ATS 742 Tropical Meteorology- Fall 2013

**Instructor:** Professor Eric Maloney  
Office: 208 ATS West  
Email: emaloney@atmos.colostate.edu  
Phone: 491-3368

**Web:** Class webpage is available on RamCT (Blackboard). Please let me know if you have trouble. Discussion papers will be posted on this site.

Class meets in 212B ACRC at 11 am-11:50 am TuTh.

**Maloney Office Hours:** By appointment

**Contact hours:** 2 (At least 2 hours of effort are expected to complete and homework and computing assignments outside of class for each hour of class time.)

**Student Learning Goals and Objectives:** The successful student will gain a professional level understanding of tropical meteorology. The course material will provide a strong foundation from which students can build to make contributions to the peer-reviewed scientific literature.

**Text:** None. The course materials will be drawn from journal articles and lecture notes. This course will approach tropical meteorology from a decidedly large-scale perspective, with less emphasis on mesoscale aspects of tropical meteorology, although these will by necessity be brought in at points.

The format of the class will be lecture/paper discussion. I intend to follow the outline included here. We will also spend time reading papers from the recent and seminal scientific literature and discussing them in class.

**Grading:** The course requirements and grading will be approximately as follows:

*Participation in Paper/Classroom Discussions: 50%*

*Final Paper: 40%*

*Broader Class Participation: 10%*

**Paper Discussion:** Students will be expected to lead discussion of a journal article. Papers assignments will be discussed during the second week of class, as well as a list of journal articles we will cover during the semester.

**Final Paper/Project:** A final paper or project description of no more than 10 double-spaced pages is required. This will deal with a review of some topic of current interest in tropical meteorology, or some independent research if you prefer. Topics need to be defined and committed to by November 1. It is recommended that a first draft be handed
in before November 29, during which I will make suggestions on style and content. The final version is due at the end of finals week.

Course Outline:

Week 1: Overview: Mean distribution of meteorological variables, the seasonal cycle of the tropical atmosphere, phenomenology of the tropics

Week 2: Tropical budgets: heat, moisture, moist static energy, kinetic/potential energy

Week 3: Weak tropical temperature gradients.

Week 4: How convection heats the tropical atmosphere. Hot towers and other vertical heating modes

Week 5: Modeling tropical precipitation with the moist static energy (MSE) budget

Week 6: Applications of the MSE budget to the tropical atmosphere

Week 7: Moisture and tropical convection: Observations and implications for parameterization.

Week 8: Moisture modes: Balanced disturbances and the weak temperature gradient

Week 9: Equatorial wave dynamics.

Week 10: No Class. IWM-V meeting

Week 11: The Madden-Julian oscillation (MJO): observations and modeling

Week 12: MJO theory

Week 13: Easterly waves: observations and theory

Week 14: Tropical cyclones and climate

Week 15: ITCZ: observations and theory

Statement on Academic Integrity
This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog (http://www.catalog.colostate.edu/FrontPDF/1.6POLICIES1112f.pdf) and the Student Conduct Code (http://www.conflictresolution.colostate.edu/conduct-code). At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.
Discussion Papers:

Week 3:
Lintner, B., and J. Chiang, 2007: Adjustment of the Remote Tropical Climate to El Niño Conditions. *J. Climate*, 20, 2544–2557. doi: [http://dx.doi.org/10.1175/JCLI4138.1](http://dx.doi.org/10.1175/JCLI4138.1)

Week 4:

Week 6:

Week 7:

Week 9:

Week 12:

Week 13:

Week 14:

Week 15: