CLIMOPS:
COUPLED ATMOSPHERE-WAVE HIGH-RESOLUTION REANALYSES FOR REGIONAL CLIMATE SERVICES

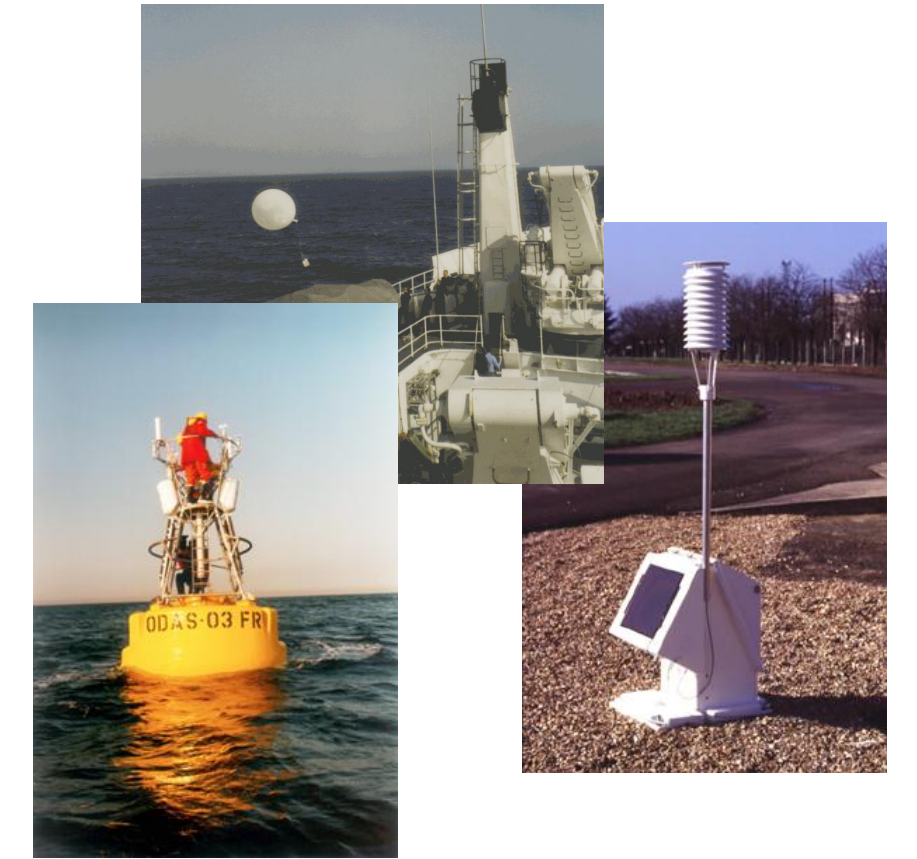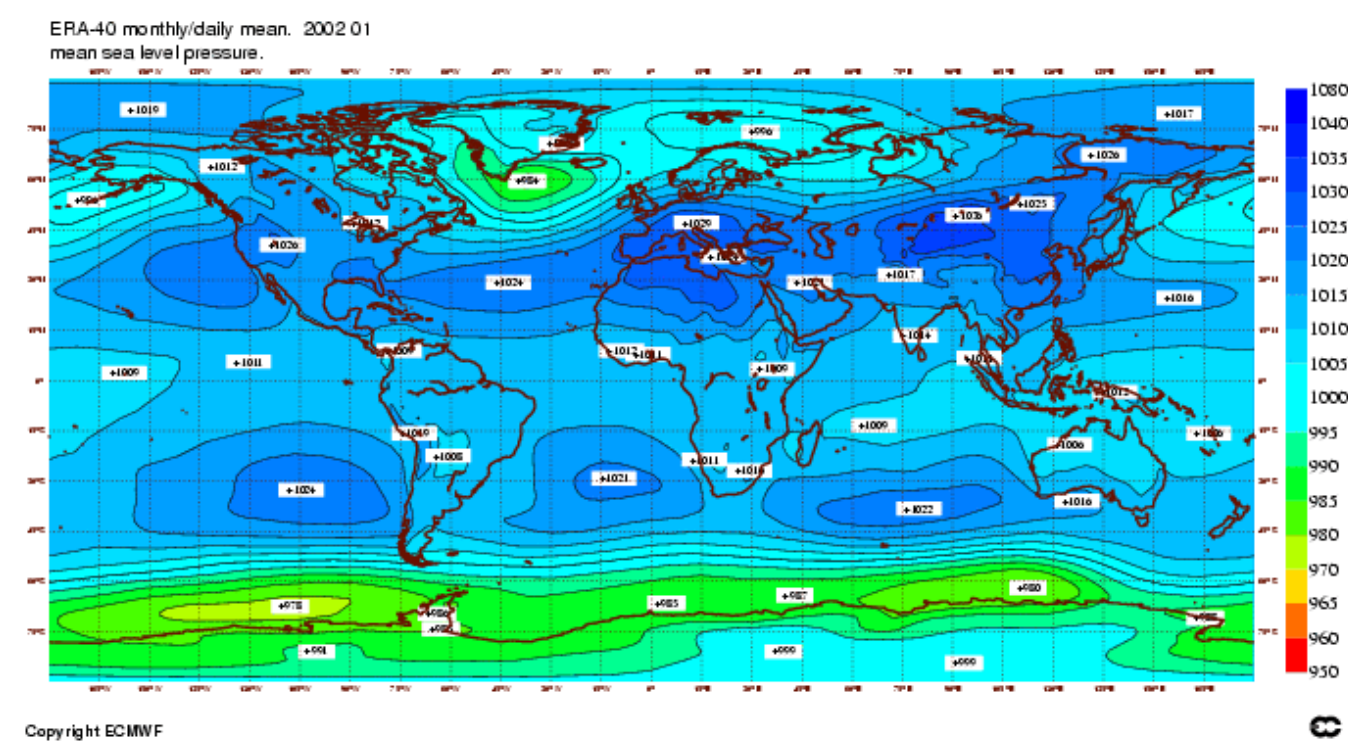**NCAR**

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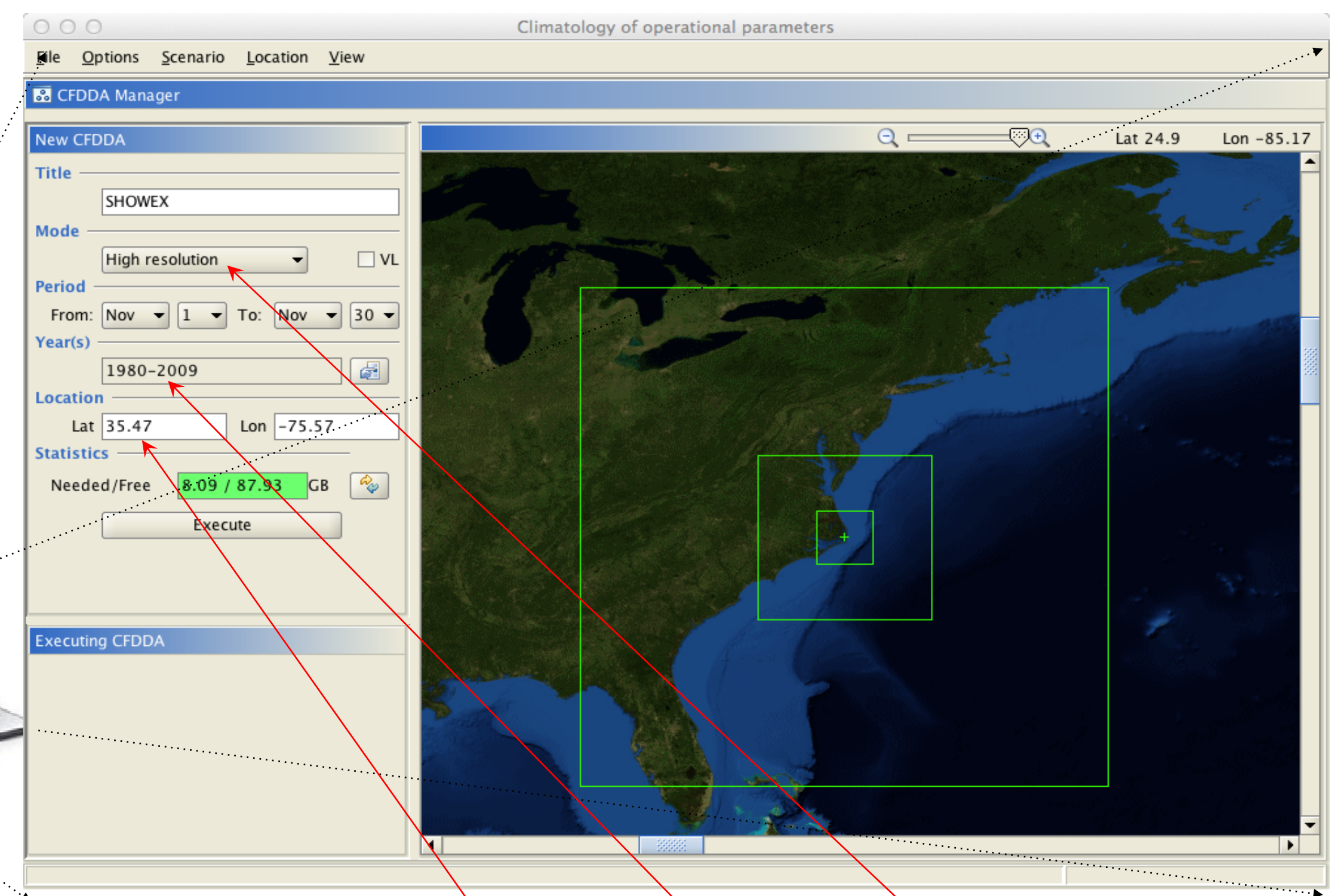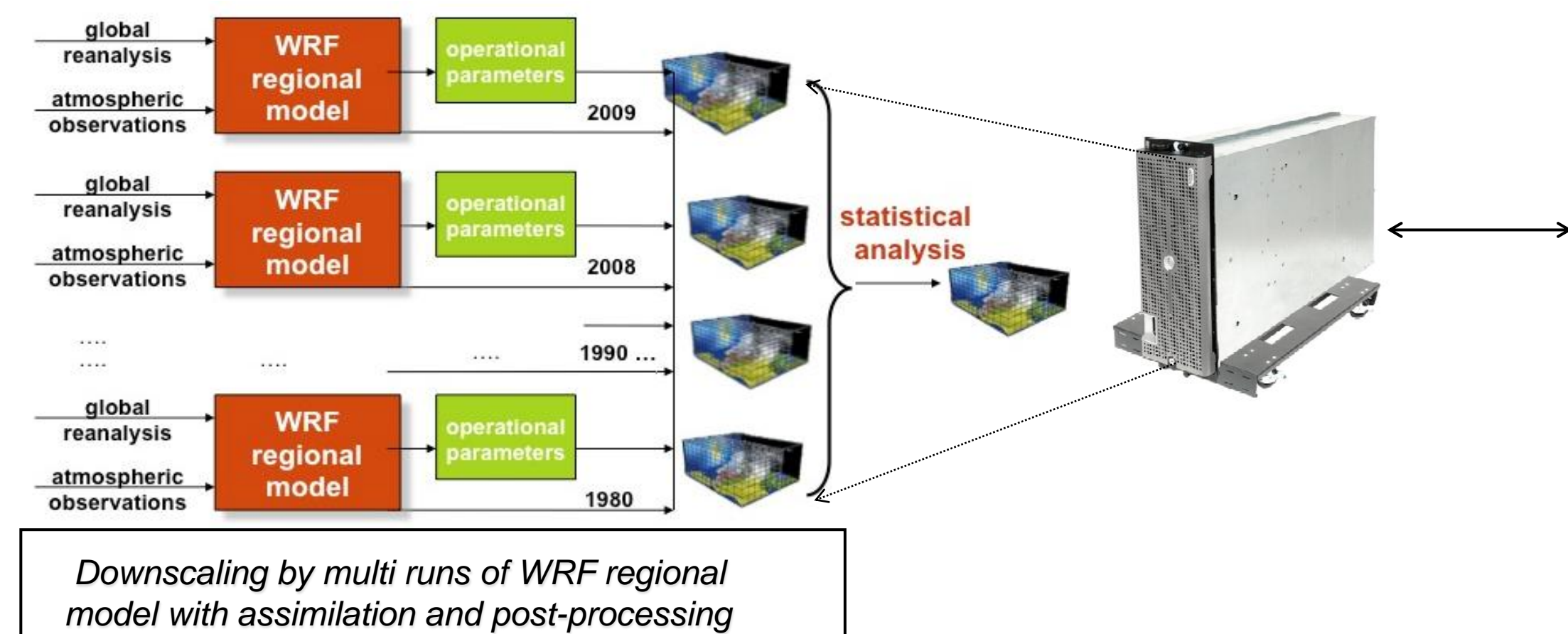*[1]NCAR, boulder, CO, [2]SHOM, Brest, France*
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INTRODUCTION: The Climatology of Operational Parameters (**CLIMOPS**) is a new regional climate analysis toolkit issue from a US-French collaboration that aims at integrating 30 years of atmospheric and oceanic observations into fine scale gridded regional climate variables. The toolkit generates "on demand" large databases of gridded atmospheric parameters at high resolution, tailored to the specific needs for regional climate information of governmental and defense agencies.

CLIMOPS: The system takes advantage of the **zooming** and **relocation** capabilities of the embedded domains that is found in the community Weather Research and Forecast (**WRF**) model. The WRF regional model is applied to dynamically downscale **NNRP** and **ERA40** global reanalyses and to generate long records, up to **30 years**, of **hourly gridded data** over 200km² domains at **3km grid increment**. To insure accuracy, observational data from the NCAR ADP historical database are used in combination with **the Four-Dimensional Data Assimilation** (FDDA) techniques to constantly nudge the model analysis toward observations. The **WRF** atmospheric model is **coupled** to the community regional wave height model **WaveWatchIII** (WWIII). The combination of atmospheric and oceanic models allows the creation of **regional climate** information that is **consistent** both with **global atmospheric** and **oceanic circulation**, as well as local **observations**.

Input data are from NCEP/NCAR (NNRP) or ECMWF (ERA) reanalysis and Obs

FUNCTIONALITIES: The model grids can be **relocated** anywhere in the **world** by simple **point and click commands** through a **graphical interface** that was developed with input from users of both French and US agencies. Users can, with the same interface, **visualize**, **download** or **print** the physical and statistical information derived from the model-based **climatologies**. The system takes advantage of the high numerical efficiency of the **parallel** version of **WRF** and **WWIII** models and run autonomously on a multi-processor **workstation**, at a fractional cost of super-computers.

*Selection of a) region; b) time period and c) resolution: 30km/30km/3.3km;*

Downscaling by multi runs of WRF regional model with assimilation and post-processing

APPLICATIONS:

✓ One **CLIMOPS** system has been installed at the French hydrographic and oceanographic agency (SHOM). Its application and potential benefit for mission planning is under evaluation.
✓ **CLIMOPS** has been applied by NCAR for the reanalysis of the SHOWEX field campaign off the cost of North Carolina in November 1999. Validation against independent local measurements of model wind and wave has been conducted.
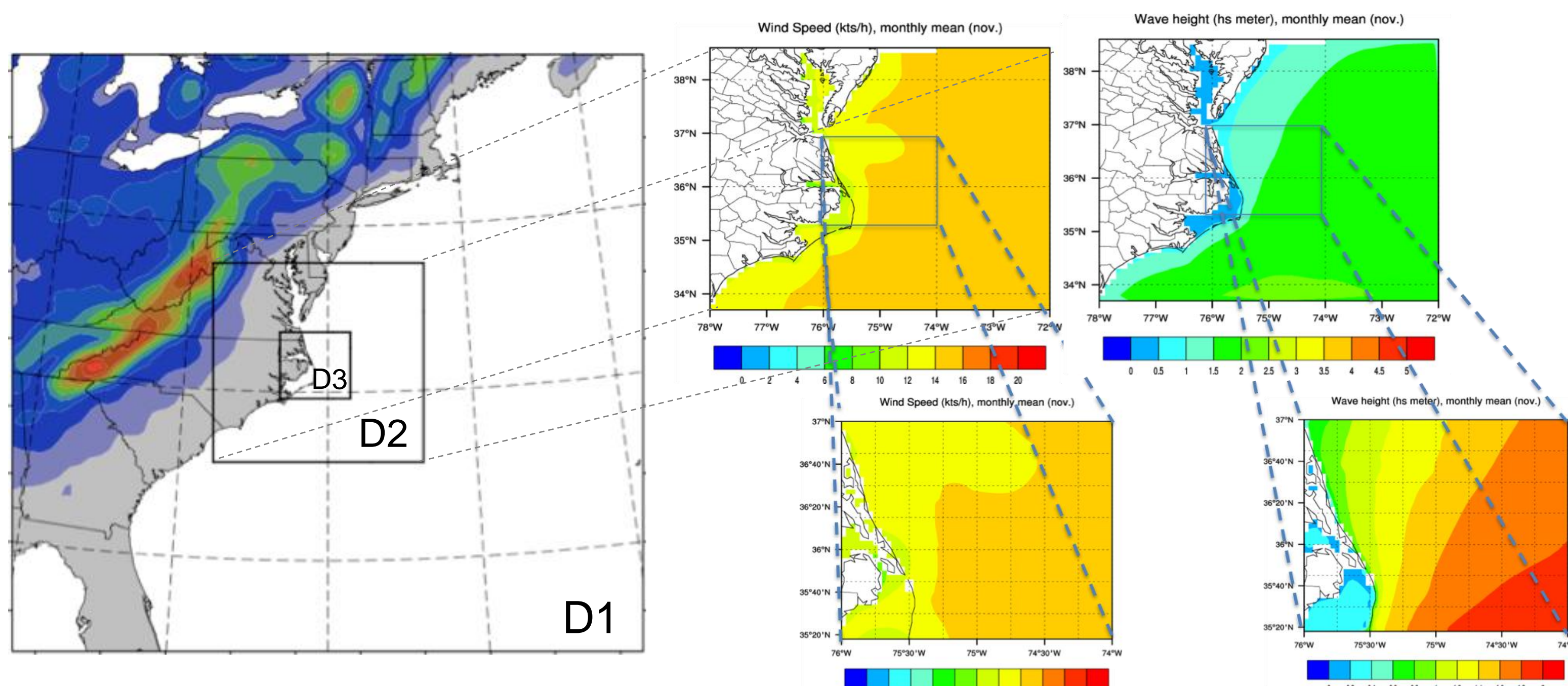
WRF domain configuration. The gird size increments 30km/10km/3.3km.

Monthly Mean (november 99) surface wind (left panel) and wave height (right panel) on WRF domain 2 (upper panel) and WRF domain 3 (lower panel)
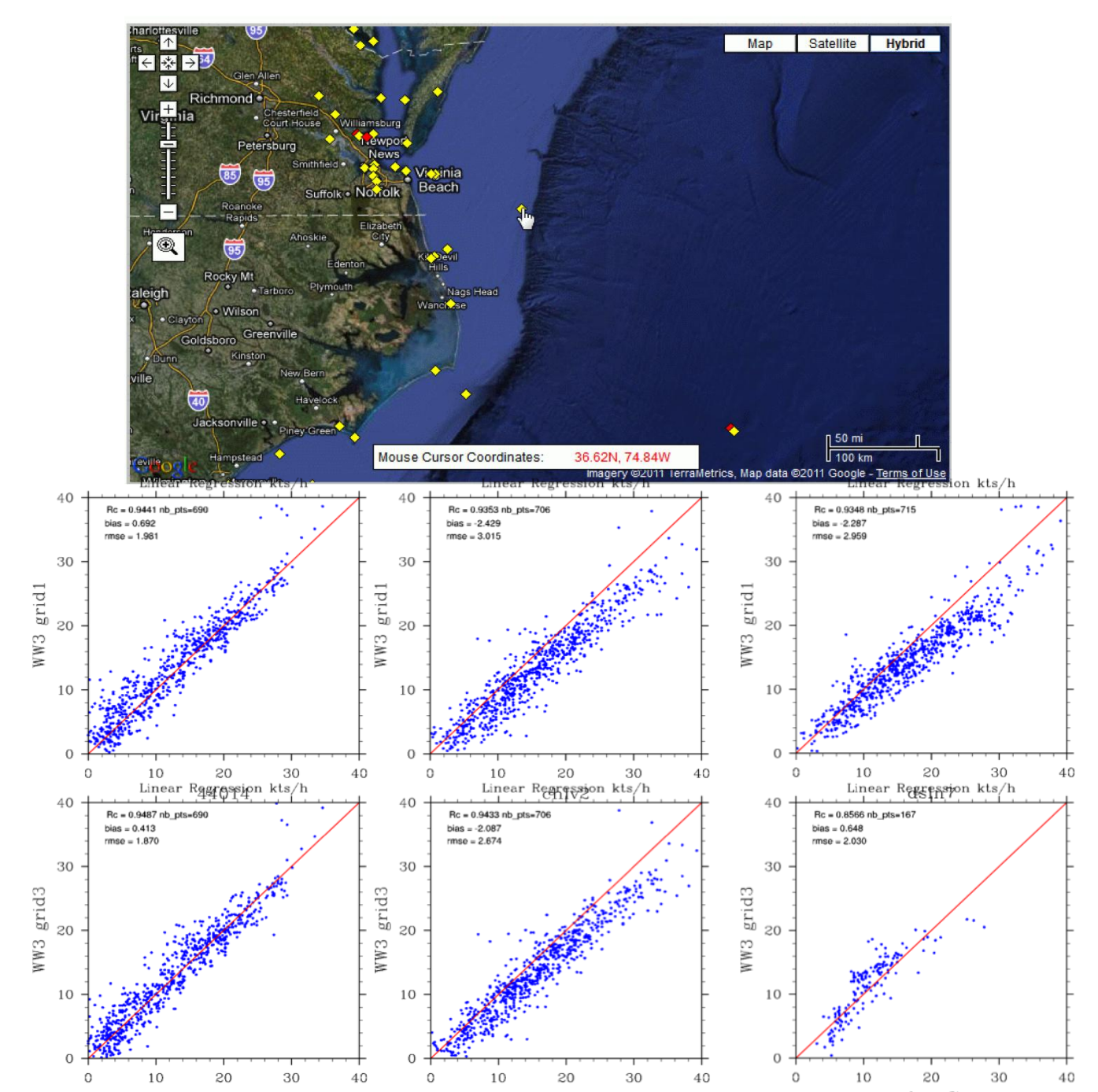
Location of the buoys and verification statistics at 3 buoys (44014, chlv2, dsin7) for WRF grid 2 (upper panels) and grid 3 (lower panel)