Required text: None
Useful texts for own library: Piexoto and Oort, 1992
Liou, 1992

Course Outline

Week 1
Jan. 17 – CSU Closed (MLK day)
Jan. 21 – Lecture 2: Review of Radiation and Radiative Fluxes

Week 2
Jan. 26 – Lecture 4: An historical perspective of the water and energy budgets.

Week 3
Jan. 31 – Lecture 5: Water vapor as a greenhouse gas.

Week 4
Feb. 9 – Lecture 8: Evaporation over ocean.
Feb. 11 – Student led review of: Seager et al., 2003: Why is there an Evaporation Minimum at the Equator?

Week 5
Feb. 14 – Lecture 9: Evaporation over land
Feb. 16 – Lecture 10: Soil Moisture and soil moisture feedback
Feb. 18 – Student led review of: Ohmura & Wild, 2002: Is the Hydrologic Cycle Accelerating?

Week 6

Feb. 23 – Lecture 12: Review of how well do we know water vapor, evapotranspiration and the transport of heat and water vapor?


Week 7

Mar. 2 – Lecture 15: Clouds and Radiation

Week 8
Mar. 7 – Lecture 16: Cloud Climate Feedbacks. Read Lindzen et al., 2001: Does the Earth have an Adaptive Infrared Iris?
Mar. 9 – Lecture 17: The Iris hypothesis
Mar. 11 – Student led discussions – Rebuttals on Iris Hypothesis and comments on rebuttals (see reading list)

Spring break

Week 9
Mar. 21 – Lecture 18: Precipitation – Measurement options
Mar. 23 – Lecture 19: Microwave remote sensing of Precipitation and latent Heating

Week 10
Mar. 28 – Student led discussion: Wentz et al., 2007: How much more rain will global warming bring?
Apr. 1 – Lecture 20: Radiative/Convective equilibrium

Week 11
Apr. 4 – Lecture 21: The GEWEX Integrated Product - lessons learned
Apr. 6 – Lecture 22: Trends in regional precipitation
Apr. 8 – Student led discussion – Muller, C. J., P. O’Gorman, 2011: An energetic perspective on the regional response of precipitation to climate change

Week 12
Apr. 11 – Lecture 23: Constraining the global energy balance. Read: Held and Soden’06: Robust Responses of the Hydrological Cycle to Global Warming

Apr. 13 – Lecture 24: MJO and self similar tropical precipitation regimes

Apr. 15 – Student led discussion - Stephens et al., 2004: Observational Evidence for the Mutual Regulation of the Tropical Hydrologic Cycle and Tropical Sea Surface Temperature.

Week 13


Apr. 22 – Student led discussion - Koren et al., 2012. Aerosol-induced intensification of rain from the tropics to the mid-latitudes,

Week 14

Dec. 2 – Lecture 27: Water/Energy storage and Ocean circulation

Dec. 4 – Lecture 28: Linking Radiation, the hydrologic cycle and climate change. Read Allen and Ingram, 2002. Constraints on future changes in climate and the hydrologic cycle

Dec. 6 – Lecture 29: Water and energy storage over the Colorado River Basin – a local perspective

Week 15


Finals Week

Books:


Papers (in order of appearance)


Some of the Adaptive Iris rebuttals:


Ming-Dah Chou, Richard S. Lindzen, and Arthur Y. Hou, 2002: Comments on “The Iris