 6 7





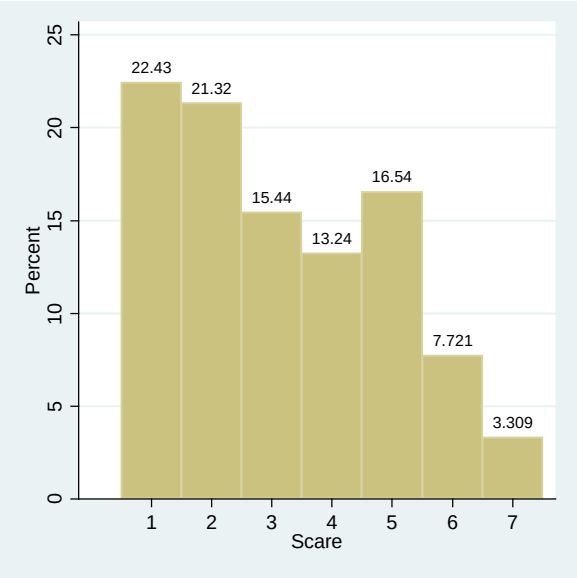
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var35	257	4.02	0.11	3.81	4.24

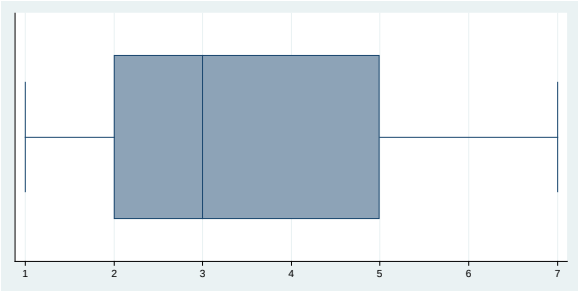
Question #	1996	2003	2008
	-	-	-

36. Some scientists present extreme accounts of catastrophic impacts related to climate change in a popular format with the claim that it is their task to alert the public. How much do you agree with this practice?

not at all ***very much***

1 2 3 4 5 6 7





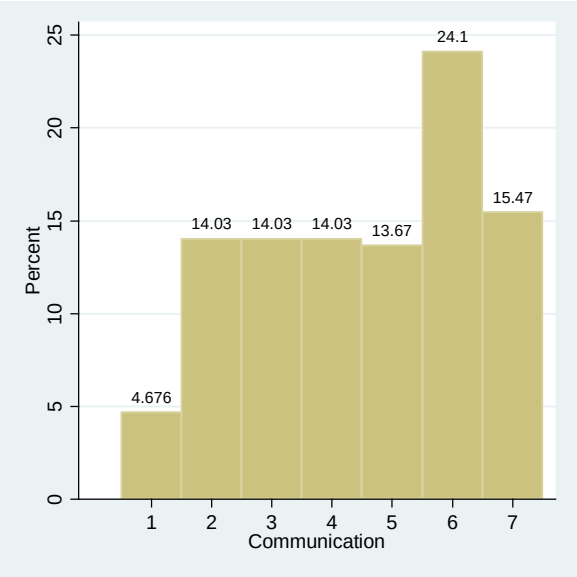
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var36	272	3.17	0.11	2.95	3.38

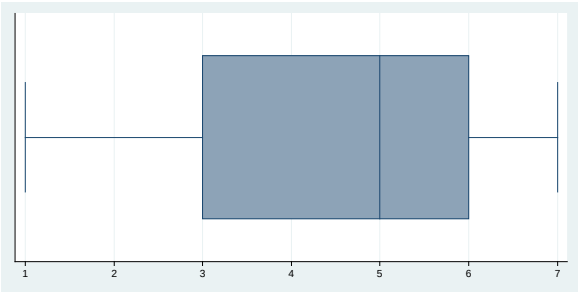
	1996	2003	2008
Question #	-	-	52

37. How much do you think climate scientists should be *directly* involved in alerting the general public about the possible *socio-economic consequences to humans* (health, policies, damages, economic loss, etc.) resulting from changes in the climate?

not at all ***very much***

1 2 3 4 5 6 7





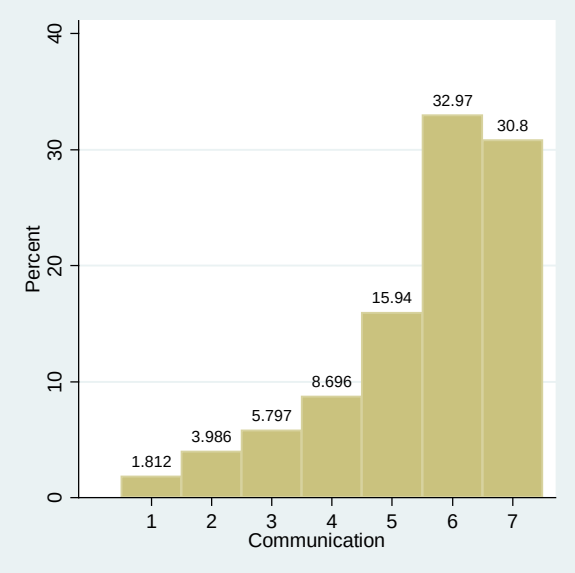
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var37	278	4.52	0.11	4.31	4.74

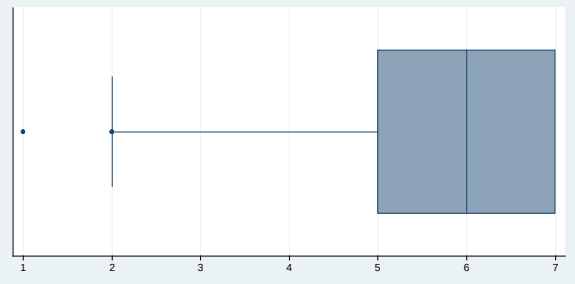
	1996	2003	2008
Question #	73	73	53

38. How much do you think climate scientists should be *directly* involved in the provision of climate change information to the public about the impacts to the *natural world* by climate change?

not at all ***very much***

1 2 3 4 5 6 7





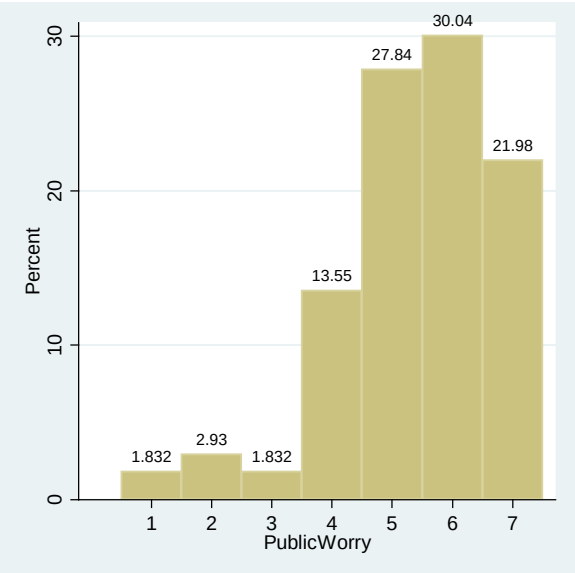
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var38	276	5.55	0.09	5.37	5.73

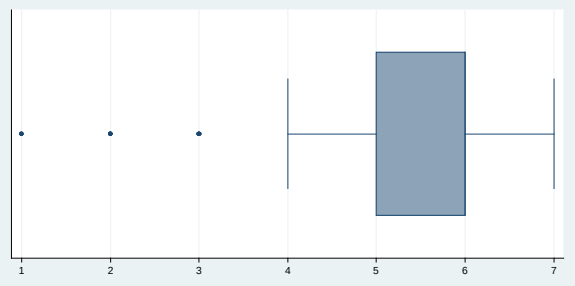
Question #	1996	2003	2008

39. Over the issue of climate change, the general public should be told to be

unconcerned ***very worried***

1 2 3 4 5 6 7

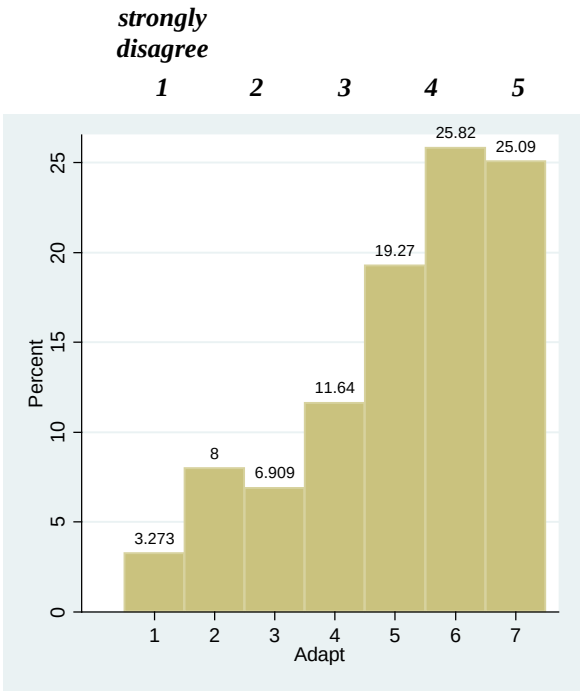


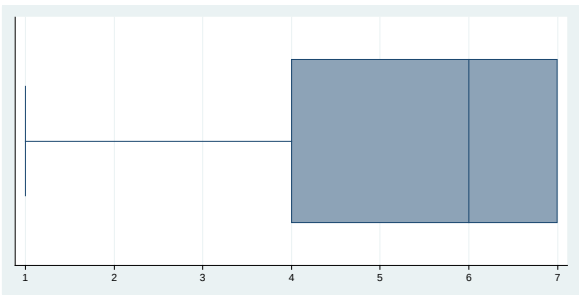


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var39	273	5.41	0.08	5.25	5.57

Question #	1996	2003	2008
	-	-	60

40. There is a great need for *immediate* policy decisions for *immediate* action to *ADAPT* climate change.

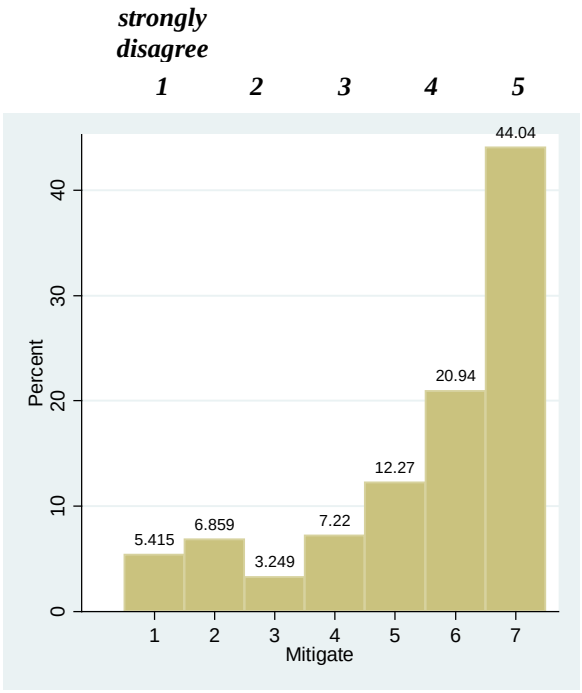


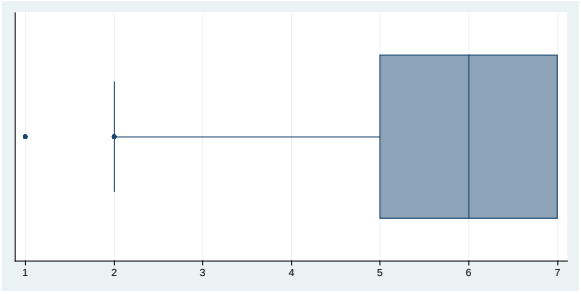


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var40	275	5.13	0.10	4.93	5.34

Question #	1996	2003	2008

41. There is a great need for *immediate* policy decisions for *immediate* action to *MITIGATE* climate change.



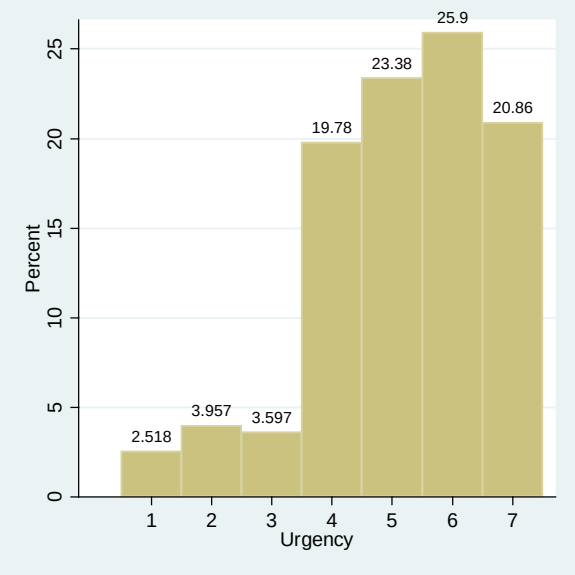


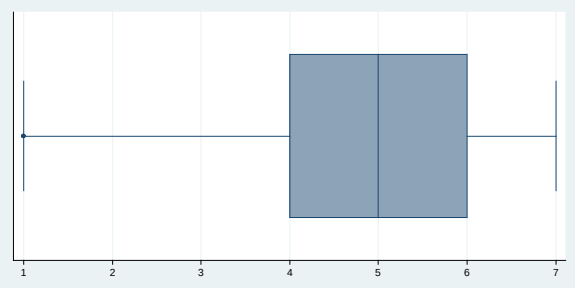
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var41	277	5.53	0.11	5.31	5.75

Question #	1996	2003	2008
			67

42. Since 5 years ago I think climate change has become

a much less urgent global issue			*remained unchanged as an issue*			*a much more urgent global issue*
1	*2*	*3*	*4*	*5*	*6*	*7*





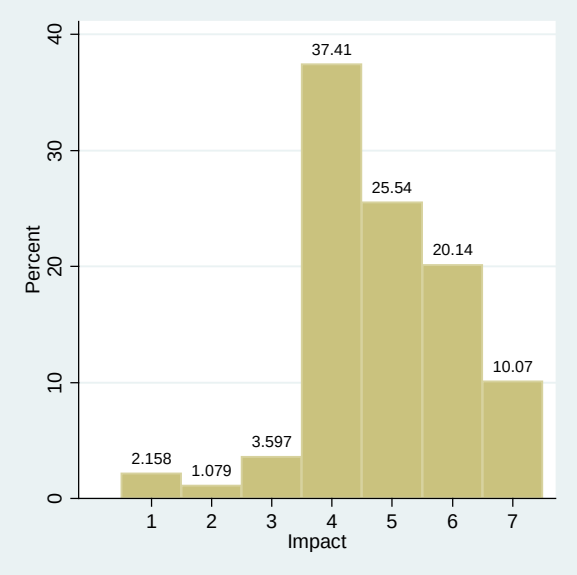
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var42	278	5.19	0.09	5.01	5.36

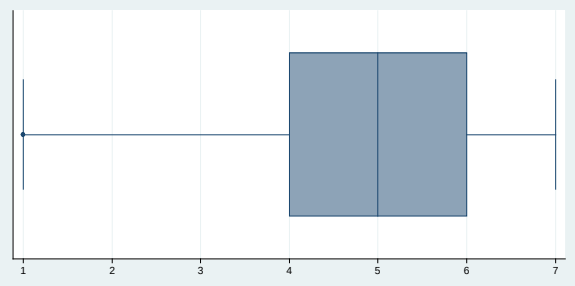
1996 2003 2008

Question #

43. Given the generation of new knowledge in the last 5 years I think the negative impacts of climate change and sea level rise are

much less than I thought 5 years ago			*about the same as I thought 5 years ago*			*are much greater than I thought 5 years ago*
1	*2*	*3*	*4*	*5*	*6*	*7*





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var43	278	4.84	0.07	4.69	4.98

Question #	1996	2003	2008
	-	-	-

CUDOS

This section, the Mertonian norms of science (Merton 1942), is the unique section of this survey, not previously investigated in our surveys. Merton perceived these as the ideals of science. They were 'communalism', whereby scientists relinquish ownership of intellectual property and assign the property community ownership in exchange for recognition (secrecy is an antithesis of communality); universalism, whereby claims of scientific truth are evaluated by impersonal criteria (research evaluated on the personal attributes of the scientists involved represents the antithesis of universalism); disinterestedness, by which scientists appear to be selfless (self-interested motivation is the antithesis of disinterestedness), and; organized skepticism, which implies "detached scrutiny of beliefs in terms of empirical and logical criteria" (Merton 1942p.126), with the antithesis represented by presenting results and methods less than transparently. Mitroff (1974) pointed out the existence of "counternorms" in science. These were "solitariness, particularism, interestedness and organized dogmatism".

While there is a considerable body of literature discussing and debating Merton's CUDOS, such discussion will not be part of this brief introduction.

The interest here was to measure the norms (or lack of) that are perceived to be in action in climate science. It is well noted that there are difficulties with how to elicit observable expressions of these norms. Ziman (2000) points out "newcomers to research soon discover that they are not just learning technical skills. They are entering a self-perpetuating 'tribe' whereby their behavior is governed by many unspoken rules." (p.31). In essence, they represent part of the 'culture' of science and as such share the common problems of studying culture, namely, that the scientists in question are so immersed in their culture that the operating normative system is invisible to them. We are aware of such problems. However, drawing on the suggestions of Moriarty (2011) "[One] approach is to construct statements of behavior that fall under the rubric of normative principles and then measure scientists' subscription to such behaviours. This approach clearly falls short of capturing complex norms, but instead provides some measure of behaviors that indicate or reference norms (an approach used by Anderson, 1996, 2000; Anderson and Louis, 1994; Louis, Anderson and Earle, 1994; Louis, Anderson and Ropsenberg, 1995). The items used for the Anderson 2000 (p.447-448) study are as follows:

Communality norm: Scientists openly share new findings with colleagues

Secrecy counternorm: Scientists protect their newest findings to ensure priority publishing, patenting or applications.

Universal norm: Scientists evaluate research only on its merit, i.e., according to accepted standards in the field.

Particularism counternorm: Scientists assess new knowledge and its applications based on the reputation and past productivity of the individual or research group.

Disinterestedness norm: Scientists are motivated by the desire for knowledge and discovery and not by the possibility of personal gain.

Self-interestedness counternorm: Scientists compete with others in the same field for funding and recognition of their achievements.

Organized skepticism norm: Scientists consider all new evidence, hypothesis, theories and innovations, even those that challenge or contradict their own work.

Organized dogmatism coounternorm: Scientists invest their careers in promoting their own most important findings, theories, or innovation.

In the survey, we quite simply asked questions of how the respondent saw his or her self in regard to a set of statements. We were well aware that the respondents might indeed be unaware of the normative system in which he or she operates.

Our findings indicate that although there is some variance in all measures (as would be expected) there are some noted exceptions. The secrecy counternorm appears to be quite prevalent in the climate science community as does the particularism counternorm.

References

Anderson M.S. and K.S. Louis. (1994) The graduate student experience and subscription to the norms of science. Research in Higher Education. 35:273-299.

Anderson, M.S. (1996) Misconduct and departmental context: Evidence from the Acadia Institute's Graduate Education Project. Journal of Information Ethics 5(1): 15-33.

Anderson, M.S. (2000) Normative orientations of university faculty and doctoral students: Science and Engineering Ethics. PubMed 6:443-461.

Holmwood, John (ed.). (2011) A Manifesto for the Public University. Bloombury Academic.

Louis, K.S., M.S. Anderson and J. Earle. (1994) Disciplinary and departmental effects on observations of faculty and graduate student misconduct. Journal of Higher Education 65:331-350.

Louis, K.S., M.A. Anderson and L. Ropsenberg. (1995) Academic misconduct and values: The department's influence. Review of Higher Education. 393-442.

Merton,R.K. (1942), "The Normative Structure of Science", in The Sociology of Science: Theoretical and Empirical Investigations, Chicago: University of Chicago Press

Mitroff , I. (1974) Norms and counter-norms in a select group of the Apollo moon scientists: A case study of the ambivalence of scientists. American Sociological Review 39:579-595.

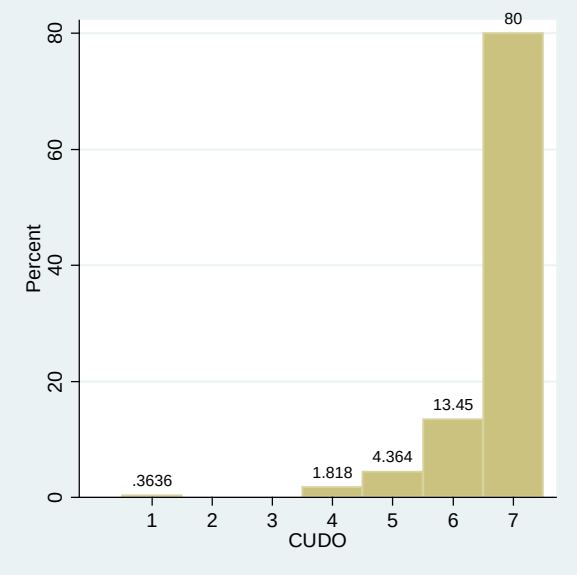
Moriarty, Phillip. (2011) Science as a Public Good. Ch5 in Holmwood, John (ed.). (2011) A Manifesto for the Public University. Bloombury Academic.

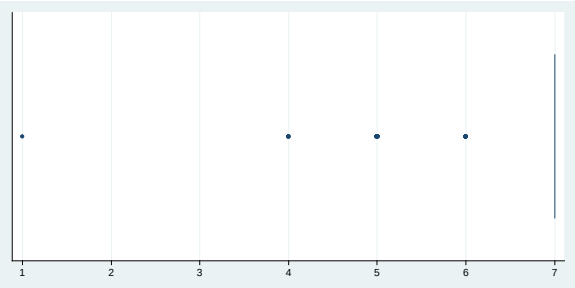
Ziman, J. (2000) Real science: What is it, and what does it mean. Cambridge: The University of Cambridge Press.

44. Scientific results should be

private property ***common property of the scientific community***

1 2 3 4 5 6 7





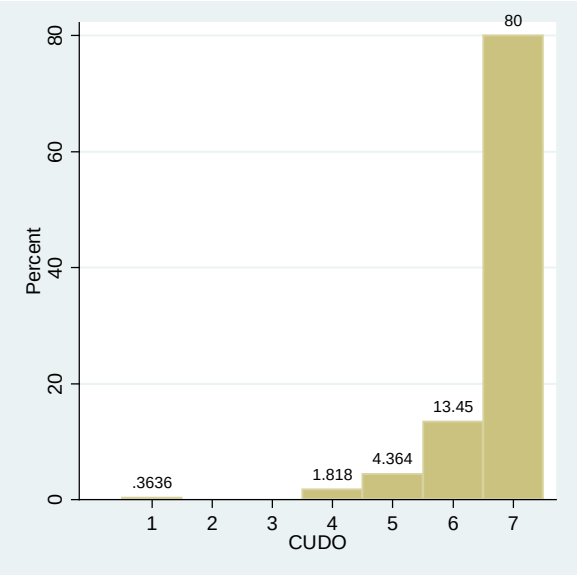
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var44	275	6.70	0.04	6.62	6.79

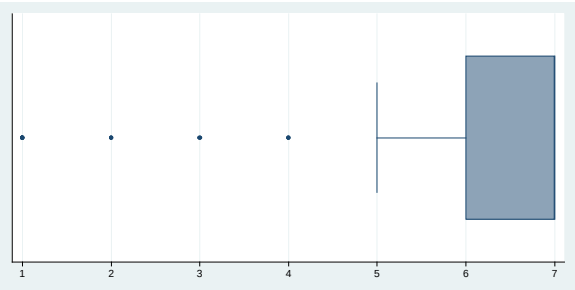
Question #	1996	2003	2008
	-	-	-

45. To hide information which might be of vital importance to other scientists is

totally acceptable ***completely immoral***

1 2 3 4 5 6 7





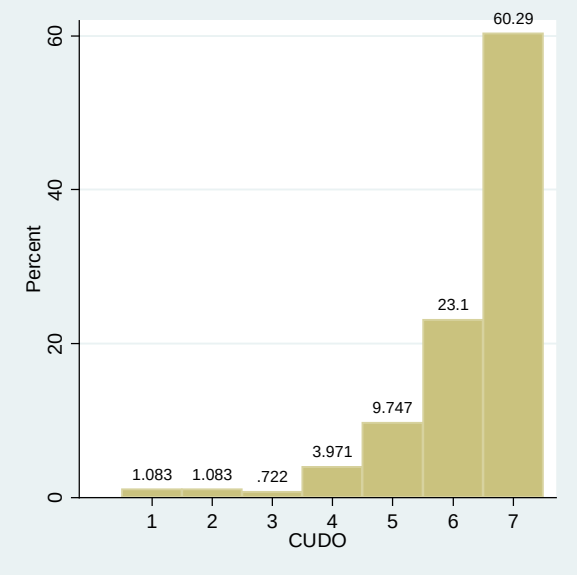
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var45	273	6.41	0.08	6.26	6.56

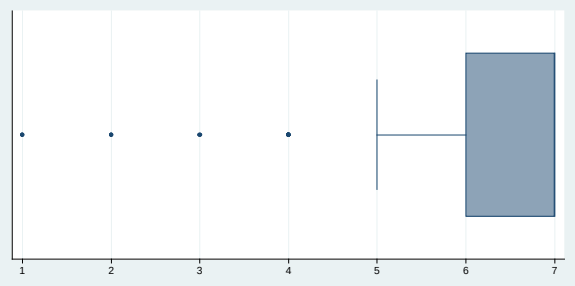
Question #	1996	2003	2008
	-	-	-

46. Other scientists should have free access to my data after I have published the initial findings.

absolutely not ***yes, under all circumstances***

1 2 3 4 5 6 7





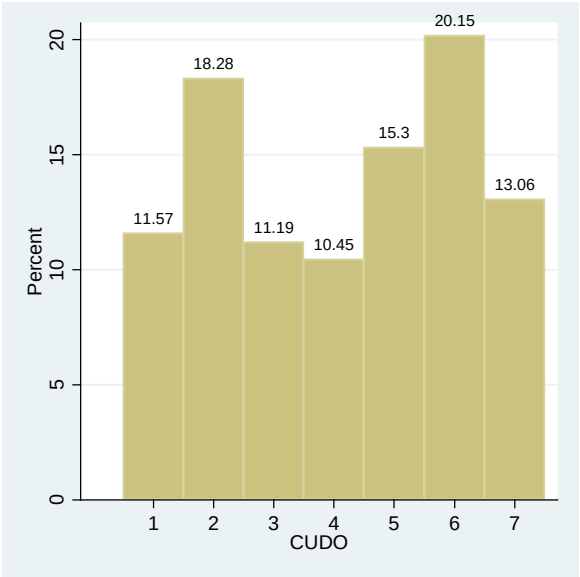
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var46	277	6.31	0.07	6.17	6.44

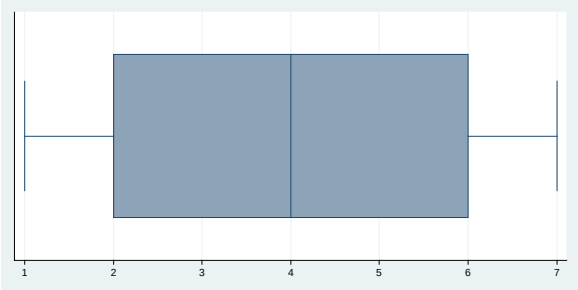
Question #	1996	2003	2008
	-	-	-

47. I have the right to keep initial findings secret to ensure that I get full credit when the findings are published.

absolutely ***have no right at all***

1 2 3 4 5 6 7





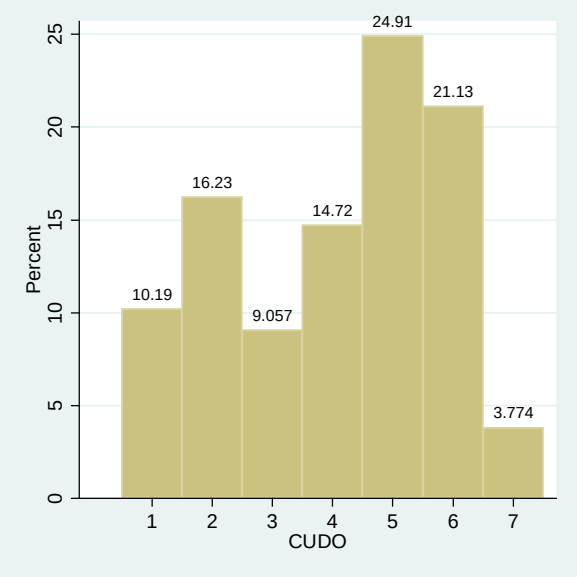
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var47	268	4.12	0.12	3.88	4.36

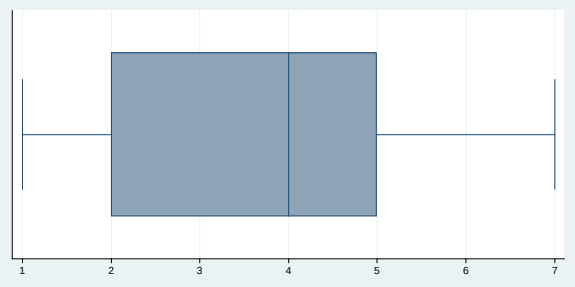
Question #	1996	2003	2008
	-	-	-

48. It is important to protect my individual scientific property rights.

not at all ***at all costs***

1 2 3 4 5 6 7





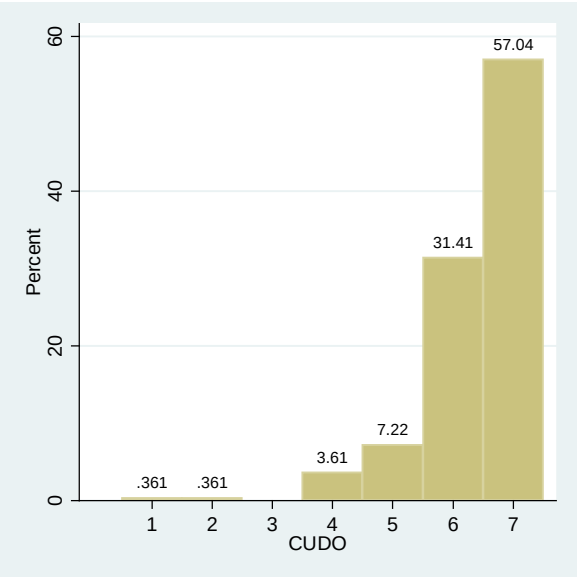
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var48	265	4.06	0.11	3.85	4.28

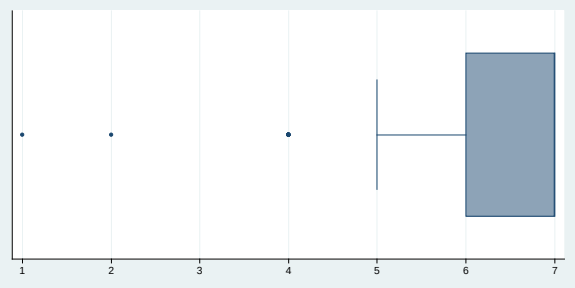
Question #	1996	2003	2008
	-	-	-

49. How much are you in favour of sharing your research materials with your peers?

not at all ***100% in favour***

1 2 3 4 5 6 7



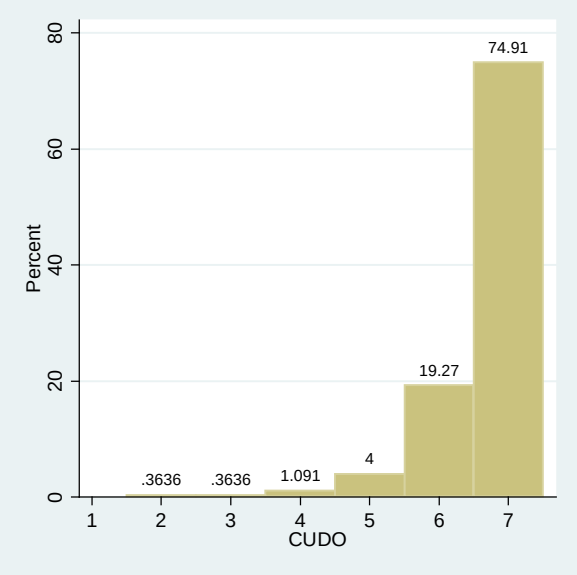


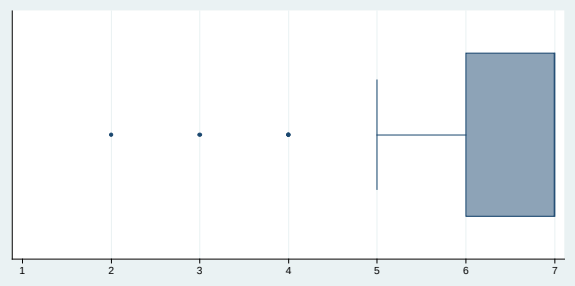
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var49	277	6.39	0.05	6.29	6.50

Question #	1996	2003	2008
	-	-	-

50 There is an obligation to publish significant findings even if they are contrary to your beliefs

never ***always***
1 2 3 4 5 6 7



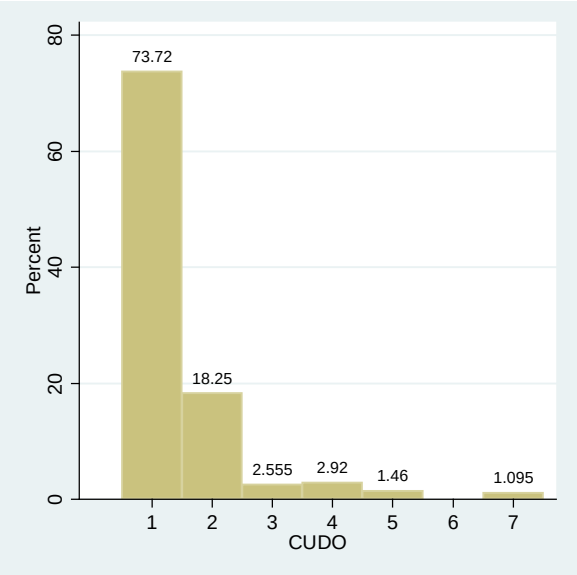


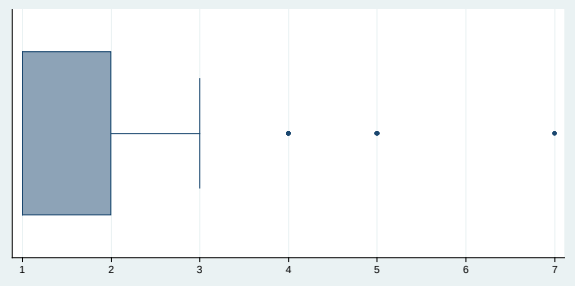
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var50	275	6.66	0.04	6.58	6.74

Question #	1996	2003	2008
	-	-	-

51. The acceptance or rejection of scientific findings and claims should depend on personal feelings.

never ***always***
1 2 3 4 5 6 7



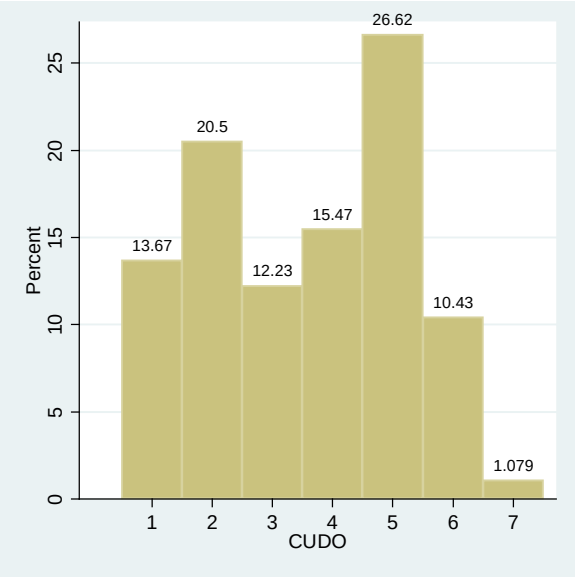


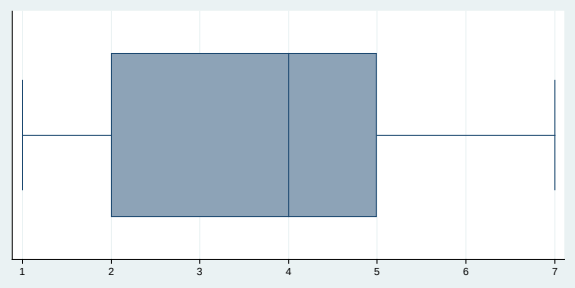
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var51	274	1.45	0.06	1.33	1.56

Question #	1996	2003	2008
	-	-	-

52. To what extent do you accept peer reviewed published, scientific results as always being accurate simply on the basis that they are published?

never ***always***
1 2 3 4 5 6 7



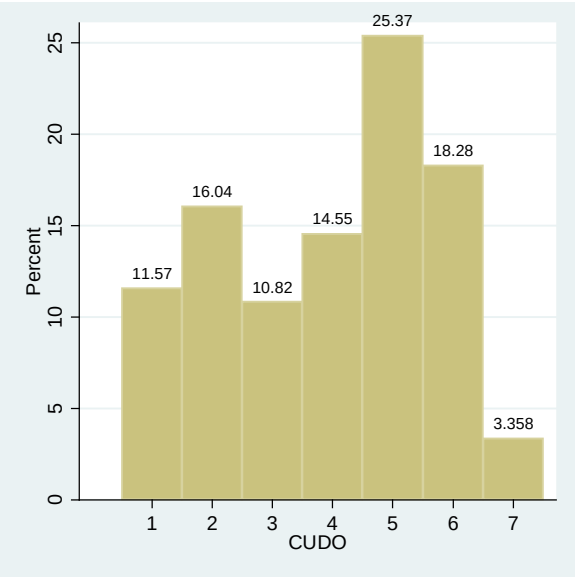


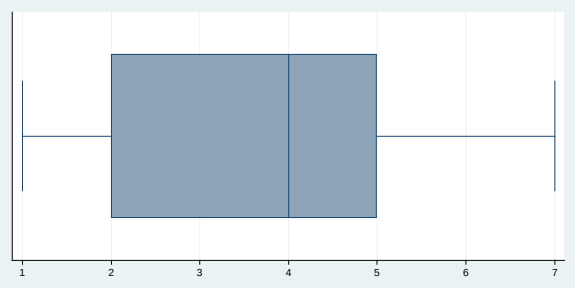
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var52	278	3.56	0.10	3.37	3.76

Question #	1996	2003	2008
	-	-	-

53. How often do you have no choice but to align your research interests with funding opportunities?

never ***always***
1 2 3 4 5 6 7





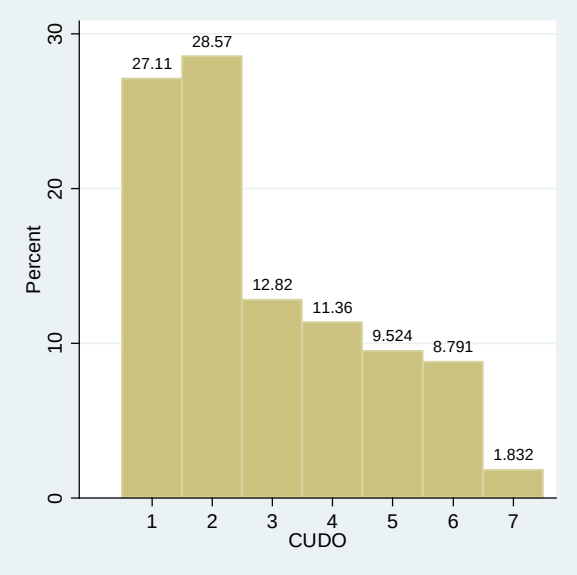
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var53	268	3.94	0.11	3.73	4.16

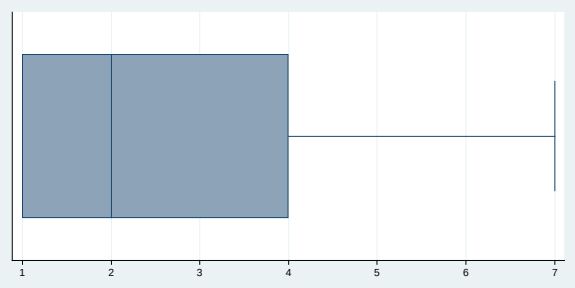
Question #	1996	2003	2008
	-	-	-

54. Talent and competence should be the *only* criteria for a position in science.

in all cases ***never***

1 2 3 4 5 6 7





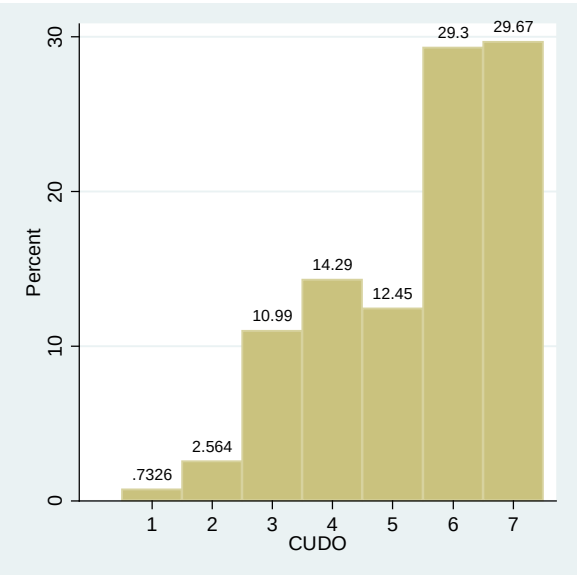
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var54	273	2.81	0.10	2.61	3.02

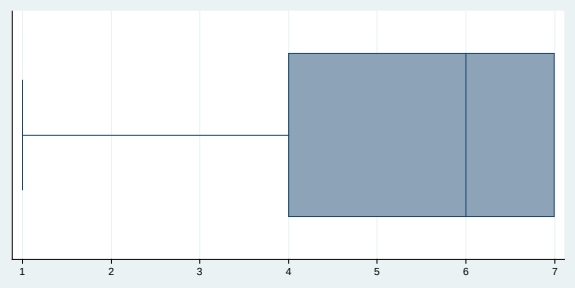
Question #	1996	2003	2008
	-	-	-

55. How secretive are you about your research in progress so as to ensure that someone else does not publish similar work before you?

very secretive ***not secretive at all***

1 2 3 4 5 6 7

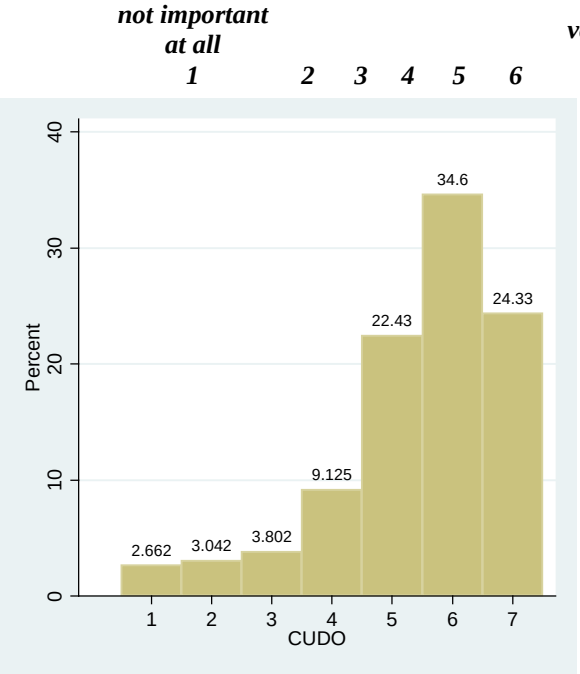


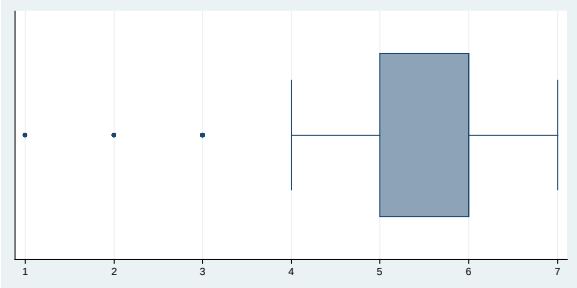


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var55	273	5.42	0.09	5.24	5.60

Question #	1996	2003	2008
	-	-	-

56. How important is it to you that your research might be generalizable or valid beyond its immediate context?

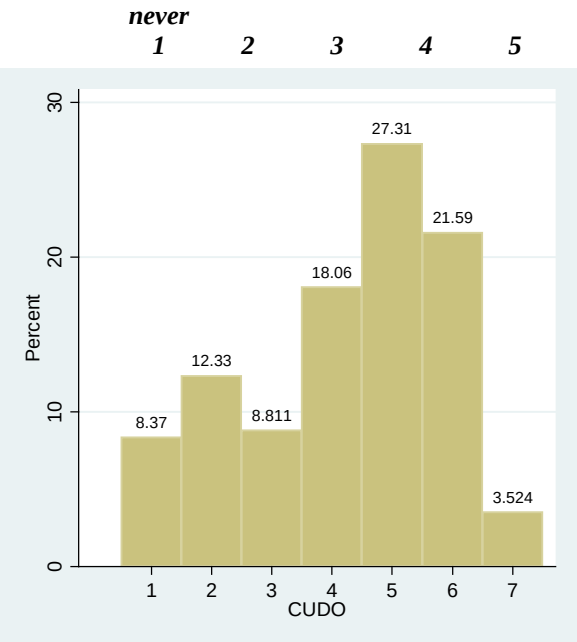


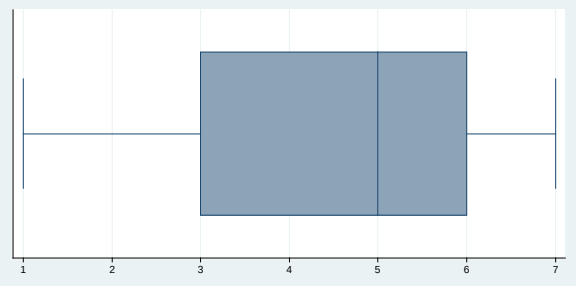


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var56	263	5.47	0.09	5.29	5.64

Question #	1996	2003	2008
	-	-	-

57. Are the well-known climate scientists, that are in agreement with similar findings of your own, perceived of as producing 'better' science than contributions made by unknown scientists?





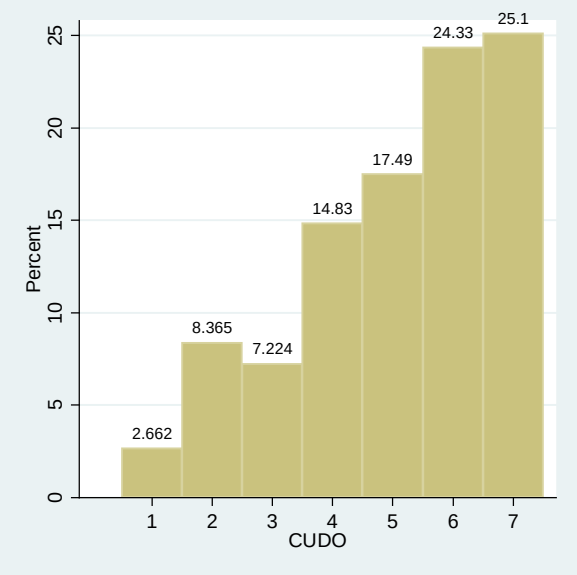
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var57	227	4.22	0.11	4.01	4.44

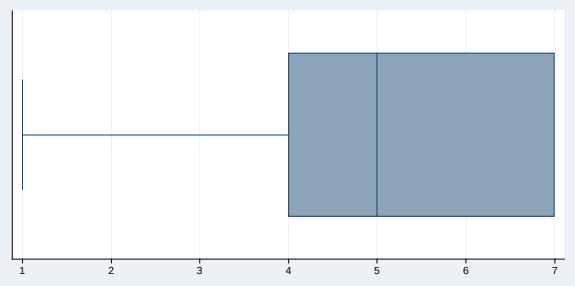
Question #	1996	2003	2008
	-	-	-

58. How much should people from outside of climate science disciplines be allowed to contribute to climate science knowledge?

not at all ***very much***

1 2 3 4 5 6 7





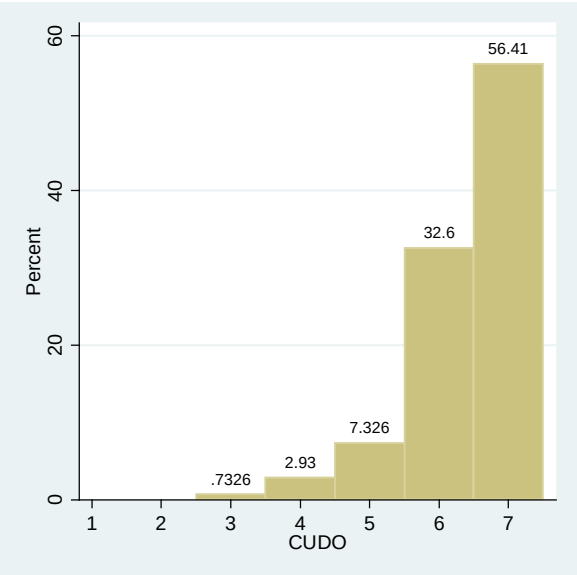
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var58	263	5.10	0.10	4.89	5.30

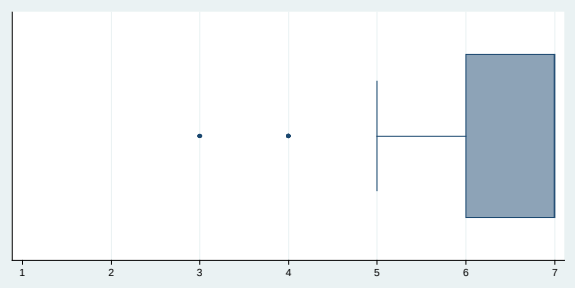
Question #	1996	2003	2008
	-	-	-

59. I try to ensure that my intellectual work is *not* influenced by my personal beliefs and values?

never ***always***

1 2 3 4 5 6 7





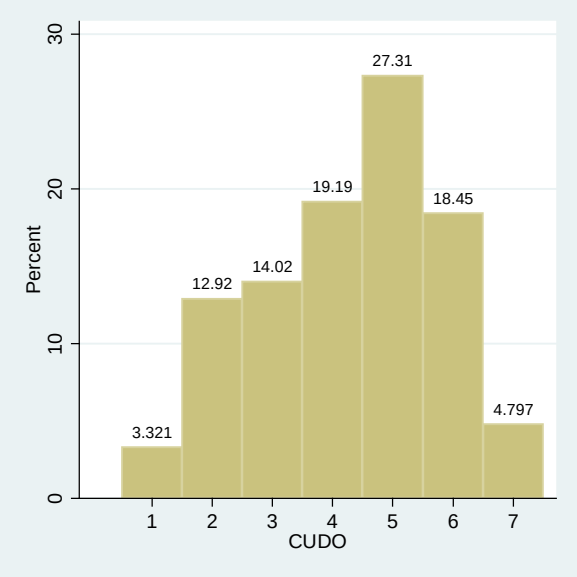
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var59	273	6.41	0.05	6.31	6.51

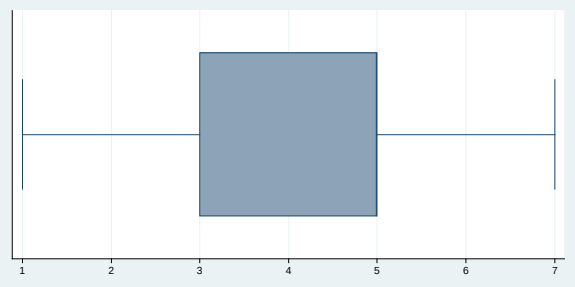
Question #	1996	2003	2008
	-	-	-

60. I pursue research that is only of personal interest to me?

never ***always***

1 2 3 4 5 6 7





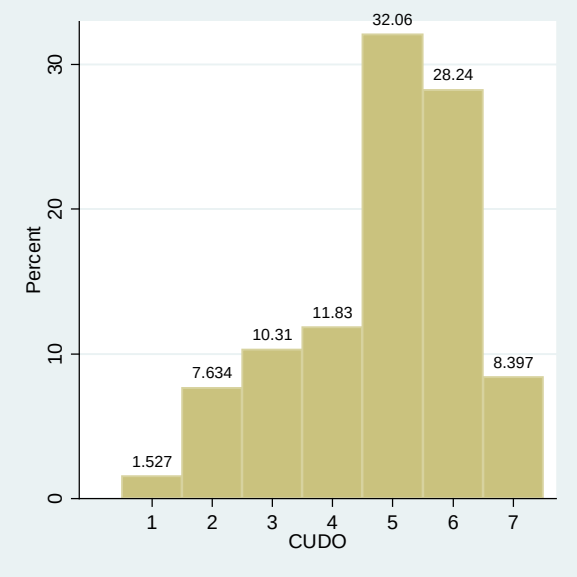
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var60	271	4.29	0.09	4.11	4.47

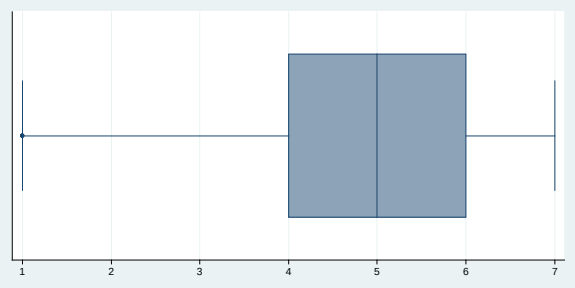
Question #	1996	2003	2008
	-	-	-

61. I feel that there are unrealistic expectations (from sponsors/public/authorities) concerning the abilities of climate science?

there are no unrealistic expectations ***they are always unrealistic expectations***

1 2 3 4 5 6 7



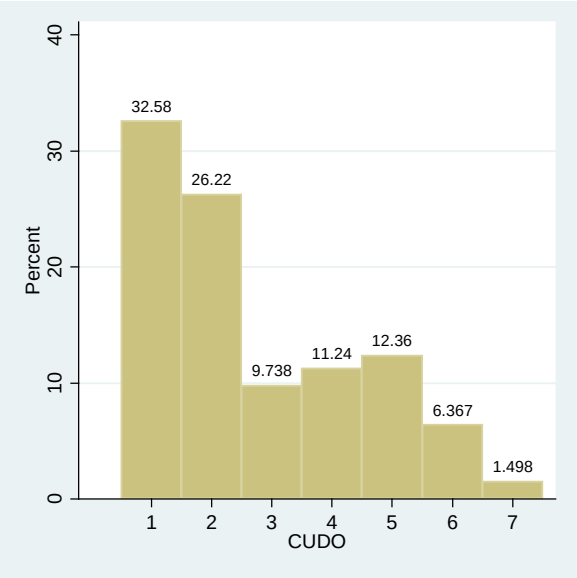


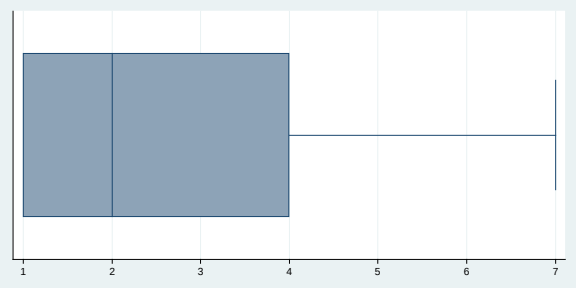
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var61	262	4.84	0.09	4.66	5.01

Question #	1996	2003	2008
	-	-	-

62. How often is there pressure to conform your research to fit with the findings of more eminent scientists (for the sake of recognition or publication)?

never ***always***
1 2 3 4 5 6 7



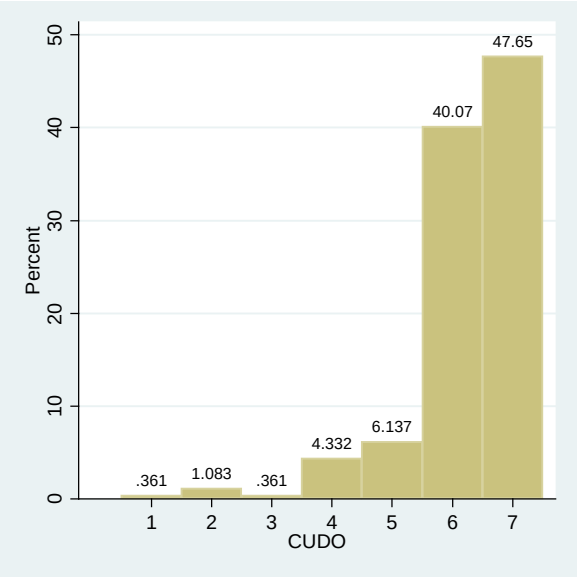


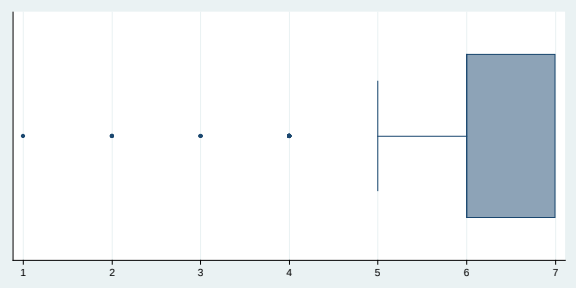
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var62	267	2.70	0.10	2.49	2.90

Question #	1996	2003	2008
	-	-	-

63. I consider all new evidence, hypotheses, and theories, even those that challenge or contradict my work?

never ***always***
1 2 3 4 5 6 7



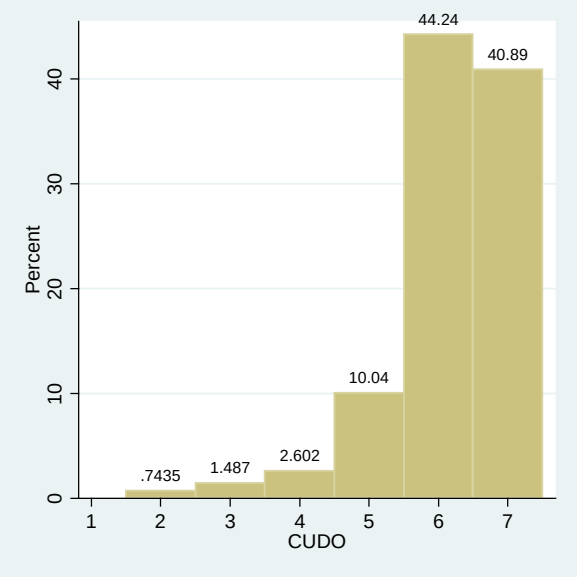


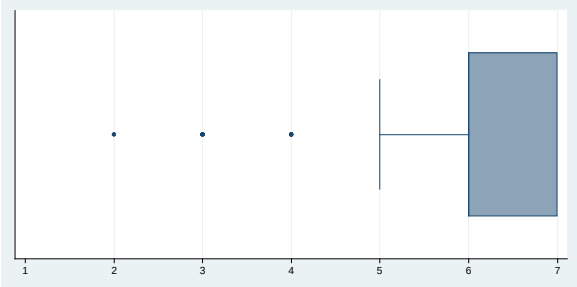
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var63	277	6.26	0.06	6.14	6.37

Question #	1996	2003	2008
	-	-	-

64. I judge other contributions to my science on the basis of quality only?

never ***always***
1 2 3 4 5 6 7



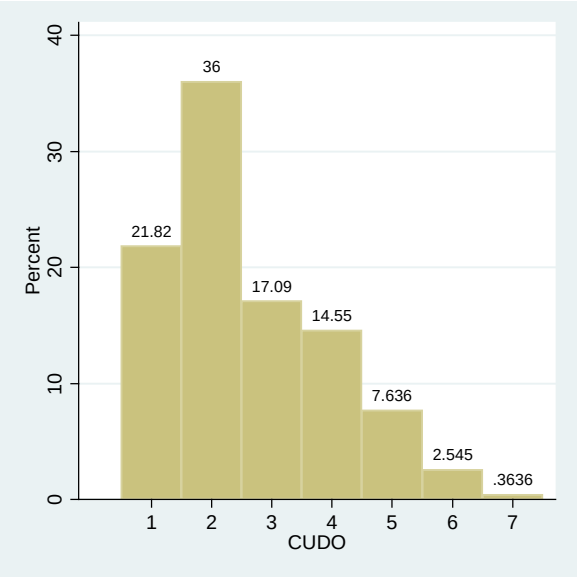


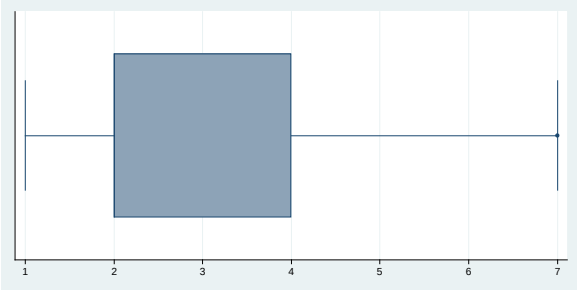
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var64	269	6.18	0.06	6.07	6.29

Question #	1996	2003	2008
	-	-	-

65. I assess the work of other scientists primarily on the status (number of publications or grants) of the author?

never ***always***
1 2 3 4 5 6 7





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var65	275	2.59	0.08	2.43	2.75

Question #	1996	2003	2008
	-	-	-

Projection and Prediction

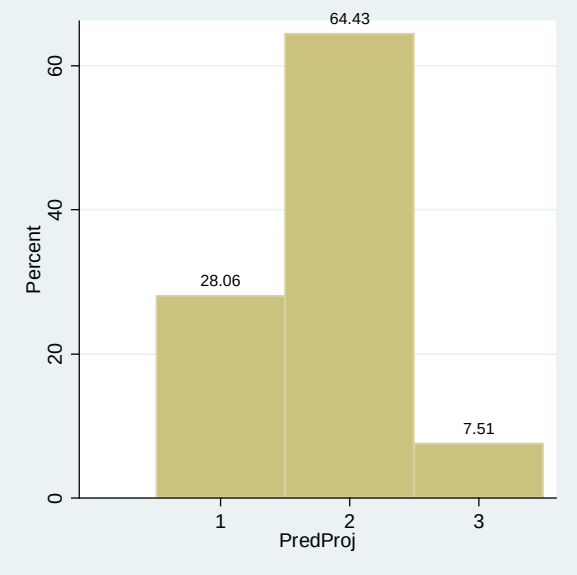
We have repeated the section on 'projection and prediction' (first appearing in the 2008 survey) as it seemed to raise significant interest within the scientific community. Subsequent arguments have gone as far as to proclaim that in climate science there is no distinction between the terms. Between 2008 and 2013, there has been little change in how respondents defined 'the most probable outcome', namely as a prediction. However, slightly fewer respondents proclaimed the possible outcome to be a prediction. When compared to 2008, scientists in 2013 were slightly more likely to claim that scenario simulation result in projections.

Relevant papers based on precious surveys

Bray, Dennis and Hans von Storch
"Prediction" or "Projection?": The Nomenclature of Climate Science
Science Communication 2009; 30; 534
http://www.academia.edu/3077388/_Prediction_or_Projection_The_Nomenclature_of_Climate_Science

66. A description of the most *probable* outcome best defines

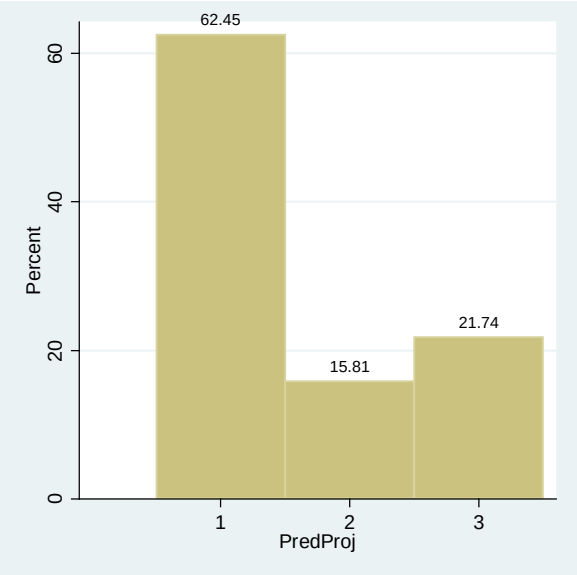
1 --- a projection
2 --- a prediction
3 --- other



	1996	2003	2008
Question #	-	-	45

67. A description of a *possible* outcome best defines

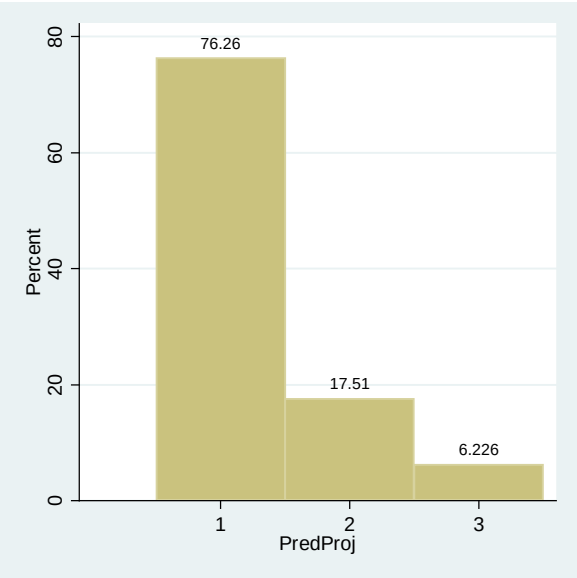
1 --- a projection
2 --- a prediction
3 --- other



	1996	2003	2008
Question #	-	-	46

68. From a scenario simulation prepared with climate models, scientists are more inclined to make

1 --- a projection
2 --- a prediction
3 --- other



	1996	2003	2008
Question #	-	-	47

Post-Normal Climate Science

A considerable body of work has been written about climate science as post-normal science. Of late, the concept of post normal science seems to be assigned two separate entities, one, a definition pertaining to characteristics of a scientific issues that involve high levels of uncertainty and high levels of risk, and two, pertaining to a scientific method which includes (or, accordingly, should include) the input of extra-scientific knowledge in the resolution of post-normal scientific issues.

Measures of uncertainty and risk are implicit in the respondents' responses throughout the survey. In this section we explicitly ask if respondents adhere to the tenets of post-normal science as an evolving scientific method for climate change, posed as a case of post normal science. Consequently, we could draw the conclusion that, knowingly or not, the respondents define climate change as a case with the characteristics of post normal science (high uncertainty and high risk) but do not adhere to the tenets of post normal science as a practice.

Our findings indicate that climate scientists do not find extra-scientific knowledge being produced by NGOs or environmentalist groups to be overly useful.

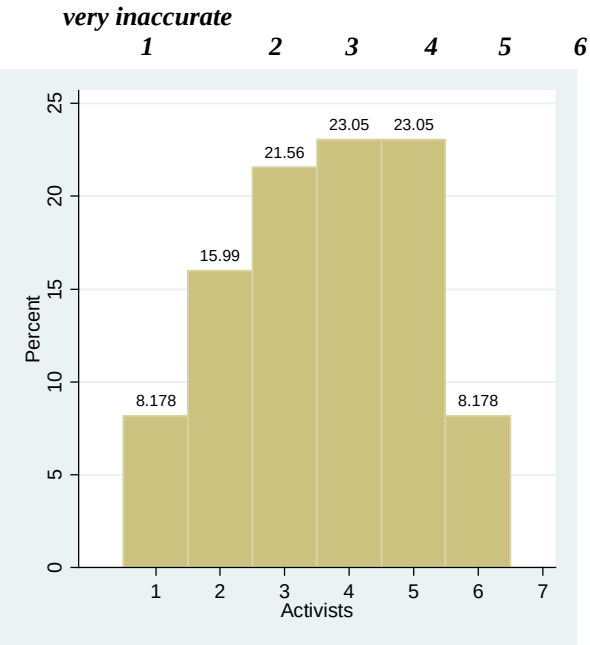
Respondents to the survey perceived the climate change issue to be currently more of a political issue than a scientific issues and that it is shaped more by public discourse than it is by science.

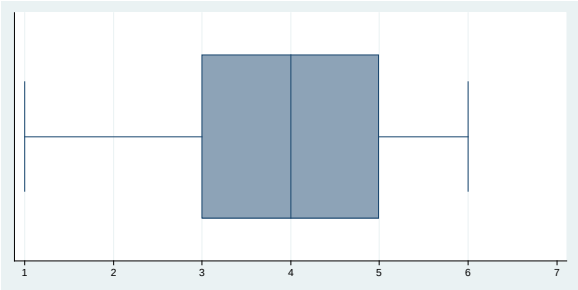
Relevant papers based on precious surveys

Bray, Dennis and Hans von Storch
Climate Science: An empirical example of postnormal science
Bulletin of the American Meteorological SocietyVol. 80, No. 3, March 1999439-455
http://www.academia.edu/3077349/Climate_Science_An_empirical_example_of_postnormal_science

Bray, Dennis
Decision Making: Truth to Power vs. Post-Normal Science
2013Unpublished Note
http://www.academia.edu/4706870/Decision_Making_Truth_to_Power_vs._Post-Normal_Science

69. Comments about climate change made by environmental activist groups are generally

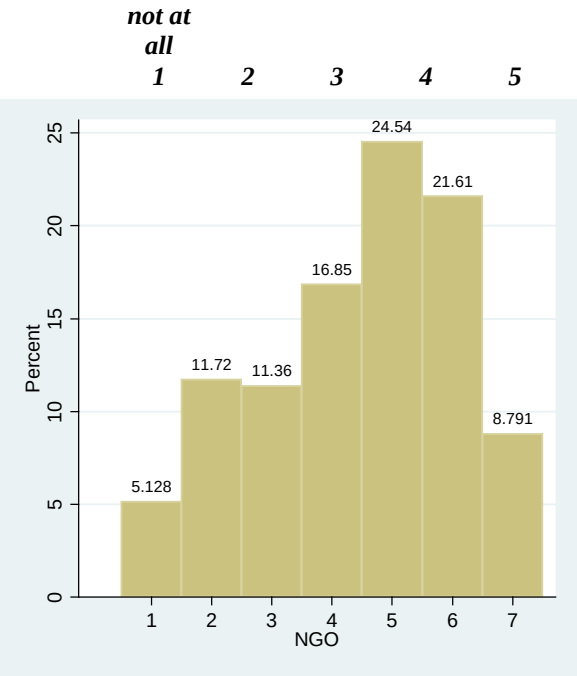


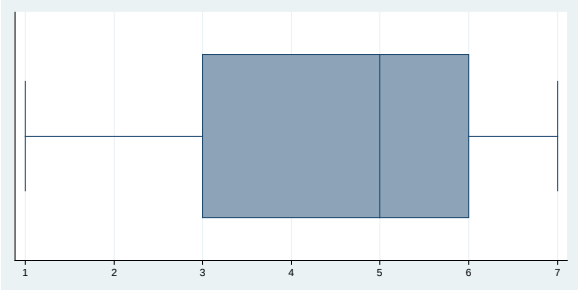


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var69	269	3.61	0.09	3.44	3.78

Question #	1996	2003	2008
	-	-	-

70. NGO's (such as Green Peace or other environmental organizations) make a valid contribution to the communication of climate science to the public and policy makers.

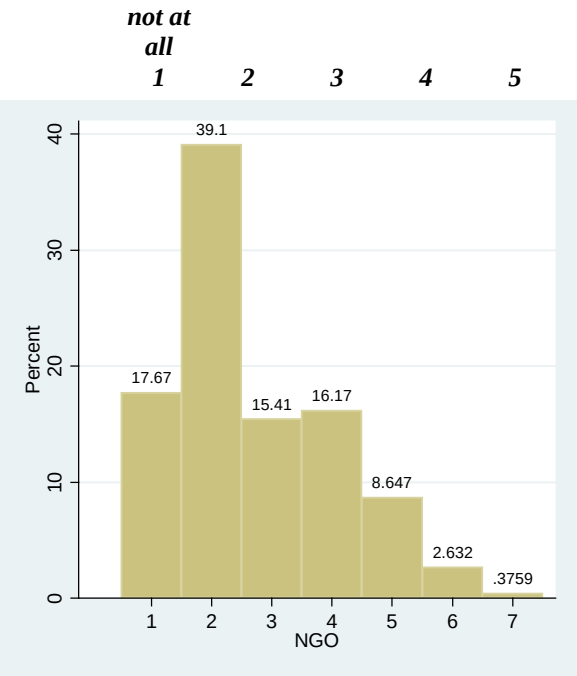


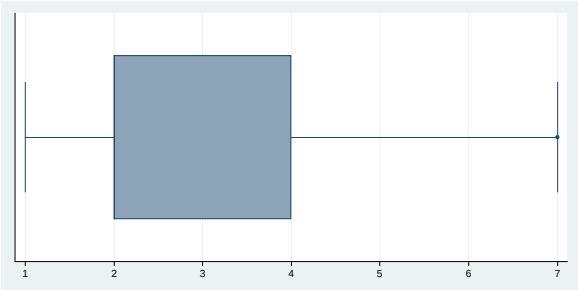


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var70	273	4.44	0.10	4.24	4.64

Question #	1996	2003	2008
	-	-	-

71. NGO's (such as Green Peace or other environmental organizations) make significant contributions to the body of scientific climate change literature.

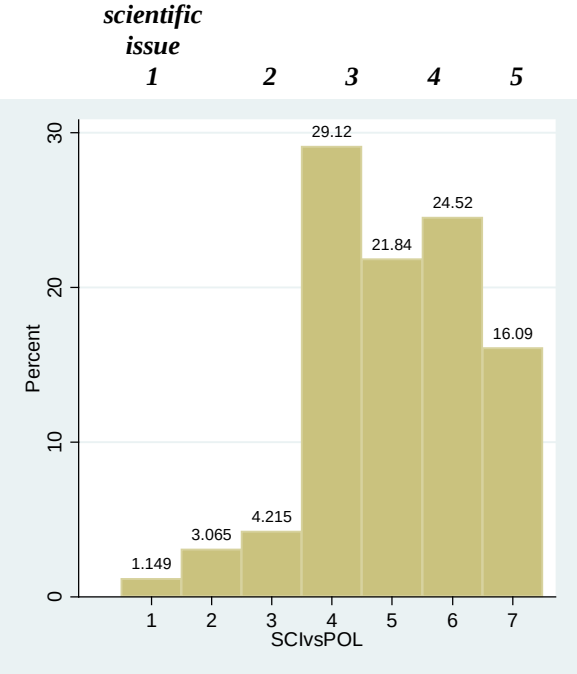


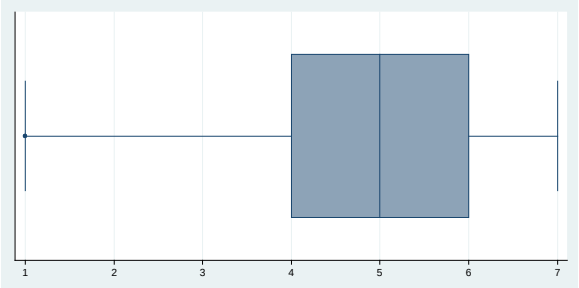


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var71	266	2.68	0.08	2.52	2.85

Question #	1996	2003	2008
	-	-	-

72. Today, the climate change issues is mostly a





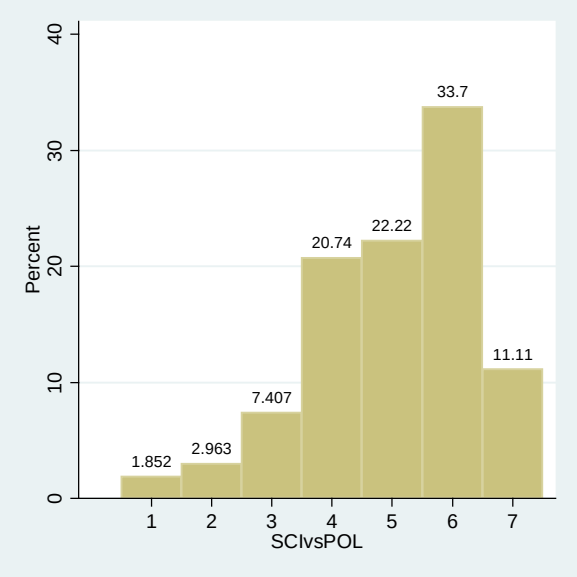
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var72	261	5.05	0.08	4.89	5.22

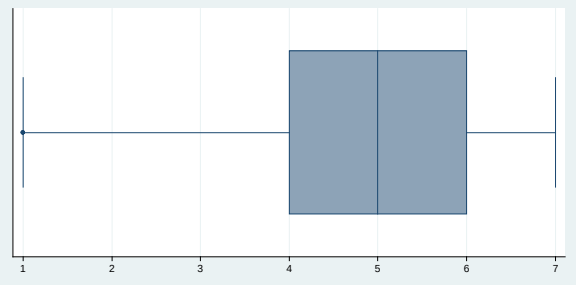
Question #	1996	2003	2008
	-	-	-

73. Climate change discourse is driven by

scientific findings ***public/political sentiment***

1 2 3 4 5 6 7





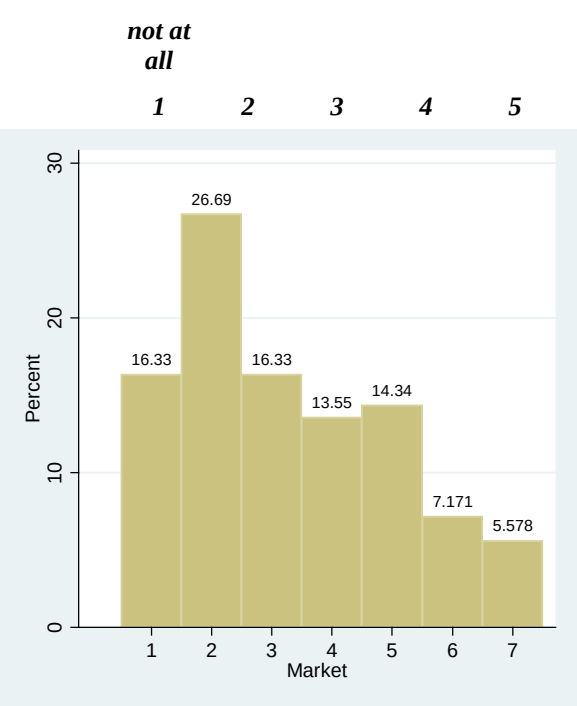
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var73	270	5.04	0.08	4.88	5.20

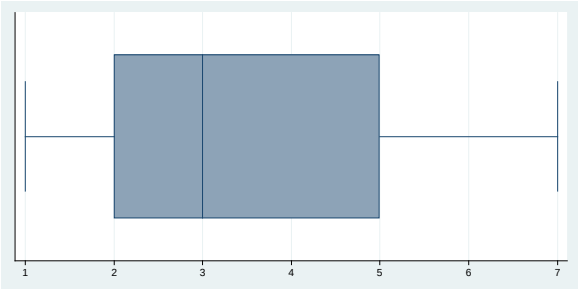
	1996	2003	2008
Question #	-	-	-

Managing Climate Change

The perceptions of the climate scientists who participated in the survey are not overly optimistic that market measures and adaptation are the long term solution to climate change. They do however, see climate change as offering economic opportunity.

74. Climate change is manageable through market based mechanisms

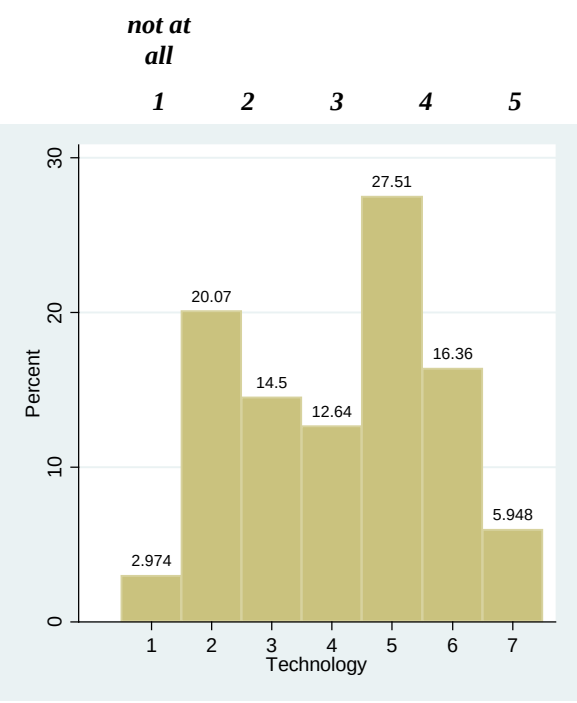


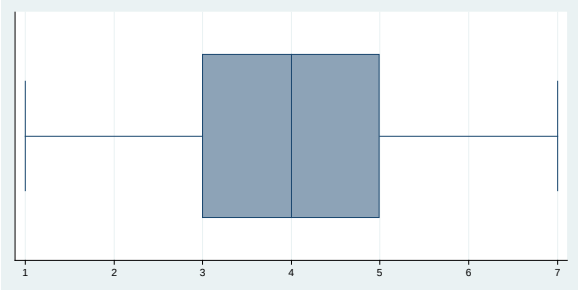


Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var74	251	3.27	0.11	3.05	3.49

Question #	1996	2003	2008
	-	-	-

75. The anthropogenic impact on climate change can be managed by technological innovations and adaptive measures in the behaviour of individuals.





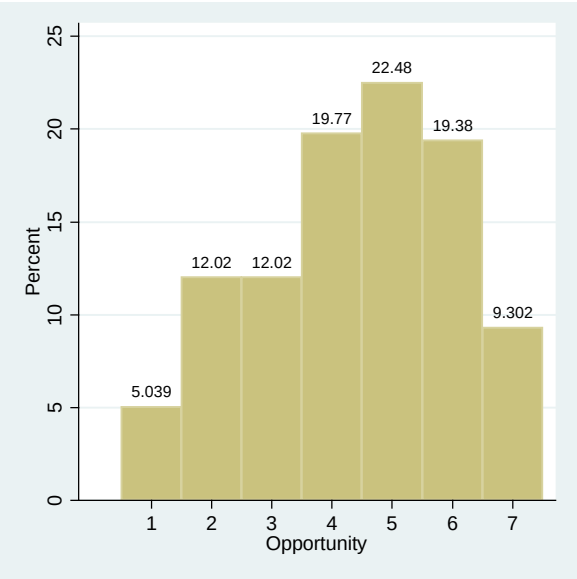
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var75	269	4.14	0.10	3.95	4.34

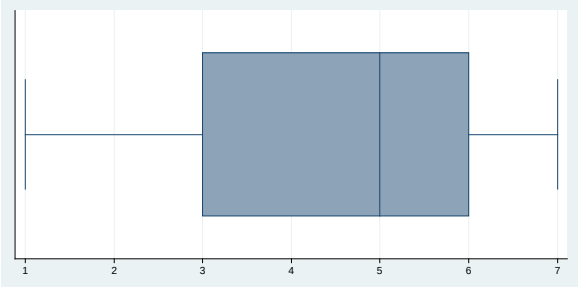
Question #	1996	2003	2008
	-	-	-

76. Climate change is an opportunity for economic growth.

not at all — *very much so*

1 2 3 4 5 6 7





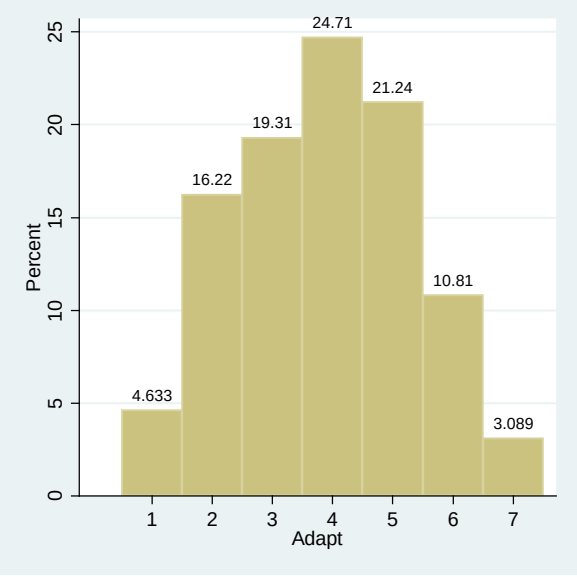
Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
var76	258	4.38	0.10	4.18	4.58

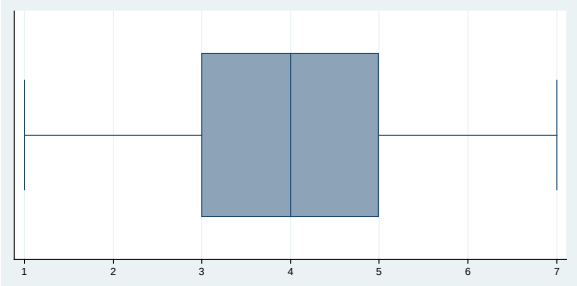
Question #	1996	2003	2008
	-	-	-

77. Adaptation measures will only prolong the climate crisis and will not successfully contain the impacts of climate change in the long run.

adaptation measures will not help — *adaptation measures are all that are necessary*

1 2 3 4 5 6 7





Variable	Obs	Mean	Std. Err.	[95% Conf.	Interval]
Var77	259	3.86	0.09	43.68	4.05

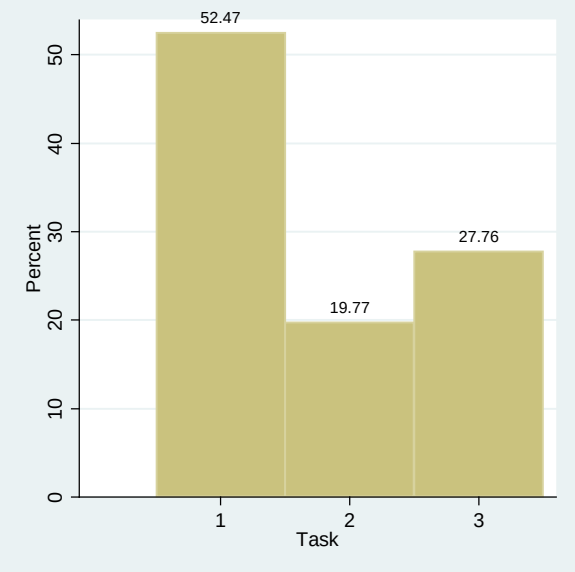
Question #	1996	2003	2008
	-	-	-

The Future of Climate Science

After assessing the impacts of and possible solution to climate change, the climate scientists that participated in the survey still see the most important task facing the climate science community as defining the climate problem and determining the cause of climate change.

78. Today, what would you rate as the most important task facing the climate science community?

1 --- define the climate problems and attribute cause of climate change
2 --- determine solutions to climate change
3 --- motivate people to act on climate change



	1996	2003	2008
Question #	-	-	-

Comments

Var79 Comments

This space was for open expression. All comments submitted are presented verbatim.

1. All questions about confidence in mean, trend and variability does not state on which spatial scale one should provide confidence for.Question 18. Concerning EXTREME EVENTS, is not possible to answer since there is no information of what type of extreme event this question relates to. 17. Concerning SEA LEVEL RISE, 17a and b is the same as the confidence in mean change in sea level rise is the same as the confidence in the trend. Maybe the heading was not meant to be SEA LEVEL RISE, but SEA LEVEL

2. For question 78 : I think that the most important tasks facing the climate science community is (i) better understanding of the climate system, (ii) better assesssing uncertainties associated with climate models and their projections, (iii) better explaining climate science (not results) to the general public, the policy makers, the media and the students.

3. sorry, I don't work with climate model so I skip all the questions about them.

4. Can we as scientists initiate/collaborate directly with companies to provide concrete goals according to efficiency (e.g. 30% of 1990s levels for their product) and the companies own objectives? Why are we waiting for policy makers/governments to make statements?

5. global/regional models: it remains unclear if average values are meant (global/regional average e.g. trend) or localised values (e.g. for India or so).

6. some questions are ambiguous or depend on definitions, e.g. the distinction between prediction and projection, so those answers may not be meaningful. But, thanks for hosting this survey!

7. No comments

8. some questions are unclear e.g. 54 if talent and competence are the only criteria then responsability and validity would be none. this does not make any sense

9. Next time ask (1) about the impact of population on global climate change and (2) the wisdom of allowing 'climate skeptics' or 'climate deniers' as part of the IPCC process.

10. Do I think climate models can simulate turbulence? Of course not! Why? Because they operate at much larger scales! It is not a reflection of the quality of the model but rather the power of computing. The answers to this and many others of these questions are easily subject to inaccurate interpretation. I very much hope the authors will take this into consideration rather than using the results of this study to misrepresent the state of climate science.

11. Survey too long!

12. Some of the questions do not have appropriate options for responses. Others seem to be very 'leading' in nature, i.e. 'do you think climate scientists will stop beating their wife.'

13. many questions are ambiguous or too general to answer. For example, #58 asks about contributions by 'people' outside climate science. The answer must depend on what type of "people' we are discussing: natural and physical scientists in other fields (absolutely) or businesspeople, lay persons, etc (probably not).

14. Climate change science has been captured by radicals dependent upon public money, press releases, and those who illegal change, hide, or purposely misinterpred real data. The 'hockey stick' is a good example.

15. Climate science has become too politicized, and the fault lies with the climate scientists themselves who have oversold the case for anthropogenic warming without due consideration of other factors. But maybe, the IPCC mandate and money for research have been the initiating drivers.

16. I am concerned with interpretation of survey results because many questions are so ambiguous. For example #25: are we rating the certainty of the stressors or the response to them?

17. An enormous amount of scientific work still needs to be done to raise the level of confidence in climate predictions. Numerical simulation models of weather have advanced beyond all expectations since I was first involved in the 1950s and I believe that the near future will produce more spectacular improvements in climate prediction. Unfortunately climate change sceptics will not live long enough to be see evidence in the advance in accuracy.

18. Nice survey. Agree quite a lot that this is a real problem, needs action even though we still need to learn more. The field of climate science seems too overconfident in its conclusions, has not shown enough proper skepticism within its own ranks (leaving that role to uninformed skeptics, to great detriment), and does not come across as impartial enough. The climate science community has been too tone-deaf to the whole messaging issue, have not learned the right techniques of human dialog.

19. High profile scientific journals are heavily biased towards anthropogenic climate change, publishing mediocre papers showing anthropogenic changes and rejecting many high quality papers that attribute changes to natural causes.

20. Some climate modelers have seemed a bit too eager to promote their ideas and results in the popular press, and pitch them to politicians. Hard to evaluate model performance with no baseline.Things are better than 1990s but worse than they might be. Better than macroeconomic models (which I've used professionally). Main point for survey is that climate science is distorted by high profile scientists striking messianic poses and treating science as a continuation of politics by other means. Big problem.

21. I'm not a climate scientist; I'm not sure why I was sent this survey. I probably should have responded 99 to everything

22. One issue I have with this survey is the use of the terminology 'climate change'. Climate is always changing. You could replace 'climate change' with 'climate' in most contexts. Mitigation and adaptation, for example, are needed regardless of whether there are changes in climate statistics. I suggest thse definitions also be polled - Climate is defined here as the statistical description of all the elements in the climate system (including the atmosphere, ocean, land surface and cryosphere).

23. re 36: The bad part of this is emphasizing potentially catastrophic events (that may not happen). Engaging the public in a popular format is good. re 37: This is undesirable to the extent that *physical* scientists are unlikely to have much expertise in socio-economic effects. Those experts that are knowledgable in this area should speak, however. re 58: depends on their expertise. If their contributions make sense, use them regardless of t 'labeled expertise'. Need more room!

24. Mitigation and adaptation are both needed, but the more mitigation, the less adaptation. You do not allow this answer.

25. Many questions are ambiguous. I answered assuming that appropriate error bars were included

26. I have been retired for 10 years, which explains my 'no answer' response to several questions.

27. I am often surprised that vocal climate scientists are well versed on feedbacks in climate systems, but seemingly blind to feedbacks in social systems. It makes me suspect that there pronouncements of what we *should* do are motivated more by a deep-seated political reasoning rather than one based on a scientific reasoning that is as well thought out as their more physically based climate science work.

28. This survey was good. However, there are some answers in the middle because I think the interpretation could go either way. Nonetheless, I am glad this is being taken.

29. Mitigation needs to be better defined. Cutting GHG emission is one thing, geo-engineering is a totally different thing. You can't put them in a same category!

30. Tough survey. Many questions seem to pose false choices, too few potential answers, or were otherwise simplistic...but alas it is multiple choice.

31. Once again you have designed a questionnaire that is ambiguous, full of false dichotomies, and loaded. How hard is it for your group to canvas opinions on the questions before you start? For instance, 'extreme events' is undefined, the questions on scientific openness completely ignore the real impediments to data sharing, don't define the limits on what should be shared or not (since it is largely the arguments over those limits, not the concept, that is in play). Another wasted opportunity.

32. In my opinion,in relation with the point35 threre is no best approach to deal the problems related with climate change. It depends of the problem, in which country and more

33. There are many one-dimentional questions aboard. They force my answers towards the negative side of the space. I am generally more positive regarding climatic models than the answers seem to indicate.

34. I do not do original work on global climate change, although I have been active on subjects of more local climate. For this reason I was unable to answer many of the questions.

35. KEY QUESTION THAT YOU SHOULD ASK How important is the extremely rapid rate of ongoing climate compared to large (but much slower rate) of climate change in the geologic past?

36. I have retired and my views are out-of-date

37. I declined to answer the 10 year time scale questions because the questions are meaningless. Model projections can only (at best) reproduce the statistics of natural variability, not the phasing of specific short-term trends. Similarly, the questions about adaptation vs mitigation. At this point we have no choice but to do both, so the questions posed are largely meaningless.

38. way too long a survey. how many degrees of freedom do you have?

39. Separating anthropogenic change from natural variability is a huge problem for the scientific community since our data sets poorly represent multi-decadal variability and the mechanisms at play. The science community is also poorly served by the plethora of studies that find some element of variability in the biosphere and frequently jump to the conclusion that this is anthropogenically forced.

40. I work on CO2, temperature and water stress effects on crop plants. Best Wishes.

41. Question 30: Attribution involves apportioning causes. I interpret question 30 as asking to what extent we are confident that extreme events are wholly attributable to climate change, rather than to what level of confidence we can assess the contribution of climate change to extreme events. Question # 64 seems to be a tautology: if 'judge' means to 'evaluate the quality of' all judgments are based on quality only.

42. While I have significant expertise in regional climate modelling, I chose not to provide answers to your questions about regional climate modelling (19-22) because they make false assumptions about what RCMs are used for. RCMs perform dynamical downscaling of observations (driven by reanalysis data) for the historical period and by global climate models for the future - RCM means, mean trends and mean variances are all, in principle, determined by the driving data.

43. thank you for developing this questionnaire

44. Thanks for asking!

45. I would have liked a question preceeding each section on how competent one feels regarding that section. My knowledge on climate science is on an expert level, my knowledge on mitigation more that of an interested layman. Furthermore I found some questions (deliberately?) imprecise, e.g.: accuracy of GCMs on a grid scale? Their skillful scale? Continental scale? Global?

46. Campaign to contain the involvement of no scientists (political chieftains and government beaurocrats) out of the IPCC.

47. Note that I do not work with models (global or regional) personally, so don't feel I have the knowledge to rate their performance in individual areas. However, I would say that without observational constraint, models are virtually meaningless as far as the real world climate goes. The lack of any questions regarding measurements_seems a strange omission in your survey.

48. 1, Too many questions.2. The meaning of several questions is unclear. For example, what is the difference between Questions 13/14 versus 15/16

49. Several questions were not clear enough to give answers.

50. I almost discontinued half way through as I find the questions poorly scoped and badly articulated. I could easily take the results and spin them in just about any way I wanted because the requisite caveats and context is often missing. Moreover the questions are posed with an implicit assumption of homogeneity where the reality is highly heterogeneous. This is a poor survey.

51. Atmospheric modeling is not my direct research so I do not feel competent to comment on the reliability of the models

52. Some of these questions are poorly posed (eg 30 – forced climate changes and climate variability often contribute to extreme weather events, 35 - we need both adaptation and mitigation) or are leading questions (36) or else require either/ or answers when we require multiple approaches (78).

53. Adaptation may not be enough, but mitigation is fraught with unknown consequences, so it is important to be prudent in determining how to approach future action.

54. The 'debate' about climate change is a smoke screen promoted by industries which are being allowed to continue to be major polluters while the 'debate' continues. They know that any 'proof' will take decades to obtain. This 'debate' has resulted in large portions of the public, governments, and scientists becoming less focused on reducing all forms of pollution, both worldwide and in their own communities.

55. Good luck with it!

56. In dividual projections and predictions may have more validity than combinations of predictions, wherein errors compound and interpretablity of results becomes very questionable.

57. Humans can't be trusted with human affairs.

58. Climate science might be said to be in a crisis situation, especially as groups like AGU turn more towards advocacy. It is a $20+ billion research industry and is subject to distorting and pathological forces. Climate science also needs climate social science and humanities solid research.

59. The leading Global Change today is global population growth. Climate change is only one of 4-5 other significant types of global change.

60. My overall feeling is that the scientific assessment of climate change in AR4 was sufficient for society to act on climate change by reducing fossil fuel emissions; now the main issue is to motivate governments to act, and to get better findings on the regional level to inform mitigation and adaptation measures.

61. I have not answered some of these questions because they are simplistic, ambiguous or subject to misinterpreted answers.

62. The lack of publication of reasonable error estimates and the sources of errors in climate models (e.g., latent numerical noise interpreted as heat), including error estimates in predictions/projections, is a very serious concern.

63. The problem is overpopulation - but Islamists, Fundamentalists, Catholics, and other ists are the cause. The Chinese made a tough and unpopular choice. And it is working.

64. Why is it so important to you to gather opinions. Opinions basically count for nothing.

65. Have lots of fun with the evaluation. I am looking forward to the results.

66. This survey is highly dependent of the specific expertise of the person responding. Mostly b/c the questions concerned the anticipated success of climate models, which depends on the type of model our understanding of how climate dynamics play out, how the public influences political decisions, and how efficient are these policies. That is human behavior will mostly decide what will be the trends and values in the future. For this reason I did not complete all the responses.

67. In some responses i am assuming a specific context – response is valid for this context but not others. if this problem was extreme i didn't answer.

68. Interesting survey. Over 20 years ago when I began research on climate change I would have said the science was fairly clear and the issues well in hand. As time has gone on I have found the science to be less than convincing and arguments from the skeptics to have substance. Too much money and politics involved at this stage for the science to remain 'pure' in its analysis.

69. For respondents in the US/Storm'Sandy' area, is there pre and post event surveys? This is a post Sandy survey.

70. My answer to Q 78 is: To communicate the climate science effectively to the public (it is the role of others to carry out the tasks given by answers 2 and 3).

71. I regret to say that I think many of these questions were very poorly posed, or framed in an ambiguous way, or subject to more than one interpretation. I think that scientists who
72. conduct opinion polls ought to work with professionals in polling and ought to test the wording of the questions extensively to improve them. For example, the 'status' (# 65) of a scientist, to me, has almost nothing to do with number of publications or grants. Jule Charney had relatively few publications.