

ATS762, Spring 2009
Biosphere-Chemistry-Climate Interactions
Tuesdays and Thursdays, 14:00-14:50 AM, 212B ACRC

Instructor: Prof. Colette Heald
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Objective:

- To discuss and explore the sensitivity of the climate system to the chemical composition of the atmosphere with an emphasis on the connections to biospheric processes and feedbacks

Pre-requisites: ATS 621 or by permission of instructor

Office Hours: None officially scheduled. Meetings to be arranged by request.

Primary Text:

IPCC Fourth Assessment Report, Working Group 1 Report “The Physical Science Basis” (available online: <http://www.ipcc.ch/ipccreports/ar4-wg1.htm> or can be purchased via Cambridge University Press
All other material for the class will be taken from the recent literature

Background Texts:

Daniel J. Jacob, Introduction to Atmospheric Chemistry, Princeton University Press, 1999.
John H. Seinfeld and Spyros N. Pandis, *Atmospheric Chemistry and Physics: from Air Pollution to Climate Change*, 2nd Ed. John Wiley and Sons, 2006.

Course Structure and Grading Criteria:

Students will alternate leading weekly discussions on topic-relevant literature. The student will select 2-4 papers on the topic from the recent literature and will prepare a short (20 min) overview oral presentation on the papers. They will then formulate some questions for discussion and lead the class discussion of each topic. These presentations will be evaluated as well as their overall participation in discussions each week. Note that the Thursday discussion leader must provide the references for discussion to the class by email on the previous Tuesday. If you would like suggestions for relevant literature, speak with Colette the week before you are scheduled to lead the discussion.

At the end of the semester each student is to prepare a written proposal for research on a topic of their choice, related to the material discussed in this course. This proposal should be formatted and presented as a proposal to a funding agency, including a relevant survey of literature, motivation and objectives of research and methods proposed. Further guidelines and grading criteria will be distributed.

Grades are weighted as follows:

In-class Presentations: 35%

Discussion Participation: 30%

Written Proposal: 35%

Date			TOPIC	THURSDAY DISCUSSION LEADER	BACKGROUND READING
January	20	Tu	Intro/Course Outline/Schedule sign-up	Colette Heald	<i>IPCC technical summary and section 7.1</i> <i>Monson and Holland, 2001</i>
		22	Th		
	27	Tu	Biogenic VOCs	Leigh Patterson	<i>Guenther et al., 2006</i>
	29	Th			
February	3	Tu	Biogenic aerosol: SOA and primary biological aerosol	Mandy Holden	<i>IPCC section 7.5.1.3, 7.5.1.6</i> <i>Griffin et al., 1999</i> <i>Jaenicke et al., 2005</i>
		5			
	10	Tu	Atmospheric nitrogen (biospheric sources, lightning, partitioning)	Katie Beem	<i>IPCC section 2.10.3.4, 7.4.2</i> <i>Schumann and Huntreiser, 2007</i> <i>Martin et al., 2007</i> <i>Jaegle et al., 2004</i>
		12			
	17	Tu	Wildfires / Deforestation / Land use change	Gena Renninger	<i>IPCC section 2.4.4.4, 2.5, 7.3.3.1, box 11.4</i> <i>Westerling et al., 2007</i>
		19			
	24	Tu	The carbon cycle (feedbacks, lifetimes, changing sinks/sources, CO ₂ fertilization) w/ Scott Denning	Li Yi	<i>IPCC section 7.3</i> <i>Sarmiento and Gruber, 2002</i>
		26			
March	3	Tu	Ocean biogeochemistry (Fe deposition, N fixation, phytoplankton) w/ Taka Ito	Laurie Mack	<i>IPCC 7.3.4</i>
		5			
	10	Tu	Atmospheric sulfate (DMS & CLAW hypothesis)	Xinhua Shen	<i>IPCC section 2.4.4.1, 7.5.1.4</i> <i>Charlson et al., 1987</i>
		12			
	17	Tu	<i>Spring Break – no class</i>		
	19	Th			
	24	Tu	Atmospheric methane (emissions and chemical production)	Bonne Ford	<i>IPCC section 2.3.2, 7.4.1</i> <i>Wuebbles and Hayhoe, 2002</i>
		26			
April	31	Tu	Air quality and climate (Urban/regional/global, intercontinental transport)	Ezra Levin	<i>IPCC section 2.3.6.2, box 7.4, 7.4.4</i> <i>Jacob and Winner, 2008</i>
		2			
	7	Tu	<i>No class</i>		
	9	Th			
	14	Tu	Stratospheric Chemistry	Kelley Wells	<i>IPCC section 2.3.6.1/2.3.7, 7.4.6</i> <i>WMO Report 2006 (Executive Summary)</i> Apr 16: proposal topics due
		16			
	21	Tu	Climate and meteorology I (Atmospheric transport)	Anna Harper	<i>IPCC section 3.5</i> <i>Mickley et al., 2004</i>
		23			
	28	Tu	Climate and meteorology II (Global hydrological cycle) w/Chris Kummerow	Colette Heald	<i>IPCC section 3.3, 3.4.2, 3.4.3, Table 11.2</i>
		30			
May	5	Tu	Geo-engineering of climate (discussion both days)	Colette Heald	<i>Special Issue of Climatic Change (2006)</i> May 7: written proposals due
		7			