

Tropical Meteorology

Problem Set 5

In this problem set, you will run and analyze the results of a quasi-linear model of the equatorial atmosphere. Follow these steps:

1. Create a directory for the model on your workstation. Also create a subdirectory called *output*.
2. Go to <http://wind.mit.edu/~emanuel/tropical/home.html> and download all the files under the heading “Notes, FORTRAN program, and Matlab script for reduced model of the Tropics” into your new directory. (Leave the *output* subdirectory empty.)
3. Read “Notes on the model”. It describes the model and how the model is run. (Note: this is slightly outdated.)
4. Compile the program *tropics.f*. (On UNIX machines, issue the command `f77 -o tropics tropics.f`. This will create an executable called *tropics*. If you prefer to run on a PC, contact me and I will supply an executable.)
5. Run the program once and examine the output using the MATLAB routine *maps.m*. By editing the last line of the file *input.txt*, run the model again starting from the final state of your first run. Keep doing this until the time-longitude sections on the equator appear to converge on a steady solution. How long does it take for the fields to settle down?
6. Meet with your fellow students and decide on a program of experiments using the model. For example, one of you may choose to look at the effects of the strength of the background mean wind while another looks at the cloud-radiation feedback. Other examples of issues to explore might include the effect of the SST distribution, WISHE, gustiness factor u^* , or interactive precipitation efficiency.
7. Write a short (≤ 2 pages) report on your findings, trying as much as possible to interpret them in physical terms.