

Optional, but worth 50% the amount of the first two homeworks. Will not be used as part of your grade if it lowers your overall HW score.

1. Maximum Potential Intensity (60 points)

Kerry Emanuel's FORTRAN subroutine for calculating MPI is available at:

ftp://texmex.mit.edu/pub/emanuel/TCMAX/pcmin_revised.f

Please download this code. On the course web page are links to four files

jun2002.txt - Mean June 2002 temperature, mixing ratio, and SST

aug2002.txt - Mean August 2002 temperature, mixing ratio, and SST

oct2002.txt - Mean October 2002 temperature, mixing ratio, and SST

aug1998.txt - Mean August 1998 temperature, mixing ratio, and SST

a. Write a small FORTRAN program to read in the four files above, and using the tcmx subroutine, calculate the MPI (both maximum wind speed and minimum pressure) for each datapoint on the globe. Attach your FORTRAN program to the homework, and include instructions on how to compile. If you do not know how to program in FORTRAN, please see me.

b. Plot (using Excel, Matlab, GrADS, or any other display package you are familiar with) the MPI global distribution for each of the four files. You should have eight plots total, four each for both wind speed and pressure.

c. Please discuss the distribution of MPI in each of the figures. Why do minima/maxima exist where they do? Why does the MPI change from month to month, or year to year?

2. Tropical cyclone motion and intensity (40 points)

You have a tropical depression at 15N and a category four hurricane at 15N. The environmental flow for the storms is the same: south-southwesterly at 5, 10, 15, 20, and 25 m/s at 850, 700, 500, 400, 250mb, respectively. Assuming the steering above is the only mechanism moving the storm, and that the steering flow is unchanging in time, at what latitudes will the two storms be after two days? SHOW ALL WORK. SKIP NO STEPS. Based upon the latitudes you end at, what other factors (that we talked about) do you think will be important for the actual motion of the storm? Will those factors lead toward a higher or lower latitude than you forecast here?