

*Course syllabus: History of Climate Science*

**Environmental Studies 402/History of Science 350**

**Topic: History of Climate Science**

Mon & Wed 4:00-5:15  
Science Hall 360  
#wischistsci350

**Instructor:**

Dr. Wilko Graf von Hardenberg  
DAAD Visiting Assistant Professor of Environmental History

**Contact details**

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**Course overview:**

Weather and climate influence our lives at many levels, from daily life to apocalyptic visions of the future. In recent years, debates about the role of human agency in climate change have become a central feature in environmental and political discourse. The contested role of humans as a force of global climate change has even led to the classification of a new geological epoch: the Anthropocene. This course explores the history of scientific ideas and practices, beginning in the 18th century, that serve as the foundation for modern conceptions of the weather and climate as a global system. Our aim is to put current scientific debates on climate change into historical and critical perspective as we seek to understand the ways climate has been interpreted and understood over time, both within and outside the scientific community.

**Course organization:**

Unless otherwise stated each week in the course is dedicated to a specific topic in the historical development of climate sciences. Monday meetings are usually traditional lectures, in which the issues at stake are presented to the class. Wednesday meetings are instead dedicated to seminar-like activities, such as review of reading material, historical contextualization of current debates in climate change science and public discourse, Q&A, and discussion. This course will also include online participation using the Twitter hashtag #wischistsci350.

**Assignments:**

Students are required to prepare three short essays discussing and contextualizing the assigned readings and discussions in class. Each paper should be around 1000 words. References to assigned readings can be given using Author-Date style ([http://www.chicagomanualofstyle.org/tools\\_citationguide.html](http://www.chicagomanualofstyle.org/tools_citationguide.html)). Papers are due, in pdf and by e-mail, before the beginning of class on

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Oct 11 (Weeks 2-6), Nov 8 (Weeks 7-10) and Dec 6 (Weeks 11-14) respectively.

The take-home final exam will consist of five questions, covering all topics touched in the course of lectures and requiring the students to make links between its different components, assigned readings, and lecture notes. Each question will count for a fifth of the final exam grade.

**Grading**

Letter grades will be converted from a 100-point scale. The following conversion chart applies: 93-100 = A; 88-92 = AB; 83-87 = B; 78-82 = BC; 70-77 = C; 60-69 = D; 59-below = F.

Grades per coursework will be broken down as follows:

Participation		–	25 pts
Paper 1	Due 11 Oct 2013	–	15 pts
Paper 2	Due 8 Nov 2013	–	15 pts
Paper 3	Due 6 Dec 2013	–	15 pts
Final exam	Due 20 Dec 2013	–	30 pts

**Extra assignments for graduate students**

Some departments require graduate students to do extra work to qualify for credit on undergraduate classes. Students that have such a requirement will have to write reviews of the following books:

- Fleming, James Rodger, and Vladimir Janković. *Klima*. Chicago, Ill.: University of Chicago Press, 2011. <http://www.jstor.org/stable/10.1086/661286>
- Hamblin, Jacob Darwin. *Arming Mother Nature: The Birth of Catastrophic Environmentalism*. New York: Oxford University Press, 2013.
- Weart, Spencer R. *The Discovery of Global Warming*. Cambridge, Mass.: Harvard University Press, 2003.

The book reviews should be standard length (between 750 and 1000 words). The due date is December 11, but students should feel free to split the work over the semester and submit one or more reviews earlier than that. Presenting one of these books to the class in late November - early December is optional and in case of interest will count as extra credit.

I have adapted the grading rubric for graduate students submitting book reviews as follows:

Participation		–	20 pts
Paper 1	Due 11 Oct 2013	–	12 pts
Paper 2	Due 8 Nov 2013	–	12 pts
Paper 3	Due 6 Dec 2013	–	12 pts
Book reviews	Due 11 Dec 2013	–	24 pts (8 pts each)
Final exam	Due 20 Dec 2013	–	20 pts
<i>In class presentation (extra credit)</i>		–	<i>5 pts</i>

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**Course policies:**

*Attendance:* Attending classes is the student's responsibility and attendance will not be taken. This class has a strong seminarial character and your involvement is essential for the course to reach its pedagogical goals. As a reminder: just showing up to class is necessary, but not sufficient, to gain grades for participation.

According to campus wide rules on religious observance I invite you, nonetheless, to notify me within the first two weeks of class of the specific dates for which you request relief for religious observance, since these may affect your ability to respect the assignments' deadlines.

*Reading assignments:* Reading the book chapters and articles given in the course schedule before classes is expected. These texts are the core materials of the course and will allow you to participate actively in discussion: their reading will affect your participation grade and is essential for a successful completion of written assignments.

*Academic integrity:* In any written assignment it is necessary to acknowledge and fully quote your sources and references. You should NEVER attribute to yourself, or give the impression that you are attributing to yourself, the words and phrasing of others. Plagiarism is an unacceptable ethical infraction and can lead to serious consequences. For further information on how to avoid plagiarism please refer to the UW-Madison Writing Center webpages:

<http://writing.wisc.edu/Handbook/QuotingSources.html>

*Communication:* E-mails will be answered only on weekdays 10am-3pm. If you have any questions that require a longer answer please drop by during office hours or arrange a meeting. You may as well use the course hashtag #wischisci350 for questions of interest to the whole class. In e-mails please always use a subject line and clarify which course you have a question about.

*Submitting Work:* All written assignments must be submitted by e-mail in pdf format by the date and time given in the course schedule. The student's name, course title, and due date of the paper should appear clearly on top of the paper. Formatting should be 12pt font, double spacing, 1 inch margins. Pages should be numbered. If you submit late your papers will receive a reduced grade (1 point for each day of delay). No late submissions will be accepted for the final exam.

*Modifications to Syllabus:* The syllabus may be subject to changes. Reasonable notice will be given.

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**Course Schedule**

**Week 1**

4 Sep 2013 *Introduction of course and presentation of the syllabus*

**Week 2**

9 and 11 Sep 2013 *Pre-histories of climate science*

- Fleming, James Rodger. *Historical Perspectives on Climate Change*. New York: Oxford University Press, 1998. Introduction and Chapters 1 to 4, 3-54
- Lüdecke, Cornelia. “Astrometeorological Weather Prediction at the Time of the Societas Meteorologica Palatina.” In *From Beaufort to Bjerknes and Beyond: Critical Perspectives on Observing, Analyzing, and Predicting Weather and Climate : a Collection of Nineteen Essays Evolving from a Conference of the International Commission on History of Meteorology (ICHM) Held in the Baroque Library of Kloster Polling, Germany, July 5-10, 2004*, edited by Stefan Emeis and Cornelia Lüdecke, 69–80. Augsburg: Rauner, 2005.
- Jefferson, Thomas. “‘Climate’ A Notice of All What Can Increase the Progress of Human Knowledge?” In *Notes on the State of Virginia*, 201–209, 1781.  
<http://is.gd/JeffersonClimate>

**Week 3**

16 and 18 Sep 2013 *Fourier and the temperature of the earth*

- Emeis, Stefan. “The Discovery of Latent Heat 250 Years Ago.” In *From Beaufort to Bjerknes and Beyond: Critical Perspectives on Observing, Analyzing, and Predicting Weather and Climate : a Collection of Nineteen Essays Evolving from a Conference of the International Commission on History of Meteorology (ICHM) Held in the Baroque Library of Kloster Polling, Germany, July 5-10, 2004*, edited by Stefan Emeis and Cornelia Lüdecke, 23–33. Augsburg: Rauner, 2005.
- Fleming, James Rodger. *Historical Perspectives on Climate Change*. New York: Oxford University Press, 1998. Chapter 5, 55-64
- Fourier, Jean-Baptiste Joseph. “General Remarks on the Temperature of the Earth and Outer Space.” Translated by Ebeneser Burgess. *American Journal of Science* 32 (1837): 1–20.

**Week 4**

23 and 25 Sep 2013 *Tyndall and Arrhenius*

- Fleming, James Rodger. *Historical Perspectives on Climate Change*. New York: Oxford University Press, 1998. Chapter 6, pp. 65-82
- Tyndall, John. “On the Absorption and Radiation of Heat by Gases and Vapours, and on the Physical Connection of Radiation, Absorption, and Conduction.” *The London Edinburgh and Dublin Philosophical Magazine and Journal of Science [Fourth Series]* 22 (1861): 169–194, 273–285.

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- Arrhenius, Svante. “On the Influence of Carbonic Acid in the Air Upon the Temperature.” *The London Edinburgh and Dublin Philosophical Magazine and Journal of Science [Fifth Series]* 41 (1896): 237–276.

**Week 5**

30 Sep 2013 *Meteorology*

- Anderson, Katharine. *Predicting the Weather : Victorians and the Science of Meteorology*. Chicago: University of Chicago Press, 2005. Chapters 3 and 4, 83-169
- Gooday, G. “Cosmos, Climate and Culture: Manchester Meteorology Made Universal.” *Manchester Region History Review* 18 (Special issue: The history of science and technology in the North West) (2007): 64–83.

2 Oct 2013 *Film screening*

- TBA. Selected parts of a documentary film relevant to the course topic will be screened.

**Week 6**

7 and 9 Oct 2013 *Climate science as an imperial science*

- Davis, Mike. *Late Victorian Holocausts: El Niño Famines and the Making of the Third World*. New York: Verso, 2002. Part III Deciphering ENSO, 213-276
- Anderson, Katharine. *Predicting the Weather : Victorians and the Science of Meteorology*. Chicago: University of Chicago Press, 2005. Chapters 5 and 6, pp. 171-284

**Week 7**

14 and 16 Oct 2013 *Fieldworks*

- Vetter, Jeremy. “Lay Observers, Telegraph Lines, and Kansas Weather: The Field Network as a Mode of Knowledge Production.” *Science in Context* 24, no. 02 (April 28, 2011): 259–280.
- Fleming, James Rodger. “Planetary-Scale Fieldwork. Harry Wexler on the Possibilities of Ozone Depletion and Climate Control.” In *Knowing Global Environments: New Historical Perspectives on the Field Sciences*, edited by Jeremy Vetter, 190–211. Rutgers University Press, 2011.
- Sörlin, Sverker. “The Anxieties of a Science Diplomat: Field Coproduction of Climate Knowledge and the Rise and Fall of Hans Ahlmann’s ‘Polar Warming’.” *Osiris* 26, no. 1 (January 1, 2011): 66–88.

**Week 8**

21 and 23 Oct 2013 *The science behind climate reference points*

- Carey, Mark. “The History of Ice: How Glaciers Became an Endangered Species.” *Environmental History* 12, no. 3 (July 1, 2007): 497–527.
- Beattie, J. J. “Climate Change, Forest Conservation and Science: A Case Study of New Zealand, 1860s-1920.” *History of Meteorology* no. 5 (2009): 1–18.
- Hannah, John. “The Difficulties in Using Tide Gauges to Monitor Long-Term Sea Level Change.” Sydney, Australia, 2010.

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**Week 9**

28 and 30 Oct 2013 *Determinism and global warming*

- Weart, Spencer R. “Global Warming, Cold War, and the Evolution of Research Plans.” *Historical Studies in the Physical and Biological Sciences* 27, no. 2 (January 1, 1997): 319–356.
- Fleming, James Rodger. *Historical Perspectives on Climate Change*. New York: Oxford University Press, 1998. Chapters 7-10, pp. 83-138
- Callendar, G.S. “The Artificial Production of Carbon Dioxide and Its Influence on Temperature.” *Quarterly Journal Royal Meteorological Society* 64 (1938): 223–240.

**Week 10**

4 and 6 Nov 2013 *Predictions and Climate Modeling*

- Coen, Deborah R. “Felix Exner and the Probabilistic Turn in Austria Meteorology.” In *From Beaufort to Bjerknes and Beyond: Critical Perspectives on Observing, Analyzing, and Predicting Weather and Climate : a Collection of Nineteen Essays Evolving from a Conference of the International Commission on History of Meteorology (ICHM) Held in the Baroque Library of Kloster Polling, Germany, July 5-10, 2004*, edited by Stefan Emeis and Cornelia Lüdecke, 143–156. Augsburg: Rauner, 2005.
- Harper, Kristine C. “Research from the Boundary Layer: Civilian Leadership, Military Funding and the Development of Numerical Weather Prediction (1946-55).” *Social Studies of Science* 33, no. 5 (2003): 667–696.
- Lynch, Peter. “The Origins of Computer Weather Prediction and Climate Modeling.” *Journal of Computational Physics* 227, no. 7 (March 2008): 3431–3444.

**Week 11**

11 and 13 Nov 2013 *An epic of climate control*

- Fleming, James Rodger. *Fixing the Sky*. Columbia Studies in International and Global History. New York: Columbia Univ. Press, 2010. Chapters 2, 3 and 5, 49-108, 137-164

**Week 12**

18 and 20 Nov 2013 *From climate control to geo-engineering*

- Fleming, James Rodger. *Fixing the Sky*. Columbia Studies in International and Global History. New York: Columbia Univ. Press, 2010. Chapters 7 and 8, 189-268

**Week 13**

25 and 27 Nov 2013 *Climate change skepticism*

- Oreskes, Naomi, and Erik M Conway. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. New York: Bloomsbury Press, 2010. “The Denial of Global Warming,” 169–215
- Howe, Joshua P. “The Stories We Tell. Naomi Oreskes and Erik M. Conway. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*” *Historical Studies in the Natural Sciences* 42, no. 3 (June

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2012): 244–254.

- Hamblin, Jacob D. ed., Roundtable Review of Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming by Naomi Oreskes and Erik M. Conway. *H-Environment Roundtable Reviews* 1, no. 2 (July 2011)

**Week 14**

2 and 4 Dec 2013     *The Intergovernmental Panel on Climate Change*

- Le Treut, Hervé et al. “Historical Overview of Climate Change Science.” In *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by S. Solomon et al. Cambridge, United Kingdom and New York, USA: Cambridge University Press, 2007, 93-127
- IPCC. “Climate Change 2007: Synthesis Report” (2007), 26-73
- Agrawala, Shardul. “Structural and Process History of the Intergovernmental Panel on Climate Change.” *Climatic Change* 39, no. 4 (August 1, 1998): 621–642.
- Hulme, Mike, and Martin Mahony. “Climate Change: What Do We Know About the IPCC?” *Progress in Physical Geography* (June 18, 2010).

**Week 15**

9 Dec 2013     *Philosophy, models and the Anthropocene*

- Petersen, Arthur C. “Philosophy of Climate Science.” *Bulletin of the American Meteorological Society* 81, no. 2 (February 2000): 265–271.
- Zalasiewicz, Jan, Mark Williams, Alan Smith, Tiffany L. Barry, Angela L. Coe, Paul R. Bown, Patrick Brechley, et al. “Are We Now Living in the Anthropocene.” *GSA Today* 18, no. 2 (2008): 4.
- Steffen, Will, Jacques Grinewald, Paul J. Crutzen, and John R. McNeill. “The Anthropocene: Conceptual and Historical Perspectives.” *Philosophical Transactions of the Royal Society A* no. 369 (2011): 842–867.

11 Dec 2013     *Summary, conclusions and discussion*

Exam questions will be provided at the end of this meeting.

20 Dec 2013     *Final exam due (9.25 pm)*

Final exams are expected via e-mail in pdf format.