Online material to accompany:

Highly Resolved Observations and Simulations of the Ocean Response to a Hurricane.

to be submitted to Geophysical Research Letters

Version 4

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This is Version 4 of what seems to be an evolving test case on the ocean response to a hurricane. This collection of files is meant to provide additional supporting data for the brief article, 'Highly resolved observations and simulations of the ocean response to a hurricane'. The intent here is to provide the data required to define the hurricane winds and the ocean initial condition that are required for running a 3-D ocean numerical model of the response to CBLAST Hurricane Frances (2004).

The files are as follows:

1) TSinitprofiles.dat is the ocean IC,T(z) and S(z) from pre-Frances 2004 in the CBLAST region and derived from EM-APEX float data (EM-APEX is by Tom Sanford and Doug Webb). Plain old ASCII.

2) stressfield.dat is the hurricane wind stress field derived from HWINDS analysis of Frances observations (HWINDS is by NOAA/AOML/HRD). Plain ASCII.

3) hurrtest_fortran.f is a Fortran subroutine that generates the wind stress as a function of spatial location in a storm centered coordinate system. This Fortran subroutine should fit comfortably into your ocean model, or provide compatible output for ingestion by your ocean model.

4) plotFrancesICandtau.m can be used to ingest and plot the data above, just in case you have Matlab. This is a Matlab script (source code), that is not essential.

5) 3dpwpFrances.mat is Matlab binary file that has all the model data, T, S, U, V and P, from the Simulation of Frances made using HWINDS and the Powell et al. (2003) Cd.

6) plot3dpwp.m is a Matlab script that loads the file above and makes very simple plots. This and the file above require Matlab.

7) hurrtest_slides.pdf is a graphical presentation of much of the data above plus a lttle more. This is a pdf file.

The file hurrtest_slides.pdf includes graphics of the simulations of the 3DPWP model run for this case using these data. There is no intent to claim that this model is the 'truth'; it is shown merely as one example of an ocean model simulation. There are two minor complications to be aware of: 1) The model data were sampled as if from a drifting EM-APEX float, not at the fixed position x = 55 km where the float was launched. The effect of the float motion is not large in the things that are shown here and you can omit this complicating detail on a first cut. 2) The model simulation included estimates of air sea heat fluxes and also of evaporation minus precipitation. These are not well known, but are not extremely importance (less than 10% effect on cooling, for example) and can be omitted with no major error incurred. The crucial thing is the wind stress and secondarily the ocean initial condition - it can hardly be overstated that the simulated ocean response is strongly dependent upon the structure and the amplitude of the imposed wind stress.

The Fortran and Matlab source code can be considered public domain. The pdf slides of the model results and of the EM-APEX data are for your personal use only, for now. We will have submitted a paper to GRL by early February, 2007 and when accepted these too will be public domain. In the mean time you can check directly with Tom Sanford regarding the EM-APEX data and check with Jim Price regards the model data. The HWINDS data are thanks to AOML/HRD who should be acknowledged for the original wind data.