

AOS 801 FALL 2017: RADIATION AND ENERGY IN THE CLIMATE SYSTEM

TOPIC AND READING SCHEDULE

Date	Topics	References*
Sep. 6	Course Overview, Review of Radiometric Concepts – Planck, Boltzmann, Wein, Flux vs. Radiance	Lecture Notes
Sep. 8	Review of Radiative Transfer – Radiative Transfer Equation, Two-Stream Models, Radiative Heating	Lecture Notes
Sep. 11	Earth's Energy Budget – Top of Atmosphere Balance, Greenhouse Effect, Surface Fluxes, Imbalances	Dines (1917), Vonder Haar and Suomi (1971), Hansen et al. (2005), Trenberth et al. (2014)
Sep. 13	Earth's Energy Budget – Modern Controversy, Zonal Imbalances, Meridional Heat Transport	Trenberth et al. (2009), Stephens et al. (2012), Trenberth and Caron (2001)
Sep. 20	Guest Lecture: Former 801 Students	McIlhattan et al. (2017); Gleckler et al. (1995)
Sep. 25	Radiative Forcing of Climate	Lecture Notes, Hansen et al. (1997)
Oct. 2	Greenhouse Gas and Cloud Forcing of Climate	Stephens and Greenwald (1991a), Harrison et al. (1990), Ockert-Bell and Hartmann (1992), Hartmann et al. (1992)
Oct. 4	Aerosol Forcing of Climate – Direct Effects, Indirect Effects, Semi-direct Effects	Yu et al. (2006), Wild et al. (2005), Matus et al. (2015), Twomey (1977), Albrecht (1989), Stevens and Feingold (2009)
Oct. 11	Guest Lecture: Ankur Desai – Topics in measuring and modeling surface-atmosphere heat exchanges	Foley et al (2003)
Oct. 16	Radiative-Convective Equilibrium – Convection, Simple Models	Manabe and Moller (1961), Manabe and Strickler (1964), Manabe and Wetherald (1967)
Oct. 18	Radiative-Convective Equilibrium – Clouds, Complex Models	Stephens and Webster (1981), Emanuel et al. (2013), van den Heever et al. (2011)
Oct. 20 makeup	Energy Balance Models – Simple EBMs, Ice-albedo Feedback, The Faint Young Sun and Ice Catastrophe	Lecture Notes, Budyko (1969), Sellers (1969),
Oct. 23	Energy Balance Models – Weather and Climate, Time-dependent EBMs, Stochastically-forced EMBs	Lorenz (1979), Hasselman (1976), Robock (1978)
Oct. 25	Feedbacks in the Climate System – General Theory, Stefan-Boltzmann Feedback, Greenhouse Gas Feedbacks, Biosphere Feedbacks (Daisyworld)	Lecture Notes, Rasool and de Bergh (1970), Held and Soden (2000), Watson and Lovelock (1983), Wood et al. (2008)
Oct. 30	Cloud Feedbacks – High-cloud Feedback, Low Cloud Feedback	Lecture Notes, Ramanathan and Collins (1991), Clement et al. (2009), Dessler (2010)
Nov. 1	Cloud Feedbacks II – The Iris Hypothesis	Lindzen et al. (2001), Hartmann and Michelsen (2002), Lin et al. (2002)
Nov. 6	Climate Sensitivity – Introduction to Climate Sensitivity	Lecture Notes, Gregory et al. (2004)
Nov. 8	Methods for Computing Climate Sensitivity	Hansen et al. (2005)
Nov. 13	Climate Sensitivity – Response Timescales, Separating Forcing, Responses, and Feedbacks	Forster and Gregory (2006), Andrews et al. (2012)
Nov. 15	Climate Sensitivity – Radiative Kernels	Soden et al. (2008), Sherwood et al. (2015), Chung and Soden (2015)
Nov. 20 & 27	Guest Lectures: The Global Water Cycle and TRMM/GPM research	Trenberth et al. (2008), Wentz et al. (2007), Stephens and Ellis (2008); Adler et al. (2014)
Dec. 4	Individual Project Presentations	Students
Dec. 6	Team Project Synthesis	Students

* All course references can be found on the course website: <http://aos.wisc.edu/~tristan/aos801>

PAPER PRESENTATION SIGN-UP

Sign up for one review in each section. Please sign up for two single-paper and one multi-paper review.

Topic	Paper(s)	Presenter	Secondary	Date
ERB	Hansen et al. (2005) & Trenberth et al. (2014)	Collin Tuttle	Anne Sledd	9/11
ERB	Trenberth et al. (2009) & Stephens et al. (2012)	CJ Begalke	Robert Kelnosky	9/13
Transports	Trenberth and Caron (2001)	Andrew Dzambo	Ke Yang	9/13
Forcing and Transports	Gleckler et al. (1995) (out of sequence)	2015 Students		9/20
Radiative Forcing	Hansen et al. (1997)	Coda Phillips	Chuck White	9/25
Radiative Forcing	Stephens and Greenwald (1991)	Anne Sledd	Ke Yang	10/2
Radiative Forcing	Harrison et al. (1990)	Chuck White	Collin Tuttle	10/2
RCE	Stephens and Webster (1981)	Robert Kelnosky	CJ Begalke	10/16
RCE	Emanuel et al. (2006)	Ke Yang	Andrew Dzambo	10/18
RCE	van den Heever et al. (2011)	Tristan L'Ecuyer	Coda Phillips	10/18
Stochastic EBM	Hasselmann (1976)	Chuck White	Coda Phillips	10/23
Stochastic EBM	Robock (1978)	Andrew Dzambo	CJ Begalke	10/23
Stochastic EBM	Lorenz (1979)	Robert Kelnosky	Chuck White	10/23
Water Vapor Feedback	Rasool and de Bergh (1970) and Held and Soden (2000)	Andrew Dzambo	Anne Sledd	10/25
Biological Feedbacks	Watson and Lovelock (1983) & Wood et al. (2008)	Collin Tuttle	Coda Phillips	10/25
Cloud Feedbacks	Ramanathan and Collins (1991), Clement et al. (2009), and Dessler (2010)	Ke Yang	Andrew Dzambo	10/30
Iris Hypothesis	Lindzen et al. (2001), Hartmann and Michelsen (2002), and Lin et al. (2002)	CJ Begalke	Anne Sledd	11/1
Climate Sensitivity	Gregory et al. (2004)	Anne Sledd	Robert Kelnosky	11/6
Climate Sensitivity	Hansen et al. (2005)	Robert Kelnosky	Ke Yang	11/8
Climate Sensitivity	Forster and Gregory (2006)	Coda Phillips	Chuck White	11/13
Responses	Andrews et al. (2012)	Anne Sledd	Collin Tuttle	11/13
Radiative Kernels	Soden et al. (2008)	Ke Yang	Andrew Dzambo	11/15
Responses	Sherwood et al. (2015)	CJ Begalke	Collin Tuttle	11/15
Radiative Kernels	Chung and Soden (2015)	Collin Tuttle	CJ Begalke	11/15
Water Cycle*	Trenberth et al. (2008)	Dave Henderson		11/20
Water Cycle*	Wentz et al. (2007) & Stephens and Ellis (2008)	Coda Phillips	Robert Kelnosky	11/27
Water Cycle*	Adler et al. (2017)	Chuck White	Dave Henderson	11/27
Entropy and Climate	Stephens and O'Brien (1993)	N/A	N/A	N/A
Entropy and Climate	Stephens and O'Brien (1995)	N/A	N/A	N/A