From: Robert Palla
To: Natasha Greene
Date: 4/26/2007 2:40:17 PM
Subject: Link to Rutgers Slides on WRF Calcs

Mark Lilly provided me the following link, which might be of interest.

http://marine.rutgers.edu/mrs/coolresults/2005/lb_latte.ppt

Mail Envelope Properties (4630F20A.2C4 : 18 : 10412)

Subject:	Link to Rutgers Slides on WRF Calcs
Creation Date	4/26/2007 2:40:10 PM
From:	Robert Palla
Created By:	RLP3@nrc.gov

Recipients
nrc.gov
OWGWPO02.HQGWDO01
NAG (Natasha Greene)

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Coastal Atmospheric Modeling for both Operational and Research Applications using the Weather Research Forecast (WRF) Model

Weather Research Forecast Model

- Developed by NCAR/MMM and NOAA/FSL
- Released as community research model (2000)
- Developed for research and operational purposes
- Operational-test phase NWS model
- Intended full operational use by March 2006

- Arakawa C-grid
- 3rd order Runge-Kutta Technique
- Mass-based terrain following coordinate

- Output as netcdf or GRIB
- Model graphics displayed using the Grid Analysis and Display System (GrADS)

Weather Research Forecast Model

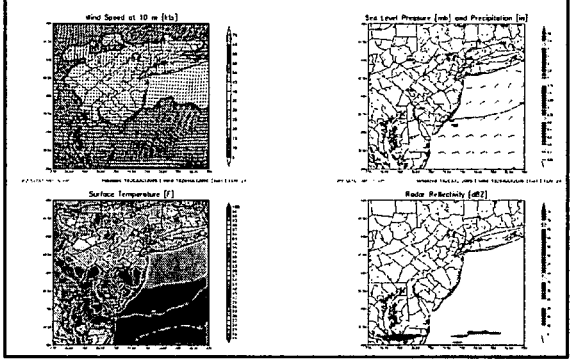
- Run experimentally Apr 2004, operationally May 2005
- Run locally on a Dell Workstation (1 CPU), 3.1 GHz, 4 GB RAM
- Redhat Linux 9, PGI Fortran Compiler 5.0
- Once daily 6 km run (1800 Z), once daily 20 km run (0600 Z)
- Hourly data output

- Funded by PSEG (NJ's largest electric and gas provider)

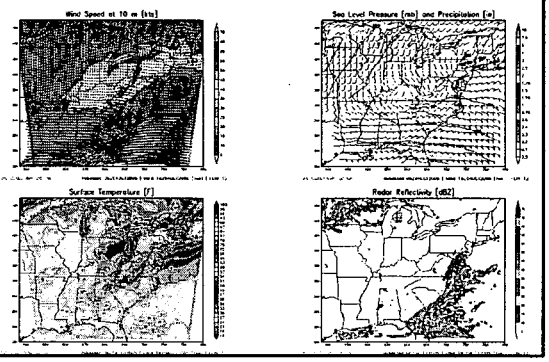
- Kain-Fritsch Cumulus
- Lin et al. Microphysics
- Dudhia SW and rrtm LW Radiation
- Noah Land Surface Model

- 6 km initialized with NAM boundary conditions
- 20 km initialized with GFS boundary conditions
- SST from NOAA 1/12° RTG_SST_HR Analysis

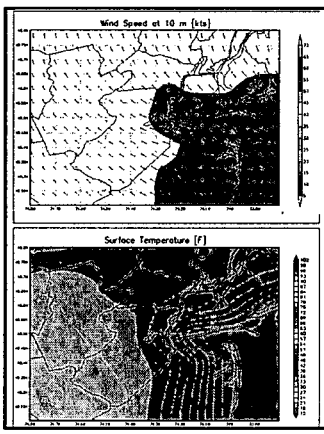
Operational WRF 6 km – 0600Z Daily - 48 HR FC



Operational WRF 20 km – 1800Z Daily – 72 HR FC



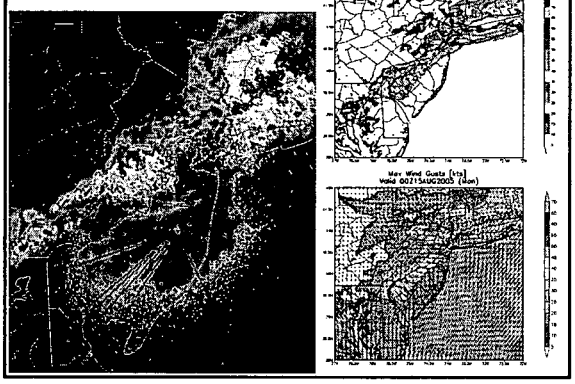
Experimental Hires-WRF 3 km 1200Z Daily 48 HR FC



- Run locally on a Penguin Server (2 CPU), 3.3 GHz, 4 GB RAM
- Redhat Workstation 3, IFC Fortran Compiler 8.1

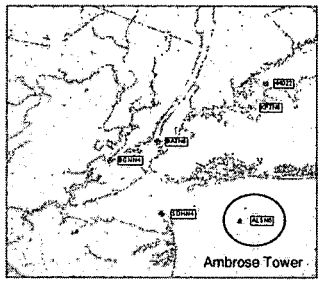
- Initialized with NAM boundary conditions

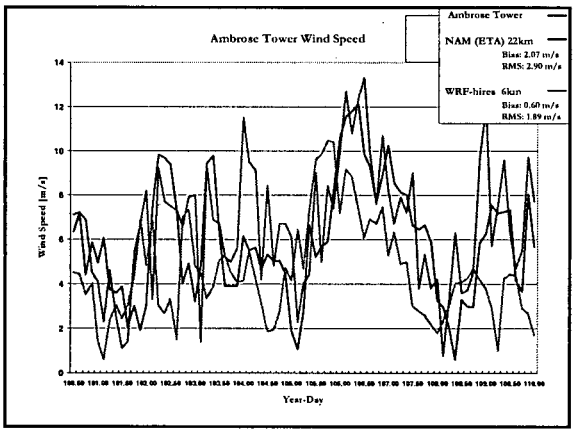
WRF Operational Validation

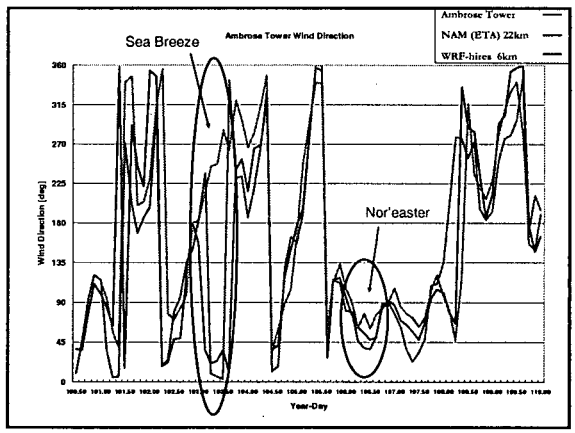


WRF Research Applications – LaTTE 2005

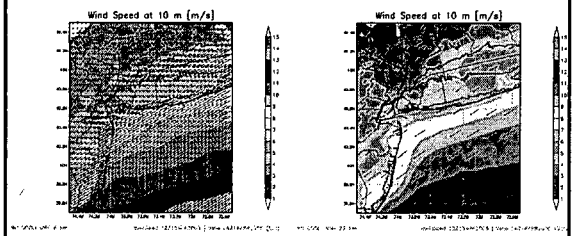
- WRF model was run at 6 km resolution once daily for LaTTE
- WRF simulations led to accurate predictions of wind shifts, both large and small scale
- Model output validated using observational data from Ambrose Tower (ALSN6) and compared to NAM 22 km output





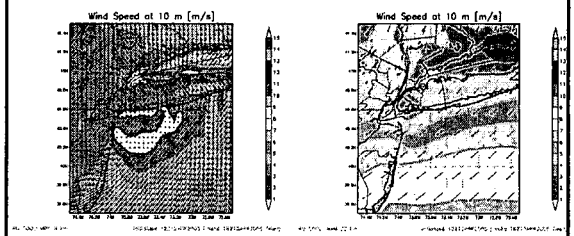


Coastal Storm

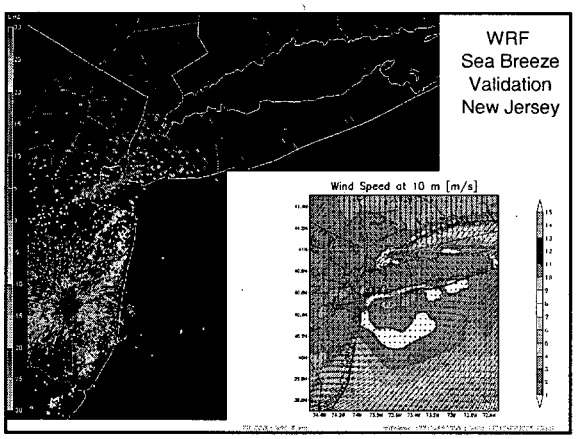


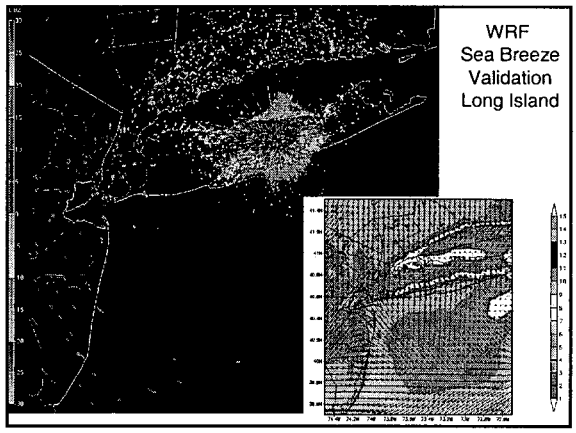
The coastal storm is resolved by both the 6 km WRF and 22 km NAM

Sea Breeze Atmospheric Modeling

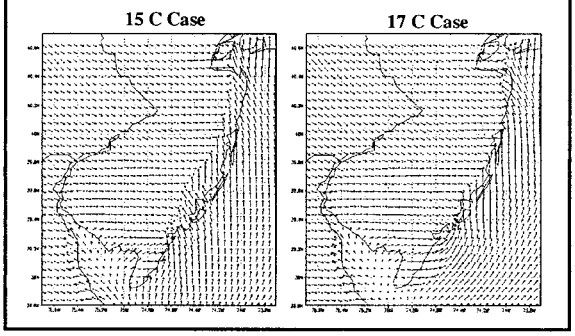


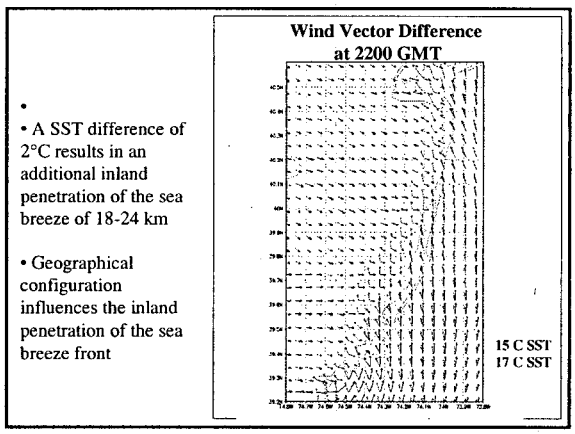
The sea breeze is resolved by the 6 km WRF and not by the 22 km NAM



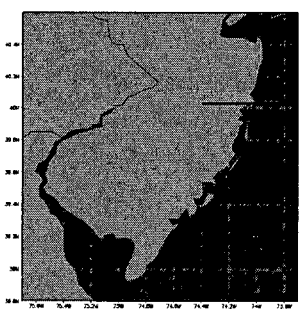


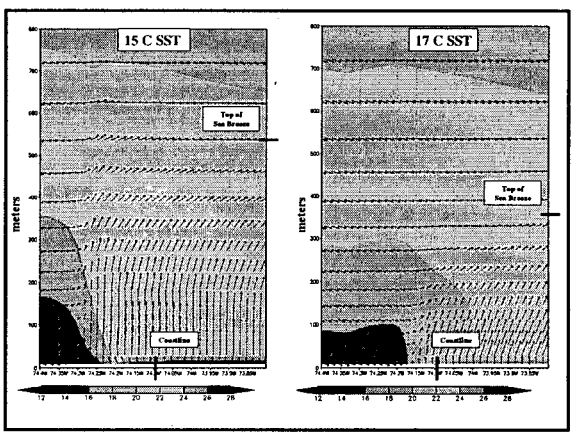
Sea Breeze Sensitivity to SST



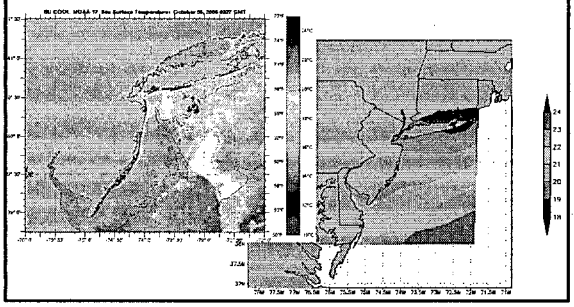


15°C vs 17°C SST-Sea Breeze Cross-section Comparison





Quality of Sea Surface Temperature Analyses for WRF Modeling



Concluding Remarks

- High-resolution atmospheric modeling using the WRF model has been shown to accurately predict both large and small scale atmospheric phenomena
- The local sea breeze impacts both the shoreline as well as the offshore coastal waters
- Accurate and timely Sea Surface Temperature is required to adequately simulate the sea breeze circulation
- A coupled ocean-atmosphere model would provide updated SST to the WRF simulations, leading to more accurate feedbacks between the sea breeze and the ocean surface, which would to lead to even more realistic forecasts of the sea breeze