Climate Dynamics Seminar

Contact Information

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Design and Objectives

This course will include conceptual introductions to a wide variety of topics in climate research, including both core and controversial issues. The course will be structured as a seminar. Students will take turns presenting and leading classroom discussions.

The primary objective of the course is for students to gain experience presenting scientific material in English, leading a discussion in a classroom setting, and actively participating in scientific discussions. Students should particularly work on learning to identify and ask questions about unfamiliar topics. Students will also become familiar with some of the key questions that climate scientists are currently facing, while developing a deeper understanding of the fundamentals of large-scale climate dynamics.

Materials

The course will be centered on a climate dynamics blog created and maintained by Prof. Isaac Held (http://www.gfdl.noaa.gov/blog/isaac-held/). Prof. Held is the head of the Weather and Atmospheric Dynamics Group at the NOAA Geophysical Fluid Dynamics Laboratory, a member of the United States National Academy of Sciences, and lecturer in the Atmospheric and Oceanic Sciences Program at Princeton University. Each post contains links to relevant papers in the peer-reviewed literature.

Evaluation

Students will be evaluated based on participation, including performance presenting and leading discussion and willingness to contribute to discussions led by other students. Students should consider the following guidelines when preparing presentations:

1. Each presentation should be approximately 20 minutes, followed by a 25-minute discussion.
2. The content and form of the presentation are up to you, but be sure to cover the basic ideas in the post as clearly as you can. It is not necessary to understand the material completely — focus on what you do understand, and include any questions that you still have.
3. If possible, include a discussion of the published papers linked to within the post.
4. Make sure to look through the comments on the post for related topics and ideas.
5. Be prepared to answer questions and facilitate the discussion. Consider creating extra slides for this purpose.

Students who are not presenting should be sure to read each blog post prior to class and write down at least one question or comment to contribute to the discussion. These will be collected at the end of each class and count toward the participation grade.

Course Schedule

1. Why focus so much on global mean temperature? (post 7)
   Summer is warmer than winter (post 9)
2. The simplicity of the forced climate response (post 3)
   Transient vs equilibrium climate responses (post 4)
3. Time-dependent climate sensitivity? (post 5)
   The recalcitrant component of global warming (post 8)
4. Transient response to the well-mixed greenhouse gases (post 6)
   Volcanoes and the transient climate response (post 49 and post 50)
5. Estimating the transient climate response from recent warming (post 27)
   NH-SH differential warming and the transient climate response (post 38)
6. Heat uptake and internal variability, pt. 1 (post 16 and post 17)
   Heat uptake and internal variability, pt. 2 (post 44)
7. Is continental warming a slave to warming of the ocean surface? (post 11)
   Modeling land warming given oceanic warming (post 32)
8. Temperature trends: MSU vs. an atmospheric model (post 21)
   Summer temperature trends over Asia (post 34)
9. Atlantic variability and aerosols (post 35)
   The global warming hiatus, La Niña, and US drought (post 41 and post 45)
10. Radiative-convective equilibrium (post 19 and post 43)
    Extremes (post 30)
11. The strength of the hydrological cycle (posts 13)
    Surface salinity trends (post 14)
12. The moist adiabat and tropical warming (post 20)
    Fixed anvil temperature (post 39)
13. Relative humidity feedback (post 25)
    Relative humidity in models (post 26 and post 31)
14. Relative humidity over the oceans (post 47)
    Increases in column water vapor over the oceans (post 48)
15. Tropical cyclones in global models (post 2 and post 33)
    Atlantic hurricanes and differential warming (post 10)
16. Tropical rainfall and interhemispheric energy transport (post 37)
    Aqua-planet hurricanes and the ITCZ (post 42)

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