EAS6410 ATMOSPHERIC CHEMISTRY

Instructor: Professor Yuhang Wang

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Textbooks: *Atmospheric Chemistry and Global Change*, ed. by G. P. Brasseur, J. J. Orlando, and G. S. Tyndall, Oxford University Press, 1999,

Or *Atmospheric Chemistry and Physics: From Air Pollution to Climate Change*, by J. H. Seinfeld and S. N. Pandis, Wiley-Interscience 2006.

Supplement textbook: *Introduction to Atmospheric Chemistry*, by D. J. Jacob, Princeton University Press, 1999. (http://acmg.seas.harvard.edu/people/faculty/djj/book/index.html)

Class: ES&T L1116, Tues/Thursday 4:30-6 pm

Office hours: Tues/Thursday 3-4:30 pm

Web: http://apollo.eas.gatech.edu/EAS6410

Homework:

	Assignment date	Due date
#1	Jan 12	Jan 26
#2	Jan 26	Feb 14
#3	Feb 14	Feb 28
#4	Feb 28	Mar 6
#5	Mar 29	Apr 12

Syllabus:

Date	Topics	BOT Chapters
Jan 10, 12	The earth system; atmospheric composition and structure	1, 16
Jan 17, 19	Tropospheric and stratospheric circulation and transport	2
Jan 24, 26	The carbon cycle and equilibrium reactions	15
Jan 31, Feb 2	Chemical kinetics	3
Feb 7, 9	Catalysis; reactions in droplets	3, 4
Feb 14, 16	Radiation, greenhouse effects, and photolysis	3,5
Feb 21, 23	Numerical methods; stratospheric ozone: Chapman mechanism	12, 14
Feb 28, Mar 2	Odd-hydrogen and odd-nitrogen chemistry	6, 7
Mar 6, 8	Halogen chemistry; polar ozone depletion	8
Mar 13, 15	Distribution of tropospheric trace gases; mid-term exam	
Mar 20, 22	Spring recess	
Mar 27, 29	Tropospheric ozone; oxidizing power of the atmosphere (Group assignment and term paper topics due)	13
Apr 3, 5	Tropospheric reactive nitrogen and hydrocarbons	7, 9
Apr 10, 12	Tropospheric sulfur and halogen chemistry	8, 10
Apr 17, 19	Group projects	
Apr 24, 26	Term paper presentation	

Grade:

Homework	**30%**
Midterm exam	**20%**
Group projects	**15%**
Term paper	**35%**

Group projects:

2012

- Long Term Trends of Surface Ozone Level

- Geoengineering

- Wild fires, Climate, and Air quality

2010

- GHG Cap and Trade Proposals: Balancing Environmental Integrity with Cost Certainty
- Semi-Volatile Organic Compounds (SVOC) and Secondary Organic Aerosol (SOA) Formation

2008

- An Unknown Source of Atmospheric OH
- Glyoxal and Methylglyoxal; Chemistry and Their Effects on Secondary Organic Aerosol

2007

- Halogen chemistry in the troposphere
- Ice ages and global warming
- Greenhouse gas emissions in India: Implications to climate change

2006

- Recent trend of stratospheric water vapor and its impacts
- Ozone depletion and polar sunrise
- A hydrogen economy's potential environmental impacts

2005

- Evolution of Mars
- Review: Constraining global isoprene emissions with GOME formaldehyde column measurements

2004

- Melting of ice sheets: A slippery slope?
- Forest fires: Particulate effects on global climatology
- Liquid stratospheric aerosol modeling
- Asian pollution transport to the United States

2003

- Air quality modeling
- Indoor air pollution
- Land use-climate interaction

Term papers:

2012

	Topics
Steph Diadas	Effect of Atmospheric SOx on Aminosilica Adsorbents for Air Capture
Xiaoxi Liu	Gas/Particle Partitioning of Polycyclic Aromatic Hydrocarbons in the Spring of Beijing, China
Tom Loadholt	Investigation of Tracer Species in HIPPO I
Matt Kollman	Characterization of Aerosols at Fire Station 8, Atlanta, GA
Benjamin Sheyko	Biological Aerosol's Role as Ice Nuclei: Assessing Upper Tropospheric Bacteria Concentrations and Genus
Lu Xu	Aerosol composition at a rural site southeast of London measured by high resolution mass spectrometry
Ran Yin	Study on NOx lifetime in chemistry transport model
Zhenzhen Yin	Improvement of Cloud Cover Fraction parameterization in Chemistry Transport Model(CTM)
Yuzhong Zhang	Simulate the vertical profile of methanesulfonic acid (MSA) over tropical Pacific

2010

	Topics
Andrew de Russy	Savannah Georgia Sulfur Dioxide
Ja-Ho Koo	Estimation for vertical profile of BrO in the Arctic spring
Zhen Liu	Uncertainties in VOC source apportionment using receptor models: A case study for Beijing, China
Allison Mencer	Contrails: A case study in Decatur, GA
Kyle Manning	Trends in [O3], [SO2], and [HNO3] in the southeast and possible implications to SVOC, SOA and AOT in the troposphere

2008

	Topics
Shannon Capps	Atmospheric Mercury: From emission to deposition
Sungyeon Choi	Study on Correlation between Tropospheric Bromine Monoxide Level and First-year Sea Ice

Dasa Gu	OMI Tropospheric NO_2 in China
Patrick Laine	Predicting Gas Phase Kinetic Data for Organic Compounds
Charles Smeltzer	Boundary Layer CO Diffusion

2007

	Topics
Sivaihm Balachandra	Impact of biodiesel in ozone production in Atlanta
David Damm	Emissions scenarios under a hydrogen economy
Greg McCormick	Global changes from world fossil fuel energy exhaustion
Jin Liao	Simple chemical modeling of ozone sensitivity to NOx and VOCs in Atlanta
Chandra Sherhar	Mixing state of aerosols: Excess atmospheric absorption paradox
Bo Yao	Source identification of aerosols in Mexico City
Xiaolu Zhang	Temporal and spatial variations of PM2.5 mass in Georgia

2006

	Topics
Even Cobb	Long-term temporal and seasonal variations in PM2.5 concentrations in Atlanta, Georgia as measured by the ASACA project
Xueyuan Deng	The effect of large scale oscillitions on arctic surface ozone concentrations
Steve Rieck	Stratospheric methane
Ning Shen	A simple reaction-diffusion model for gas-solid interaction in the atmosphere
Chun Zhao	The application of KF-convection scheme in chemistry transport model

2005

	Topics
Burton Gray	Tracking SO_2 in Antarctica Using ISCAT 2000 Data
Luz Padro	Effect of Solute Core Curvature on Solubility
Wei-Chun Hsieh	Calculating equilibrium droplet sizes under different RHs and its applications
Zhijun Zhao	A Simple Model for Regional Near-Surface HOx
Israel Free	Dimethyl selenium

2004

	Topics
Akua Asa-Awuku	The impact of secondary organic aerosol derivatives of isoprene on cloud formation and albedo
Dave D'Onofrio	North Atlantic Oscillation and its influence on ozone in London
Christos Fountoukis	Evaluation of an aerosol activation parameterization
Tom Hanley	The effects of global pollution on solar power efficiency
Kelly Huard	Metro Atlanta air pollution: O_3 and PM2.5 at Yorkville and Jefferson St.
Saewung Kim	Snowpack photochemistry - focused on the PAN(peroxyacetyl nitrate) in Summit Greenland
Sangil Lee	Particulate matter and its sources in Georgia
Dian Putrasahan	Ozone depletion: BrOx-HOx-NOx chemistry
Andrea Thompson	Comparison of ozone concentrations between Atlanta and other Georgia cities
Robyn Williams	Assessing optical, thermodynamic and physical properties of aerosols by simulating LIDAR response
Bo Yan	Evaluation of secondary organic aerosols in Atlanta
Farhana Yasmin	Iodine chemistry and its role in ozone depletion
Jie Zhu	Simulative study on the sources and sinks of OCS under lightning

2003

	Topics
Arsineh Hecobian	Ozone trend in a residential area in Las Vegas 2001
Kim Kubera	Surface ozone and lower atmospheric temperature inversions
Sara Lance	Looking at ammonia in ACE-1 data
Yaqiu Li	Volcanoes and stratospheric ozone depletion
Helena Park	PM 2.5 source apportionment and control strategy
Rick Peltier	Acid Aerosol measurement
Rosa Sohn	Inverse modeling
Jiangfeng Wei	Response of total ozone to ENSO in the tropics
Yang Zhang	Photolysis rate of ozone
Wenyan Yu	Uptaking ozone by lung