

DART project and preliminary results

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Outline

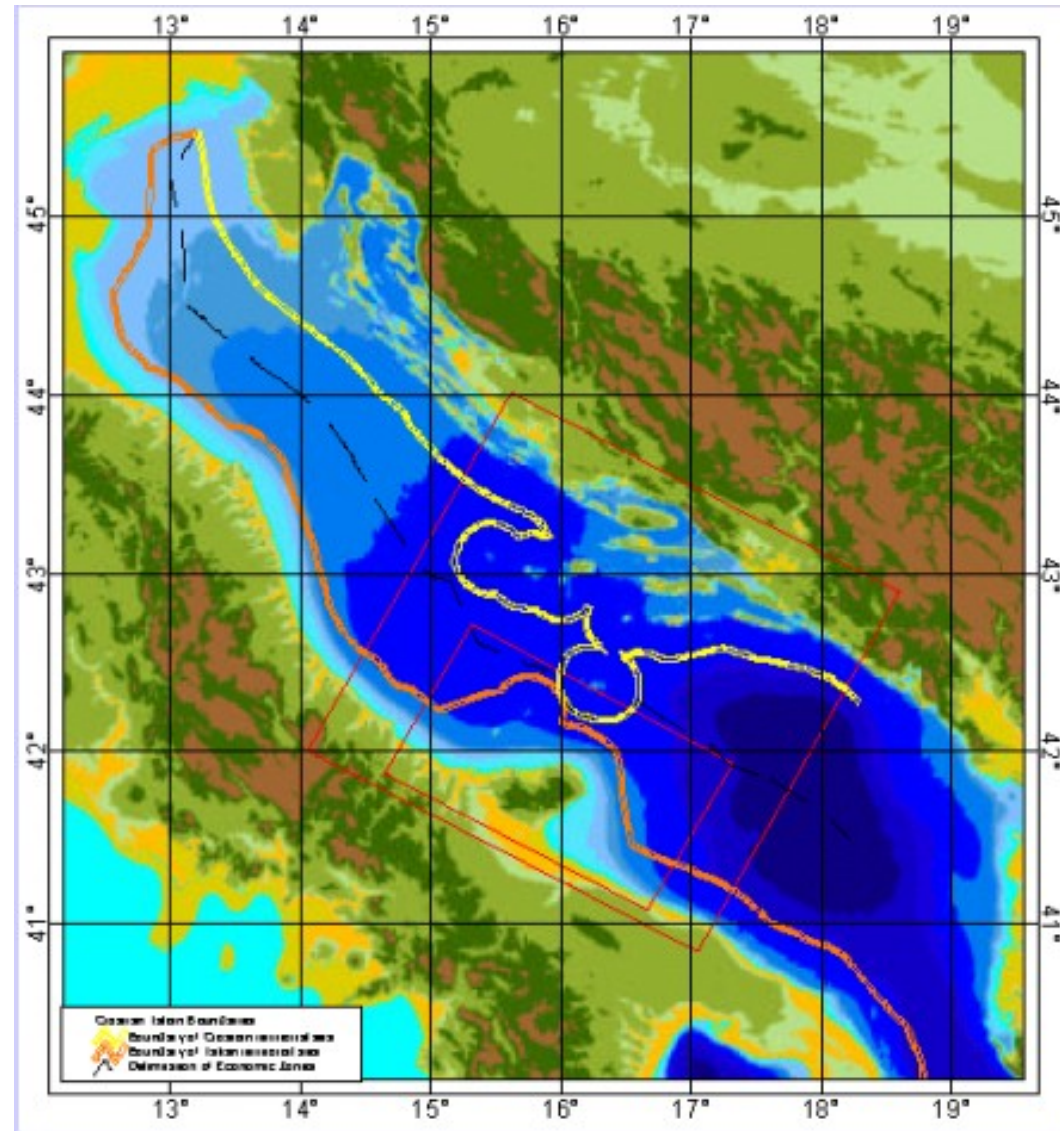
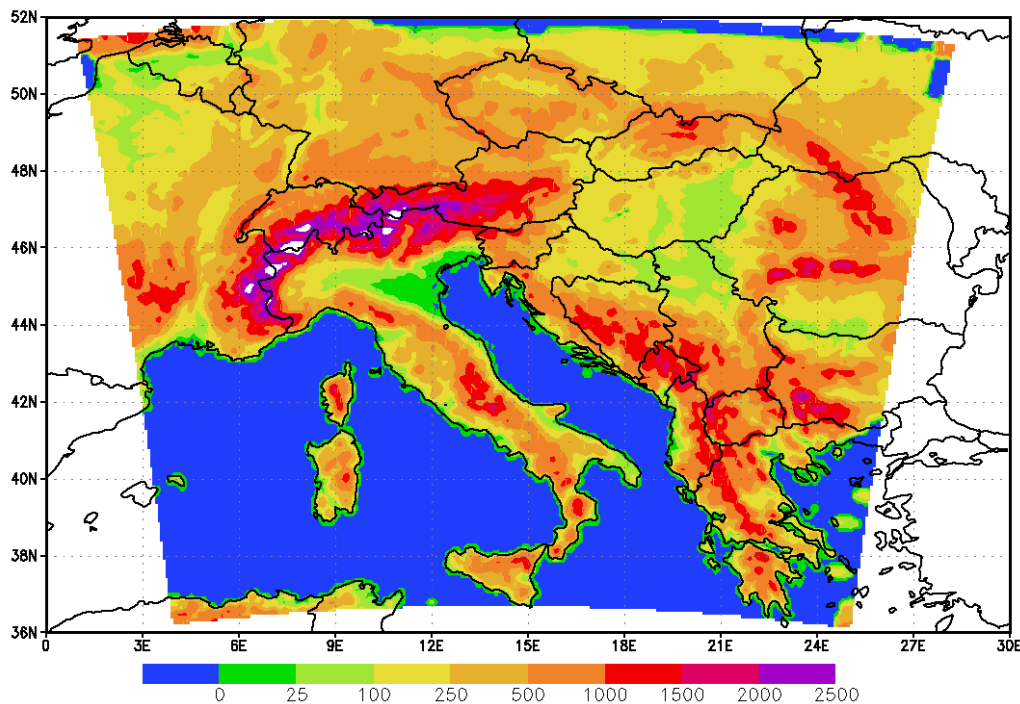
- what is DART?
- meteorological, oceanographic and wave models involved
- meteorological model and measured data
- results of model forecast comparison to measured data
- future work

The DART project

- Dynamics of the Adriatic in Real-Time
- evaluate observational and modelling capabilities accessible on the field
- two field experiments
 - 27th February – 28th March 2006
 - 13th – 31st August 2006
- results presented at
 - DART workshop at NURC, 23-24 April 2007
 - MREA (Maritime Rapid Environmental Assessment) 25-27 September 2007

Area of interest

- Central Adriatic
- Gargano-Split
- Bari-Dubrovnik
- Gulf of Manfredonia



Meteorological, oceanographic and wave models

- Meteorological models
 - Aladin (France), Aladin (Croatia), Coamps (NURC), LAMI (ARPA)
- Oceanographic models
 - Adricosm (INGV), HOPS (INGV), NCOM (NRL), ROMS (ARPA)
- Wave models
 - SWAN (ARPA), SWAN (NRL), WAM (Athens), WAM (ISMAR)

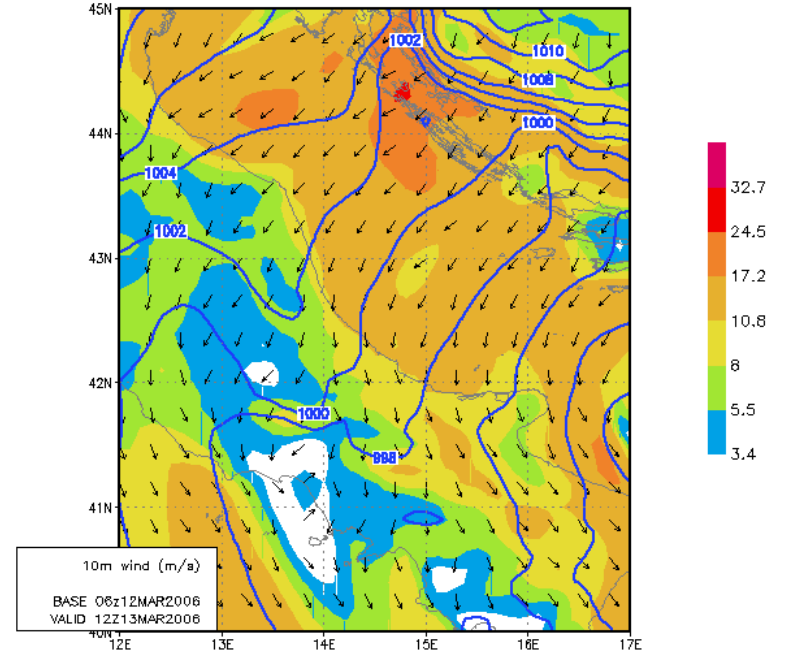
Met. model output used for

- weather forecast – plan the operations on Sea
- drive the ocean and wave models
- model inter-comparison
- comparison to data
- fields used:
 - 10m wind, 2m temp and RH, mslp, precipitation, radiation and heat fluxes
- all done in real-time (on-board the ship)

Wind

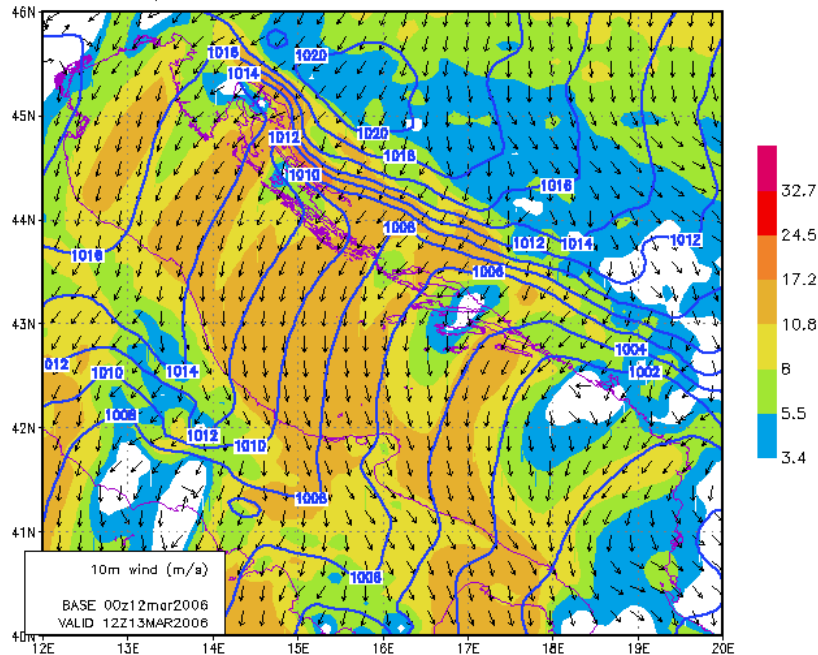
- Aladin slows down too much over open sea

ALADIN/FR 10m wind 12Z13MAR2006 UTC 30h forecast



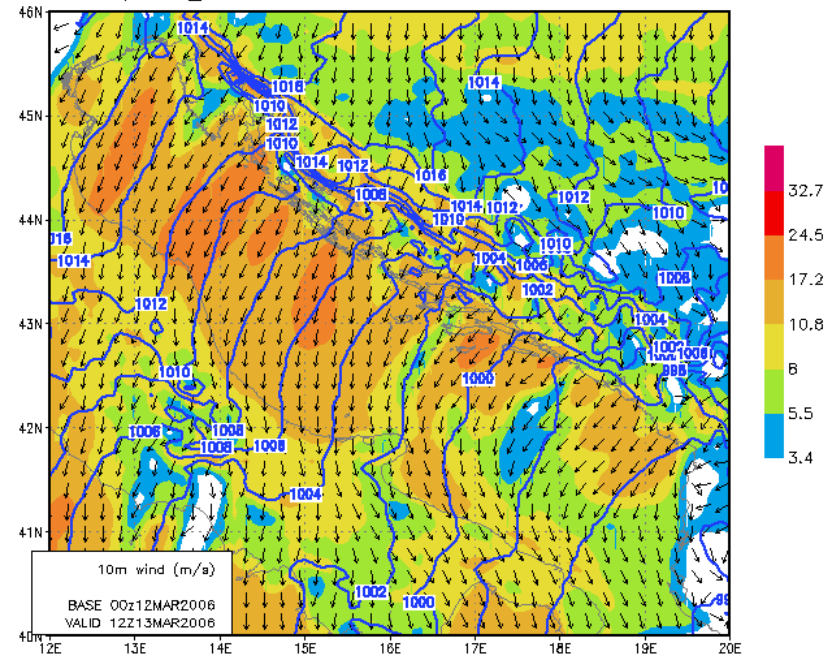
(m/s)

ALADIN/HR 10m wind 12Z13MAR2006 UTC 36h forecast



(m/s)

LAMI/ARPA_IT 10m wind 12Z13MAR2006 UTC 36h forecast

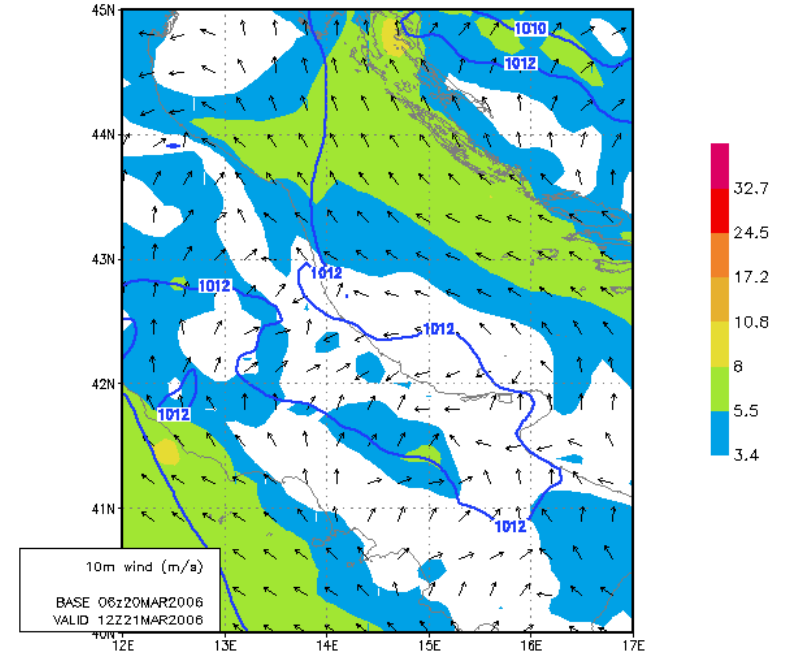


(m/s)

Wind

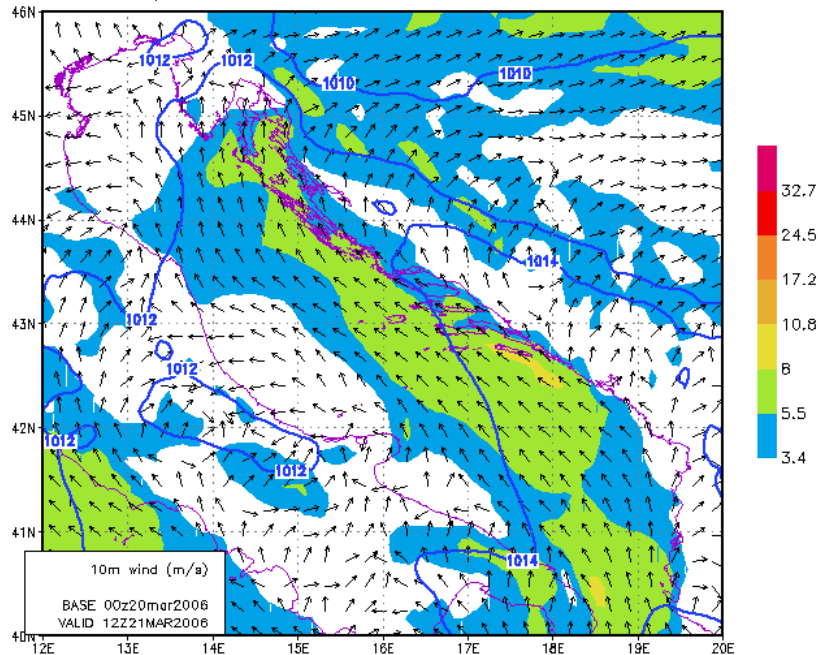
- Aladin too slow,
- Lami gives different field

ALADIN/FR 10m wind 12Z21MAR2006 UTC 30h forecast



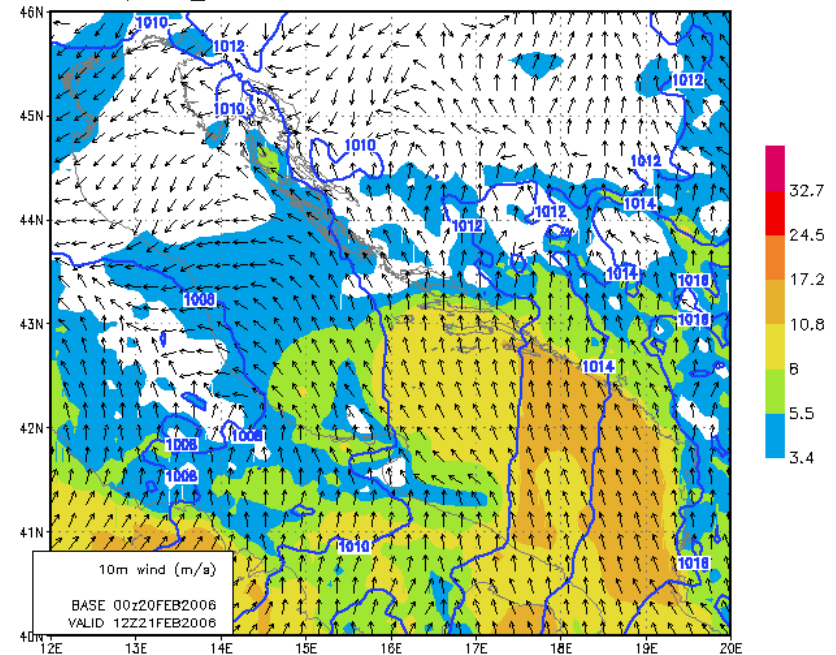
(m/s)

ALADIN/HR 10m wind 12Z21MAR2006 UTC 36h forecast



(m/s)

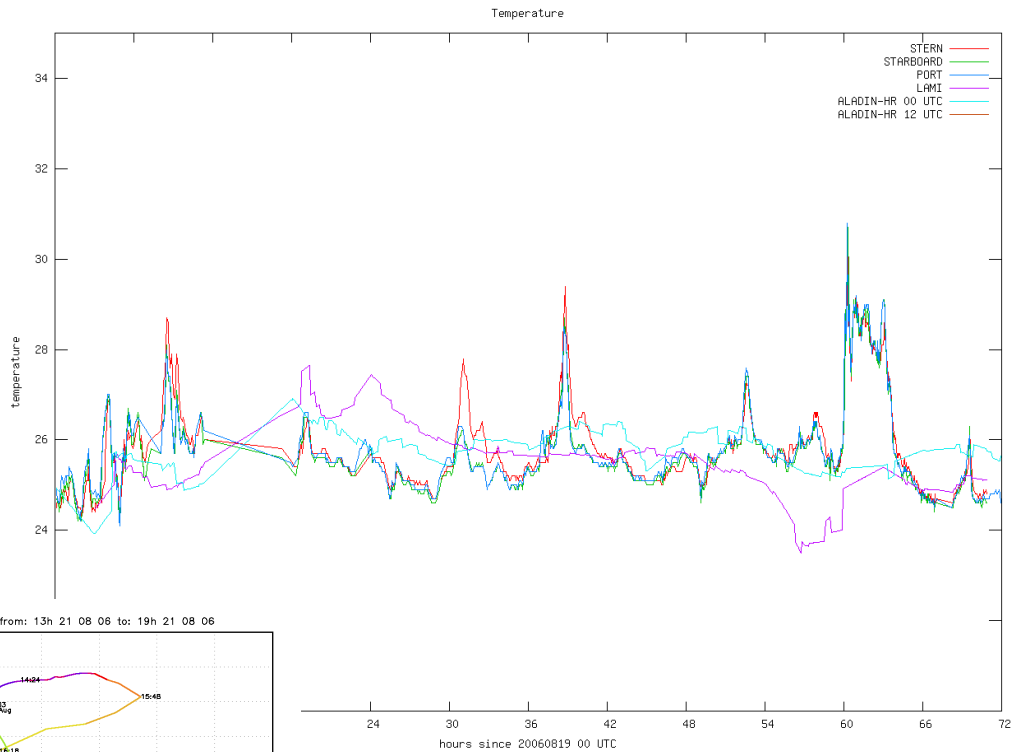
LAMI/ARPA_IT 10m wind 12Z21FEB2006 UTC 36h forecast



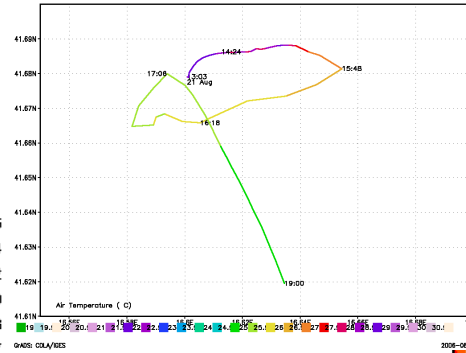
(m/s)

Temperature

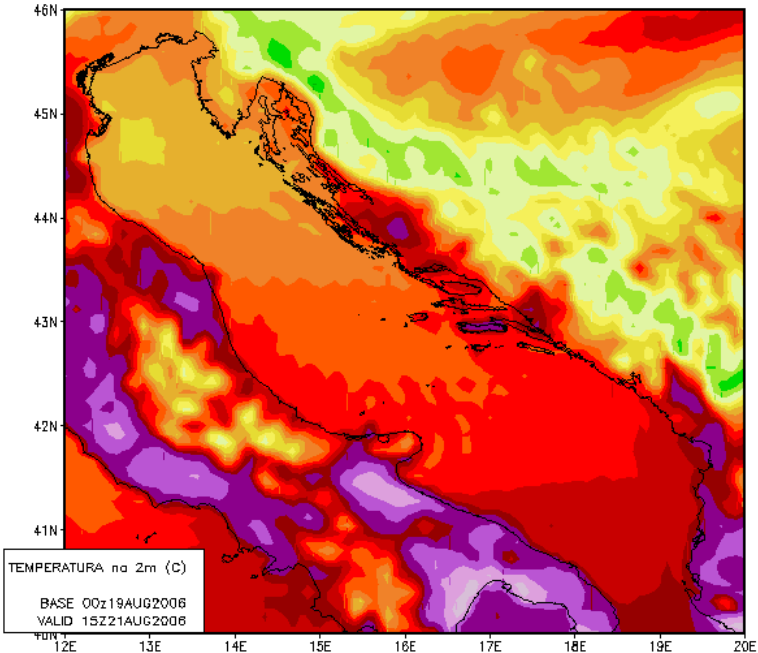
- sometimes surprisingly different than the forecast



Alliance measurements st. 01 from: 13h 21 08 06 to: 19h 21 08 06

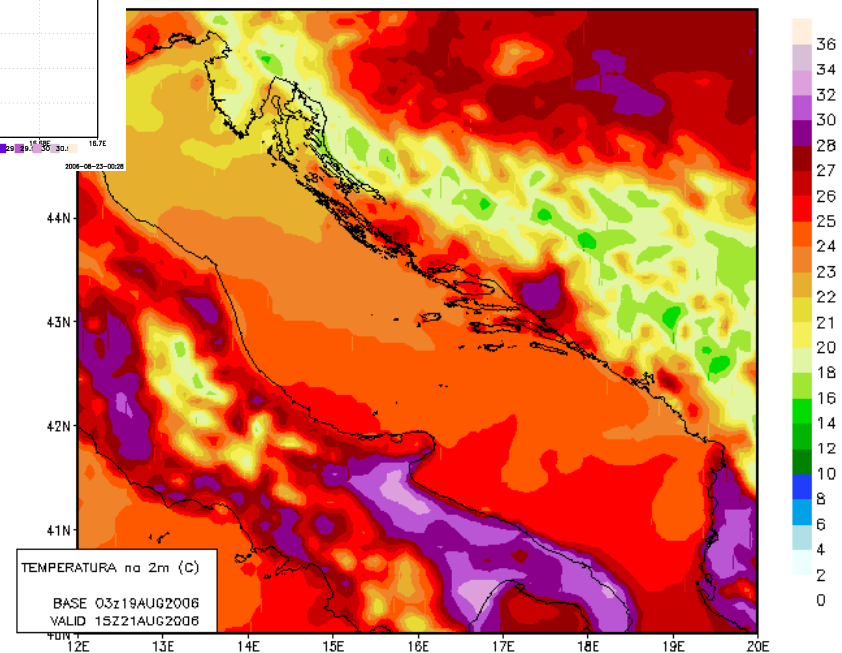


ALADIN/HR TEMPERATURA u 15Z21AUG2006 UTC 63h forecast



(C)

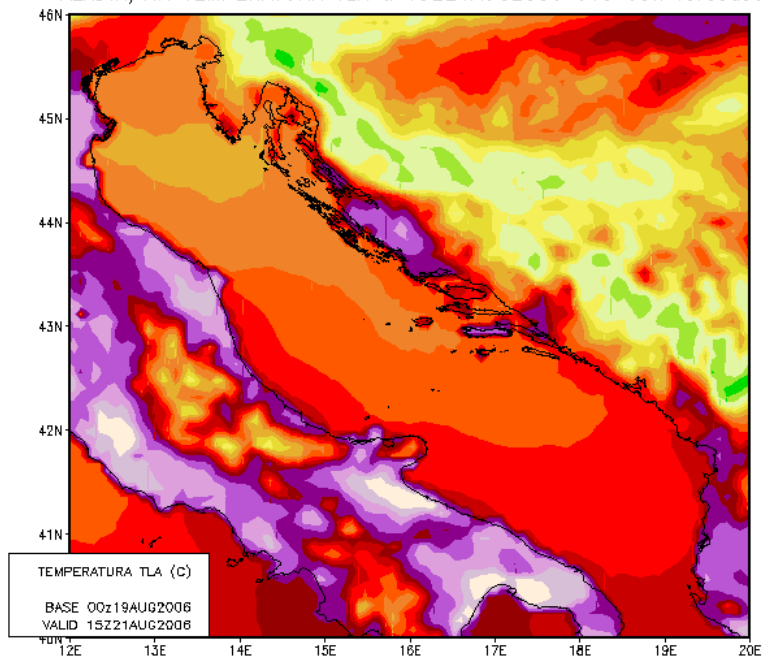
/ARPA_IT TEMPERATURA u 15Z21AUG2006 UTC 63h forecast



(C)

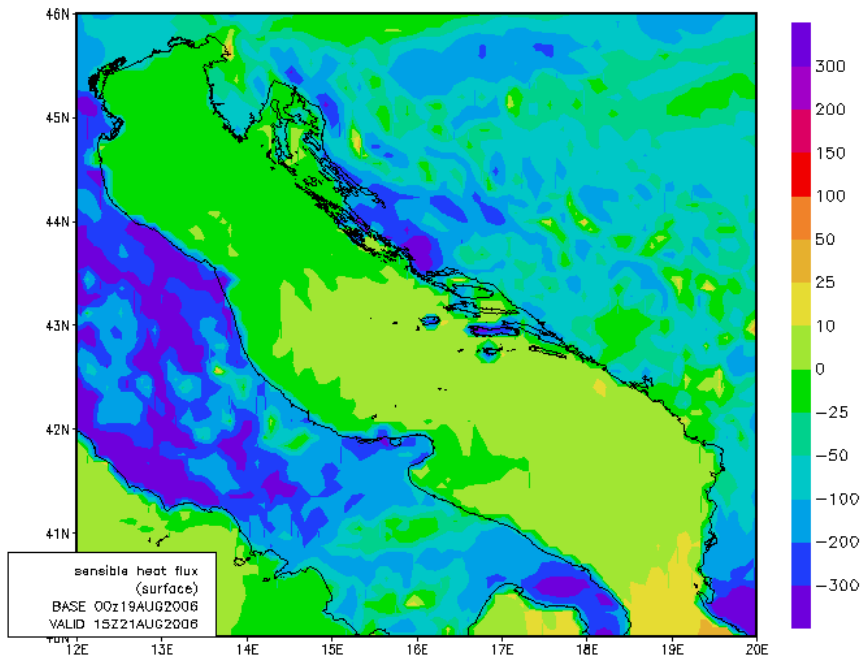
Heat flux

ALADIN/HR TEMPERATURA TLA u 15Z21AUG2006 UTC 63h forecast

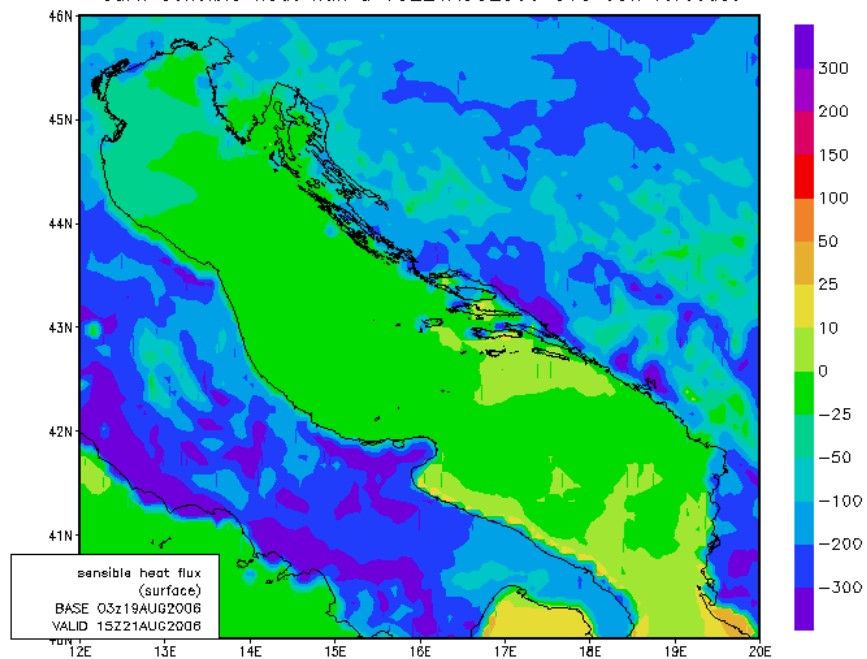


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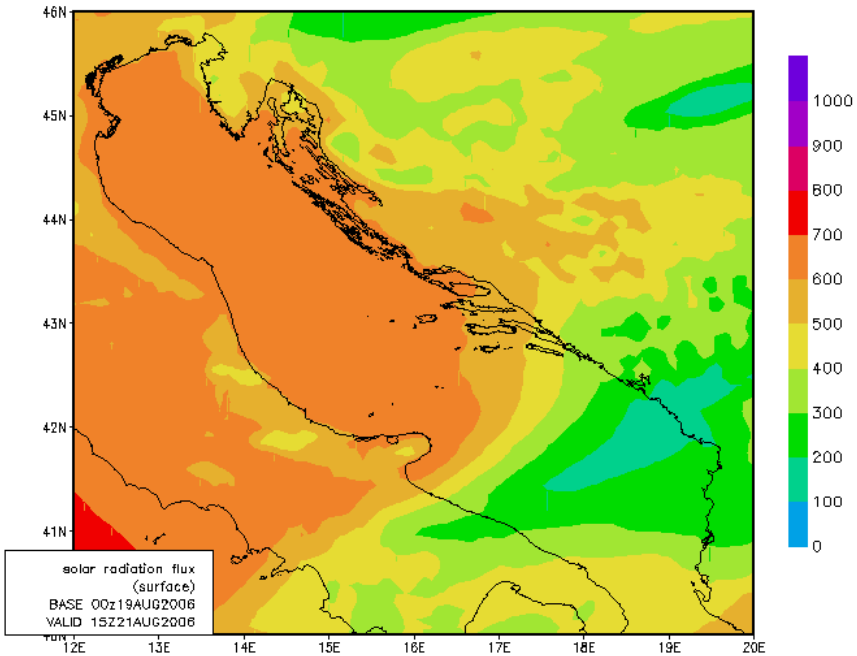
surf. sensible heat flux u 15Z21AUG2006 UTC 63h forecast



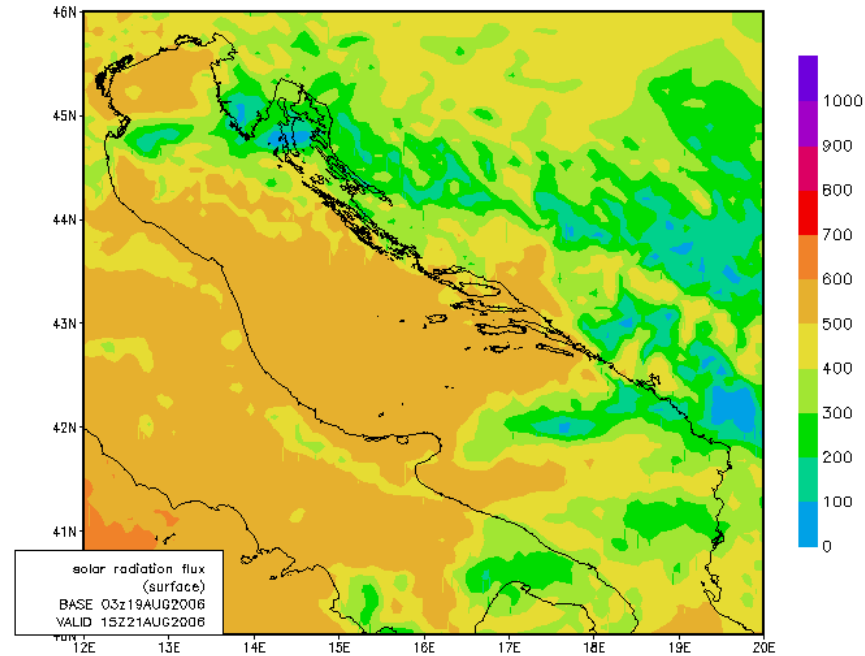
surf. sensible heat flux u 15Z21AUG2006 UTC 63h forecast



surf. solar radiation flux u 15Z21AUG2006 UTC 63h forecast

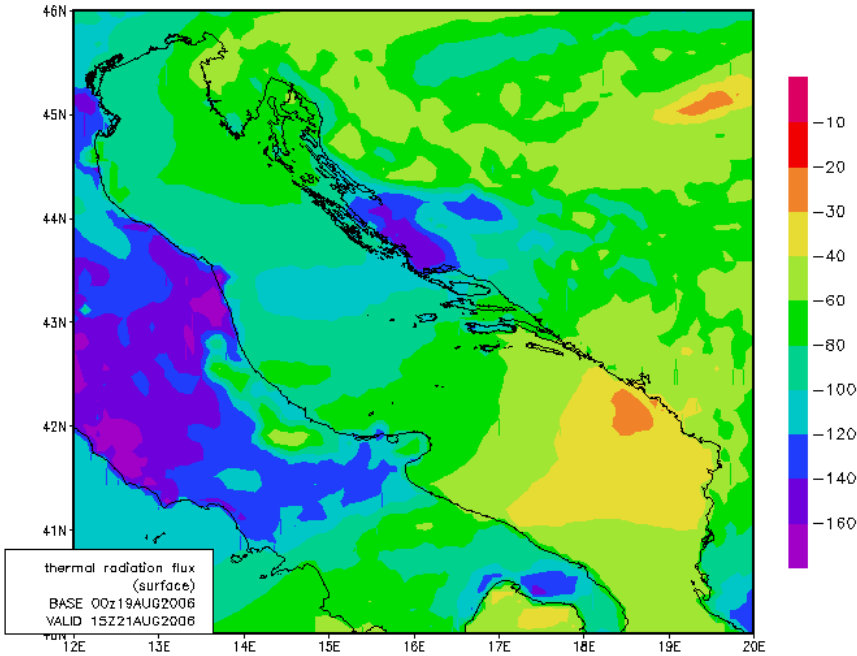


surf. solar radiation flux u 15Z21AUG2006 UTC 63h forecast

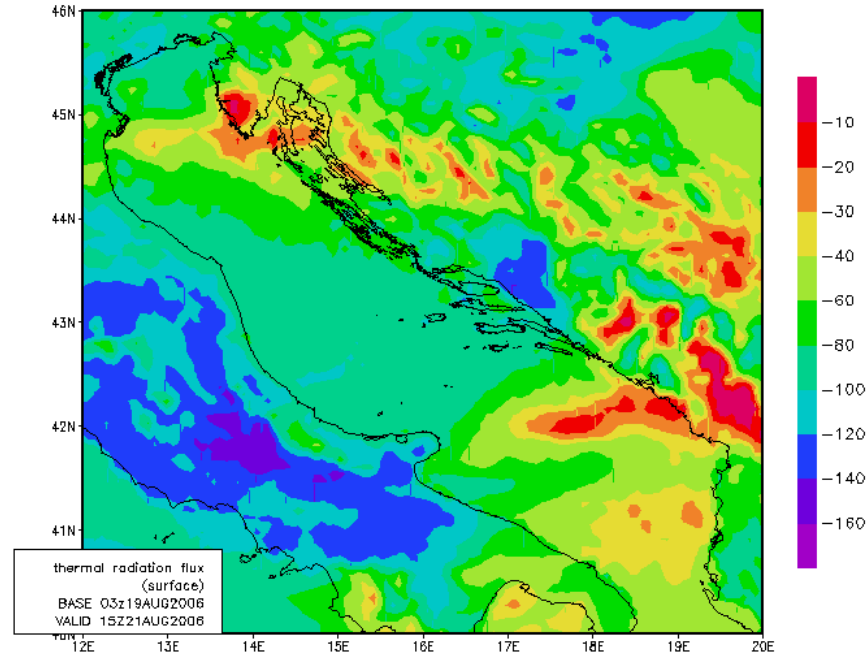


Radiation fluxes

surf. thermal radiation flux u 15Z21AUG2006 UTC 63h forecast

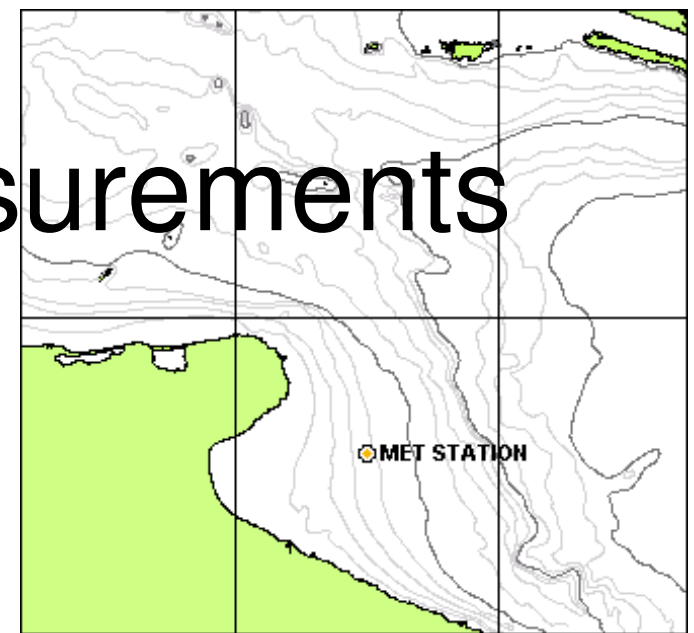


surf. thermal radiation flux u 15Z21AUG2006 UTC 63h forecast

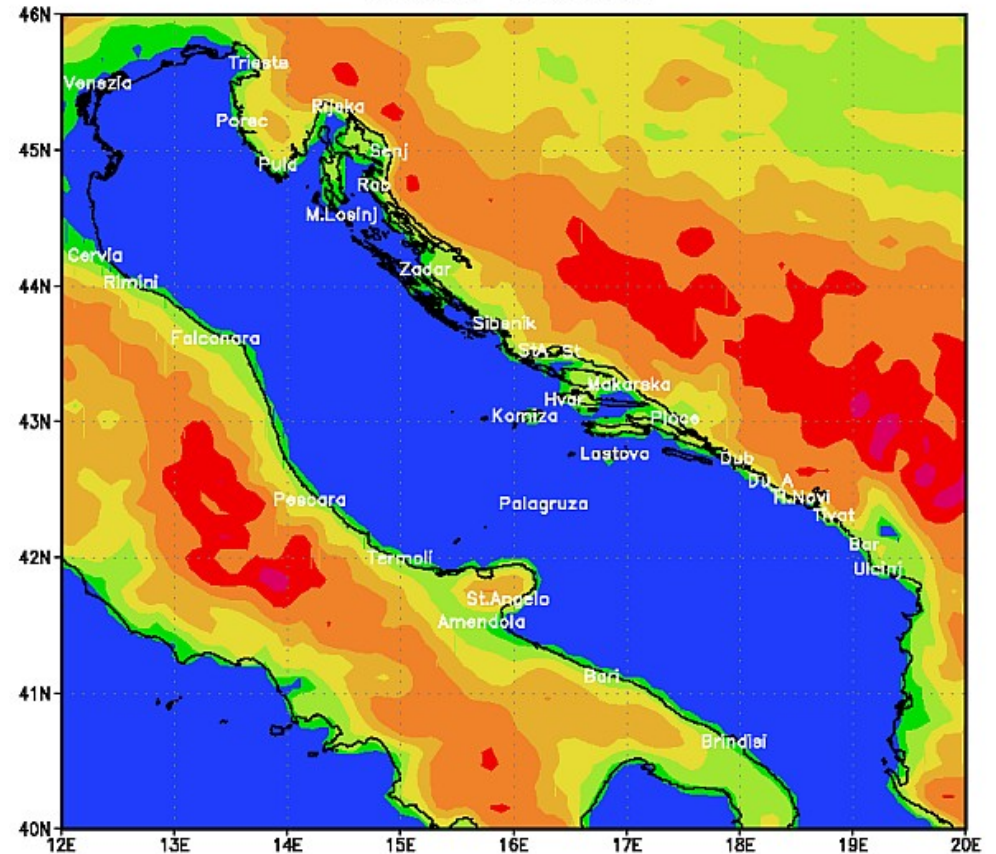
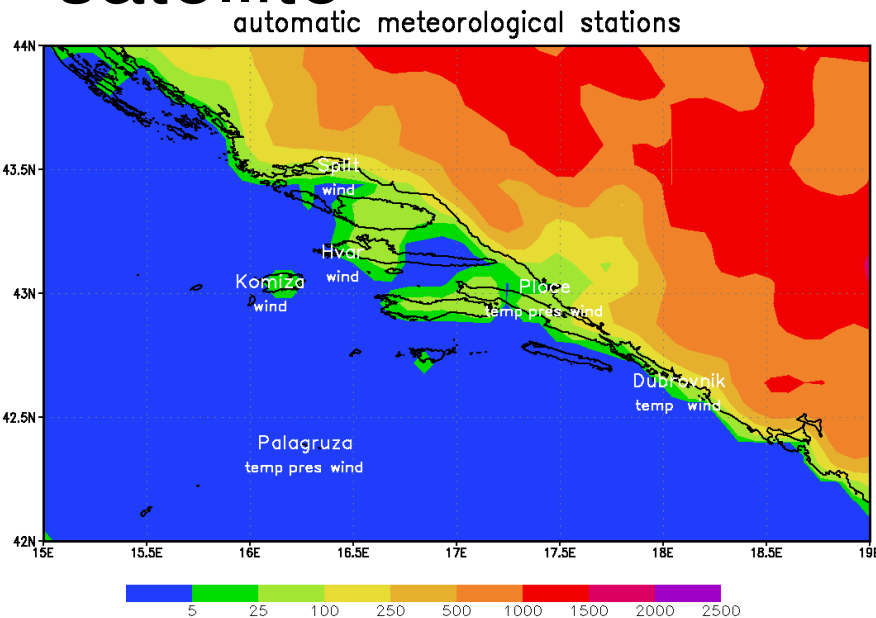


Meteorological measurements

- SYNOP stations (Italy, Croatia)
- Automatic stations from Croatia
- 3 automatic stations on ship
- 1 buoy
- satellite

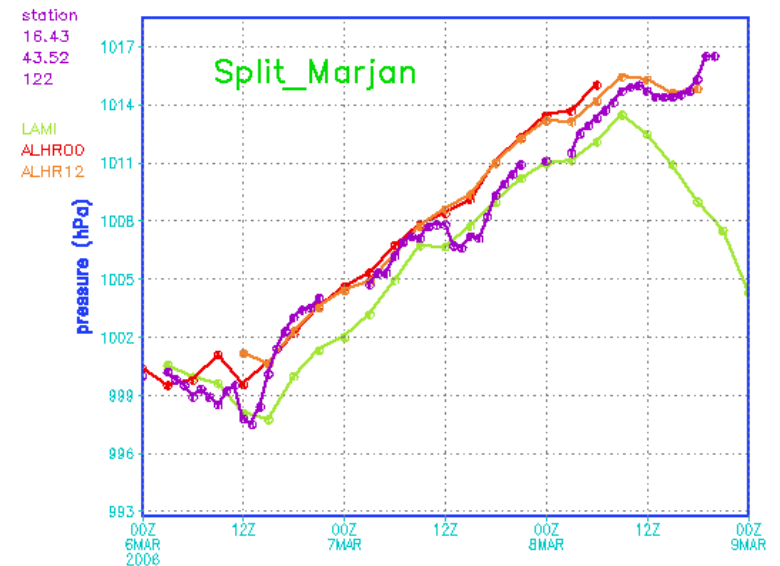
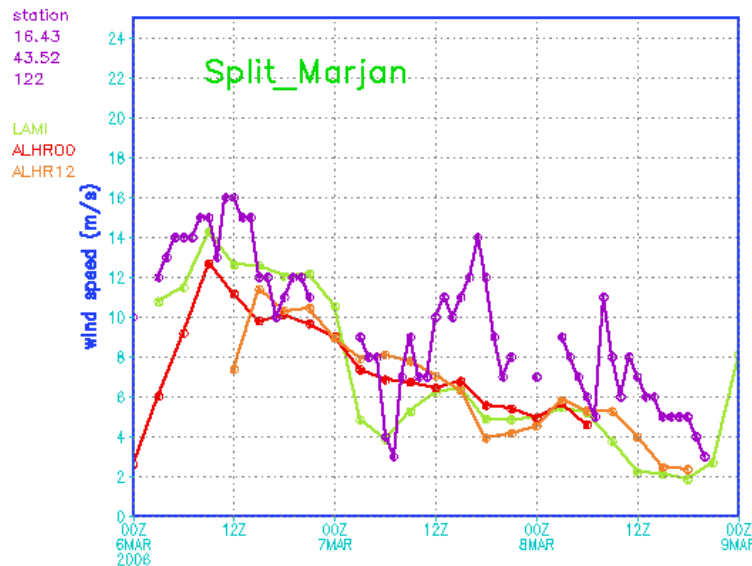
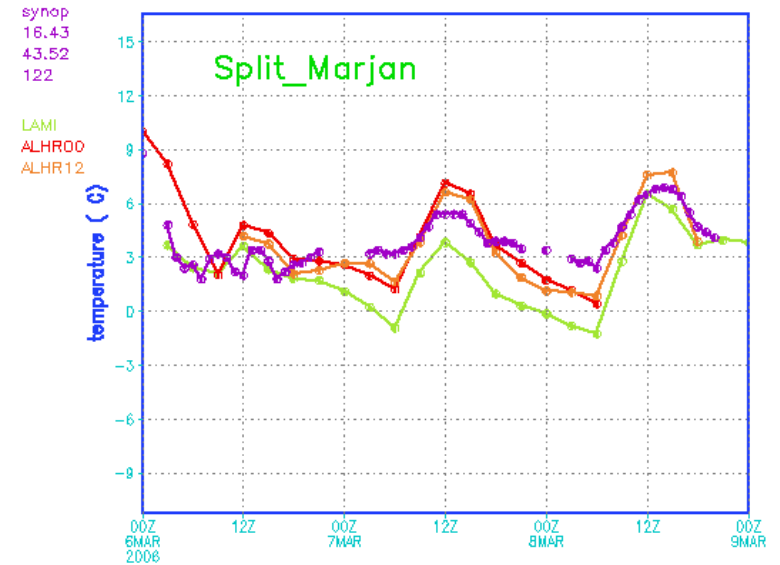


SYNOP stations



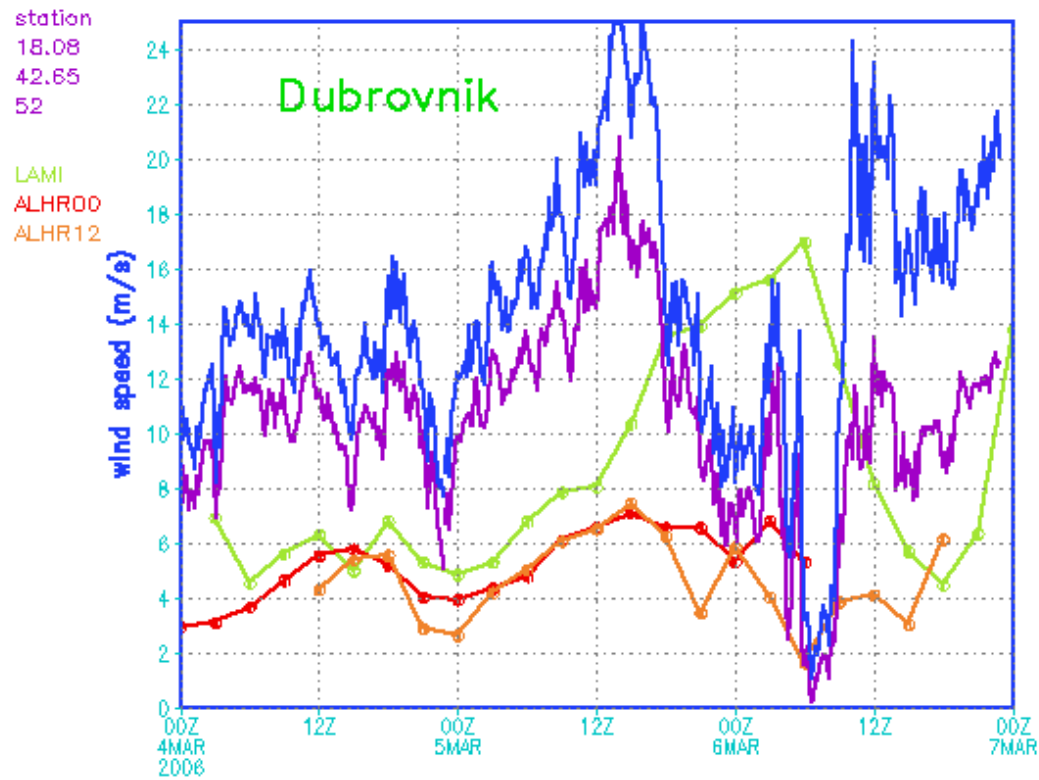
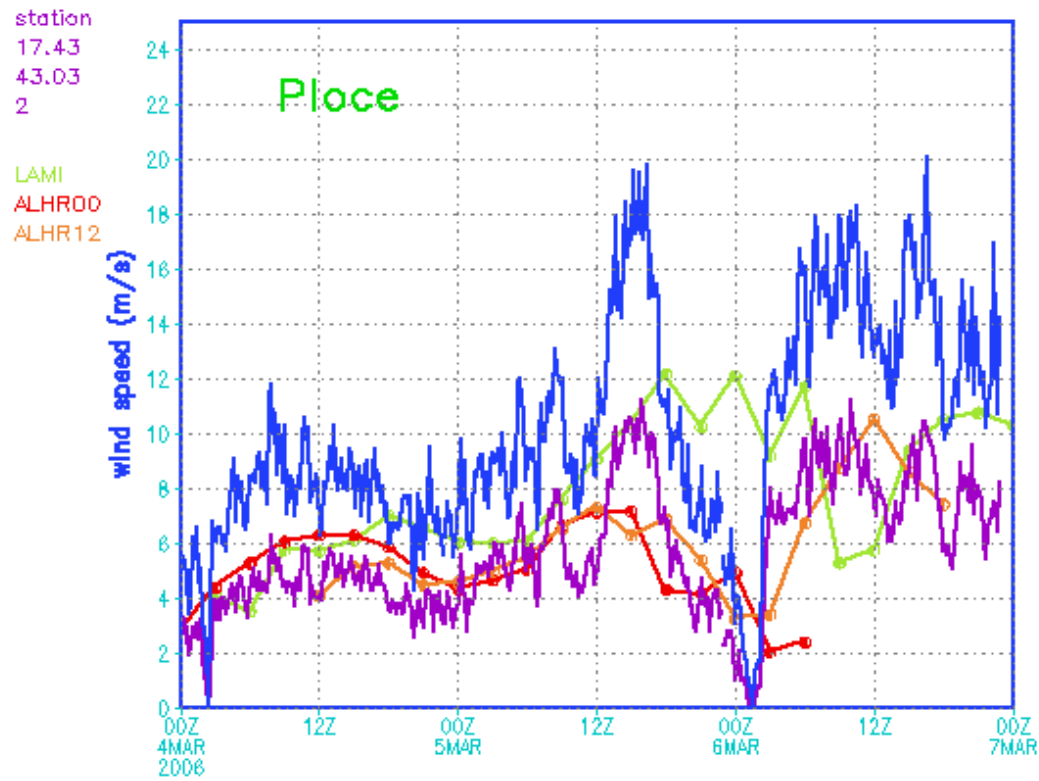
SYNOP stations

- delivered on hourly basis (when available)
- evaluate model performance
- forecast to measured data comparison



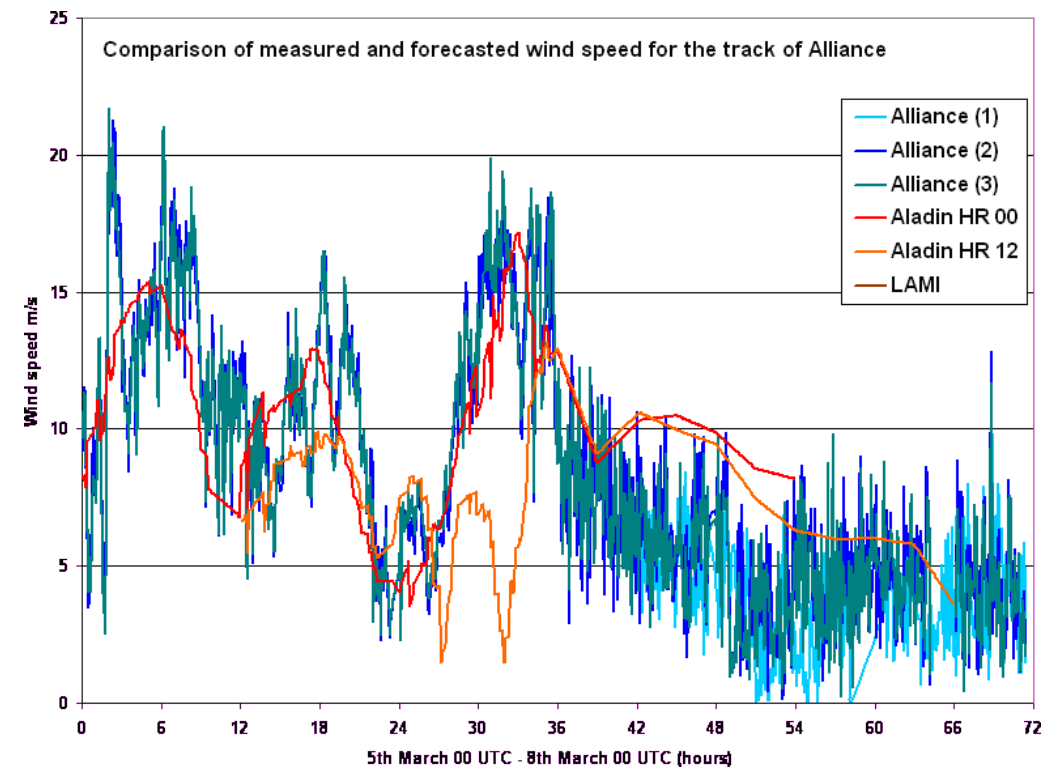
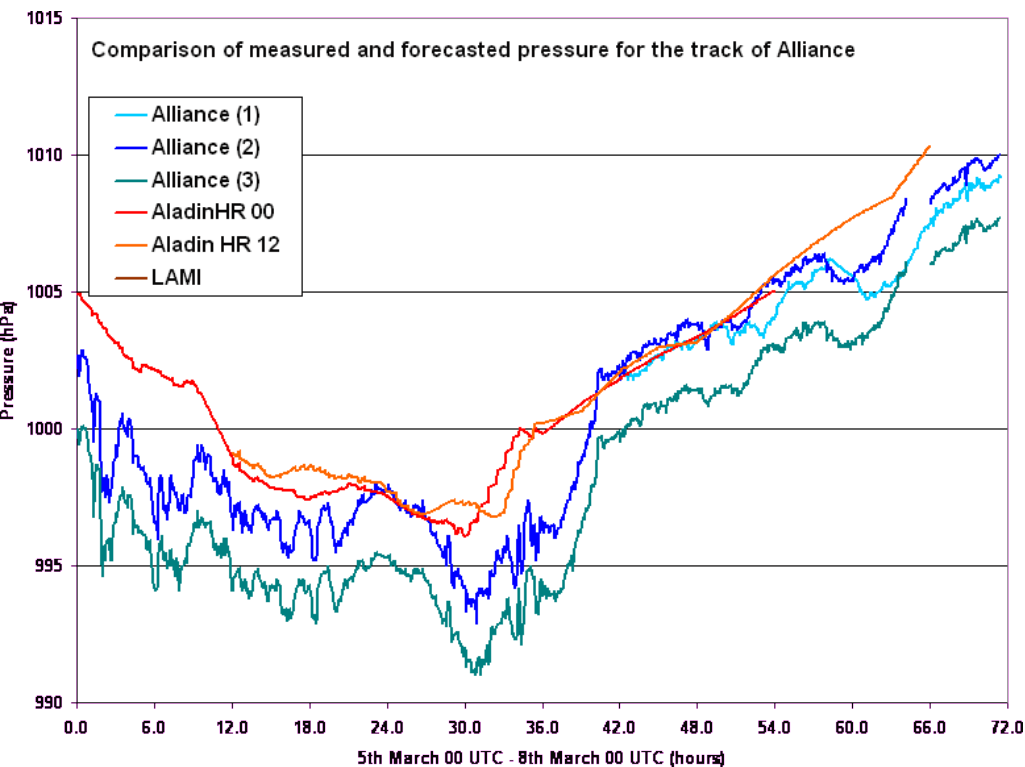
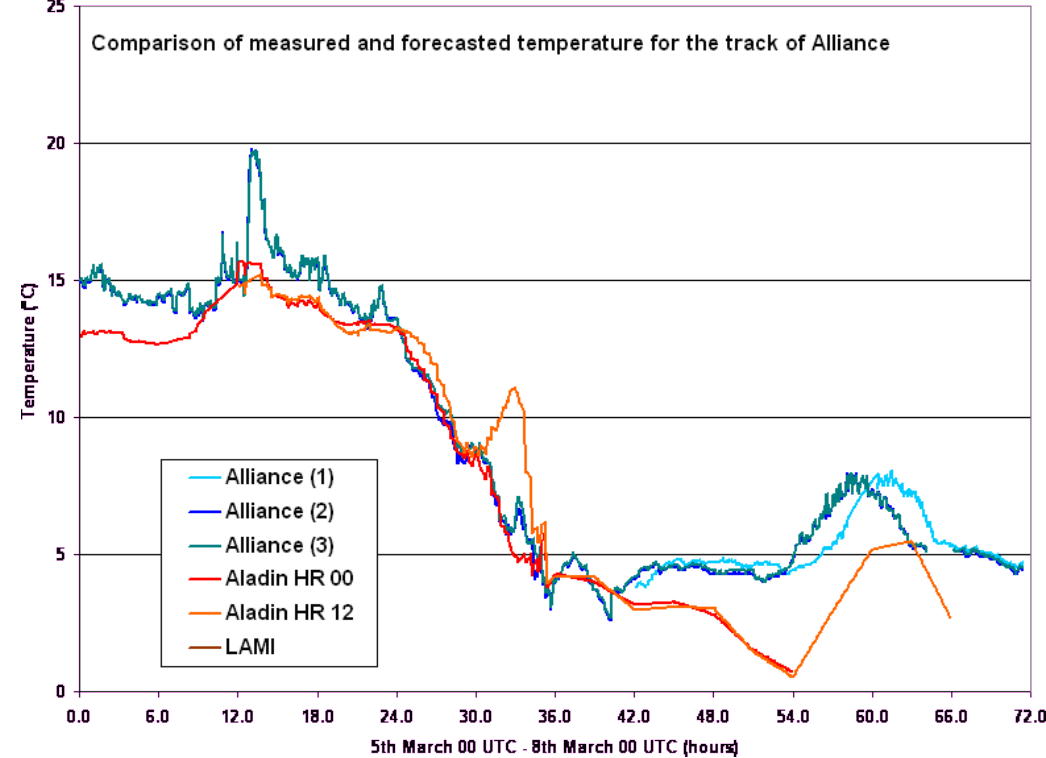
Automatic stations

- delivered on hourly basis
- evaluate model performance
- operational forecast to measured data comparison
- in case of SE wind, wind speed underestimated

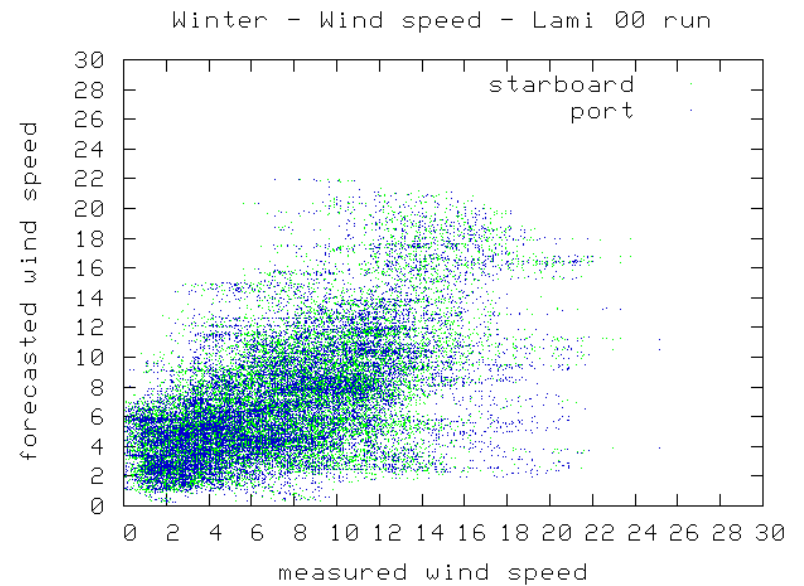
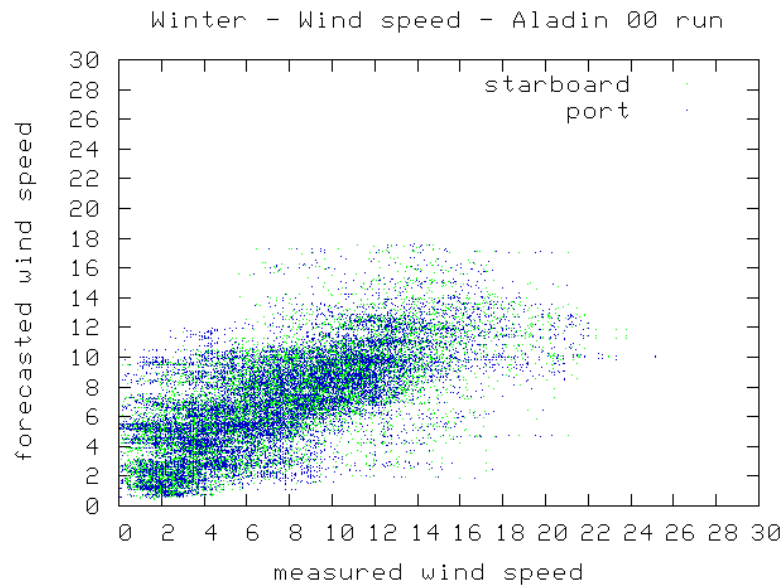
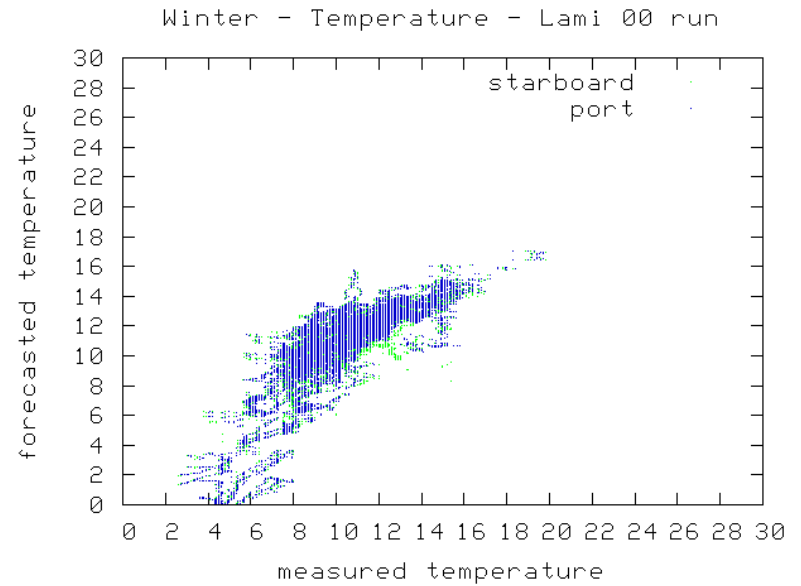
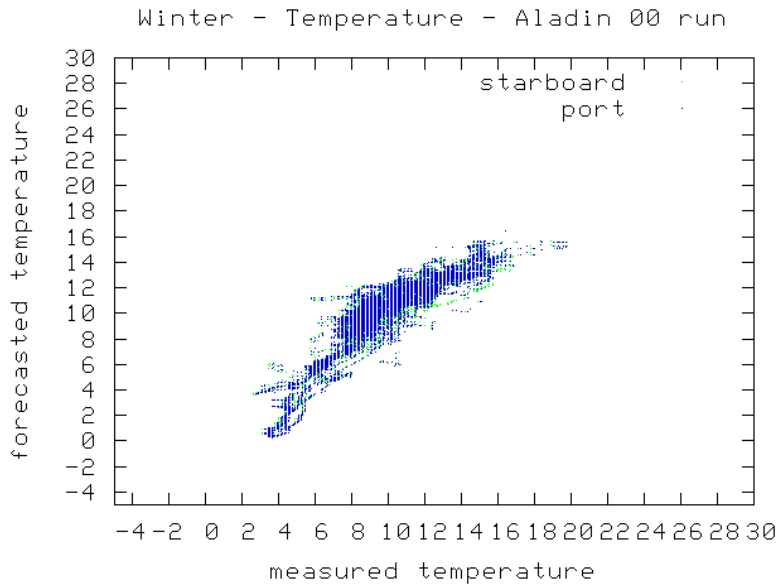


Ship

- delivered constantly
- evaluate model performance
- operational forecast to measured data comparison

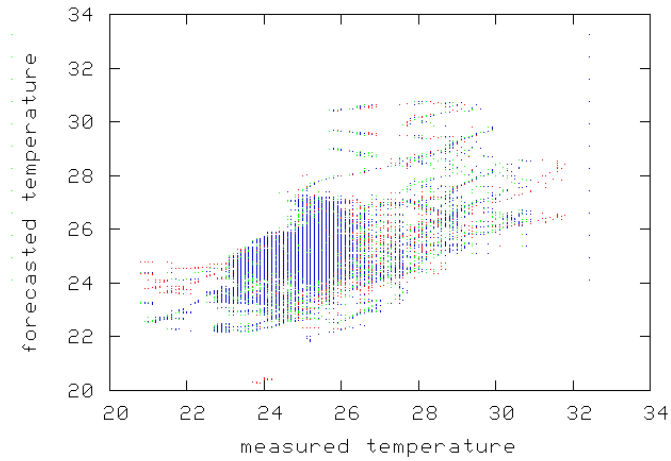


Comparison to data from the ship

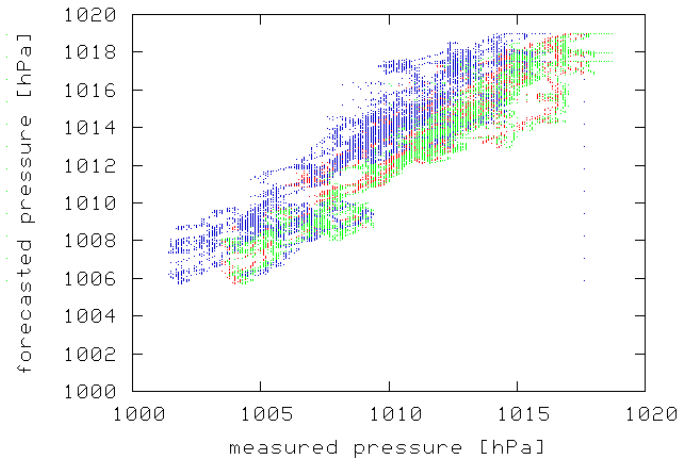


Comparison to data from the ship

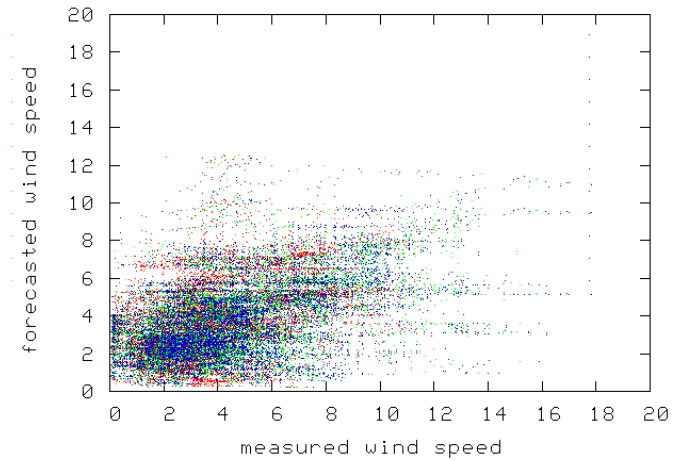
Temperature - Aladin 00 run



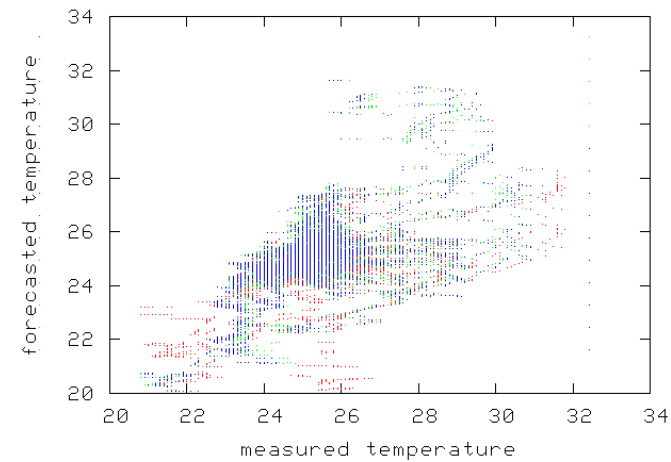
Mean sea level pressure - Aladin 00 run



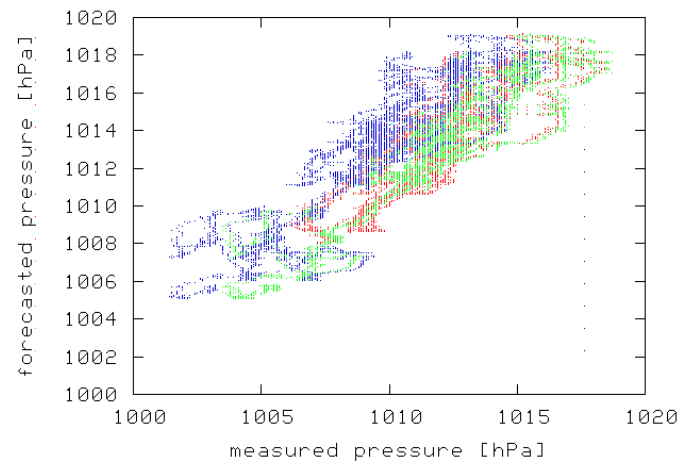
Wind speed - Aladin 00 run



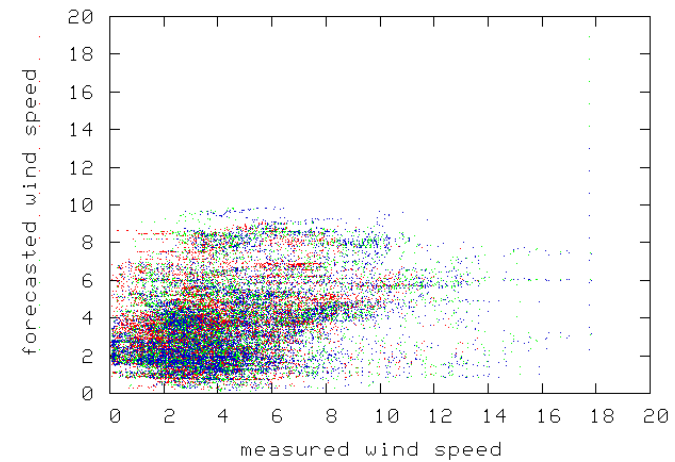
Temperature - Lami run



Mean sea level pressure - Lami run

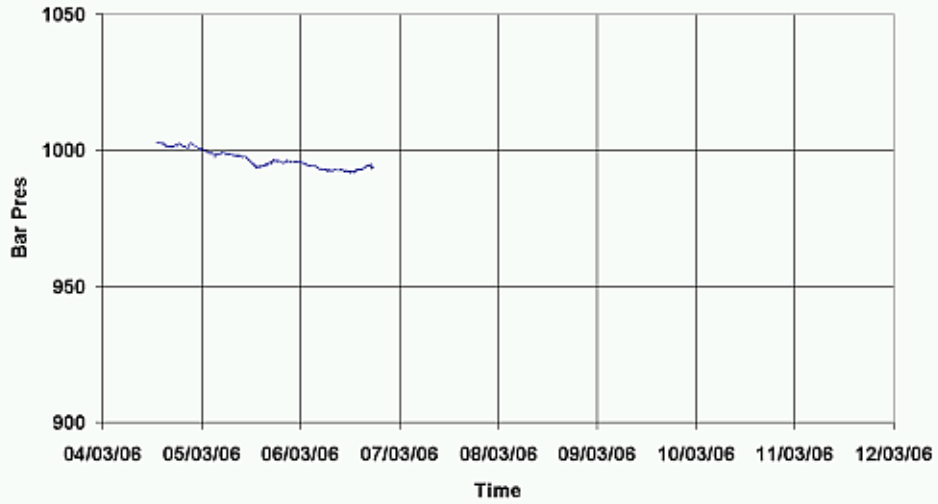


Wind speed - Lami run

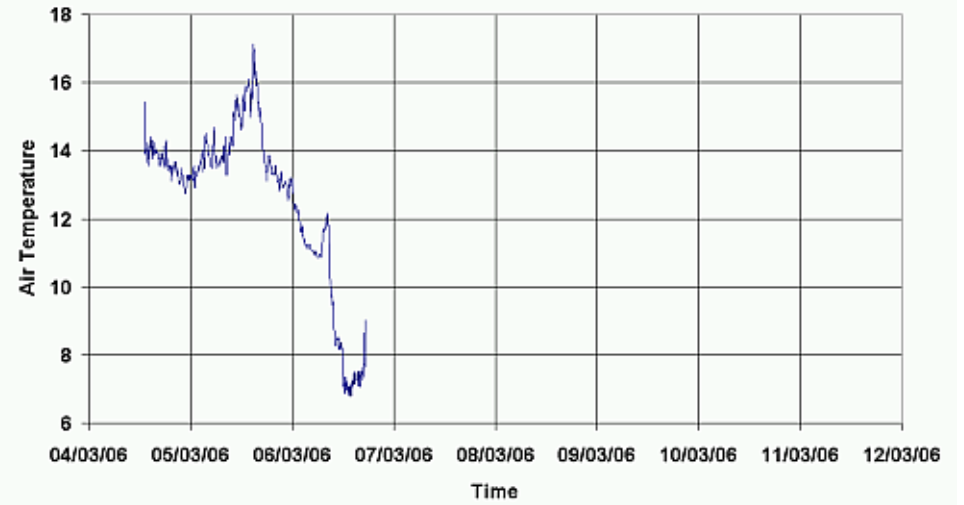


Buoy

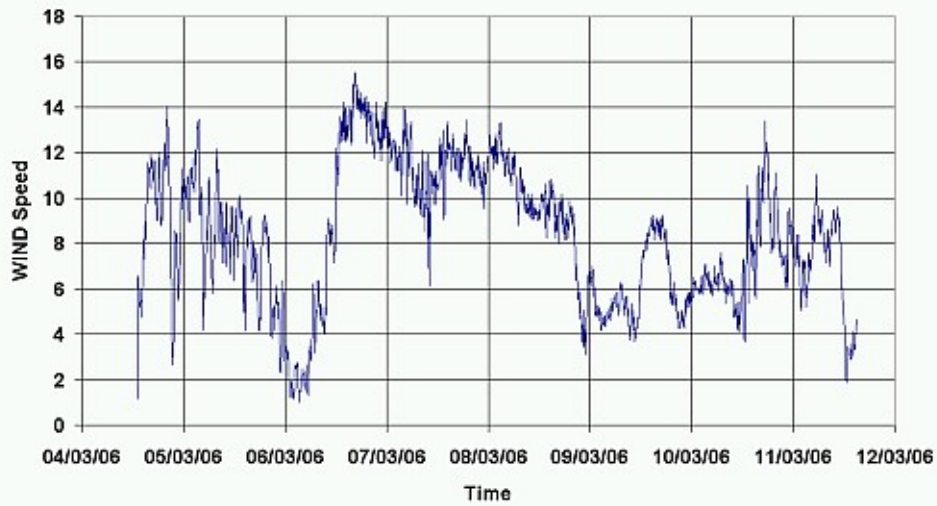
Meteo Buoy



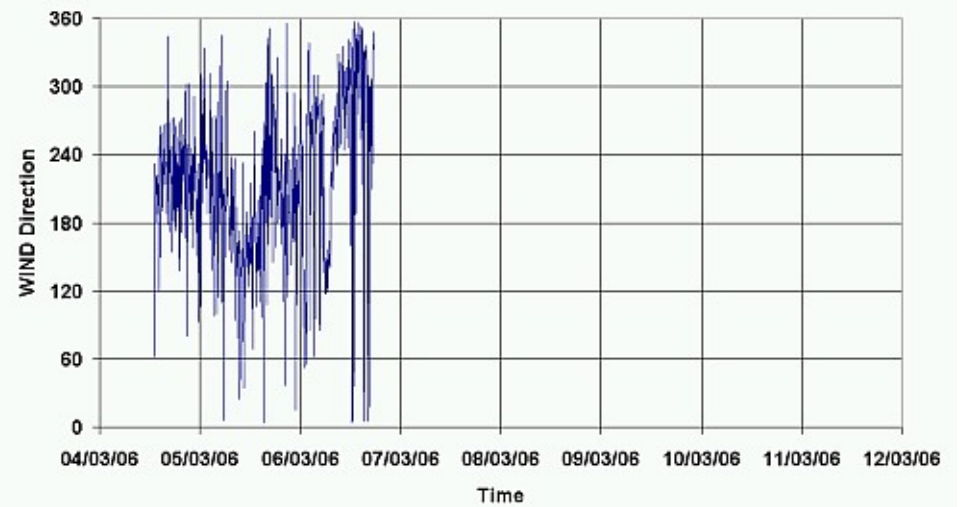
Meteo Buoy



Meteo Buoy

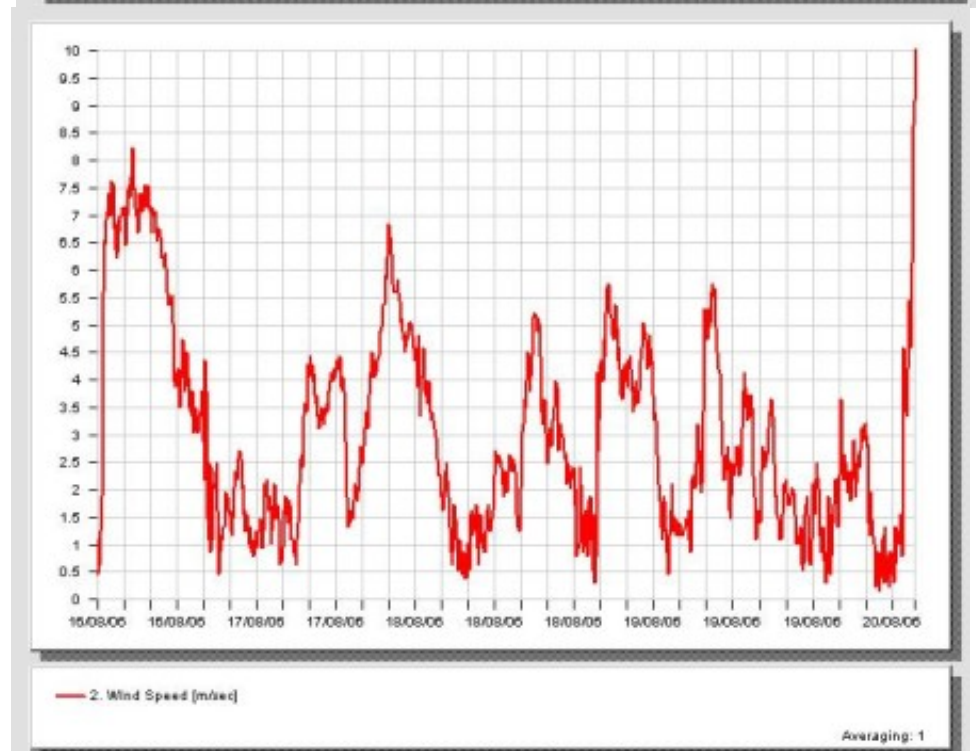
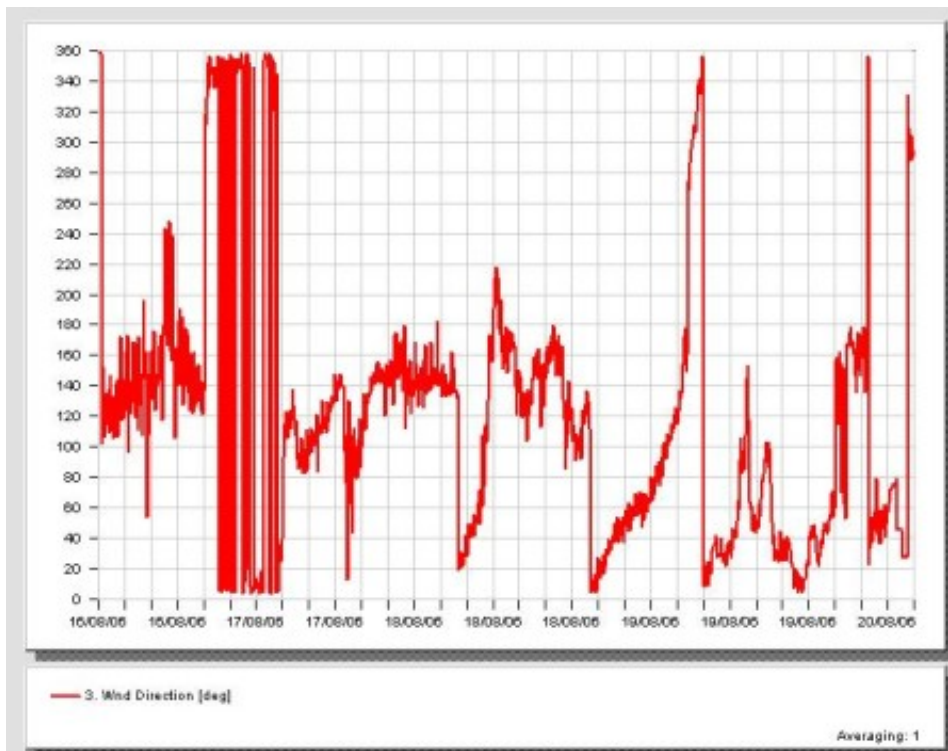
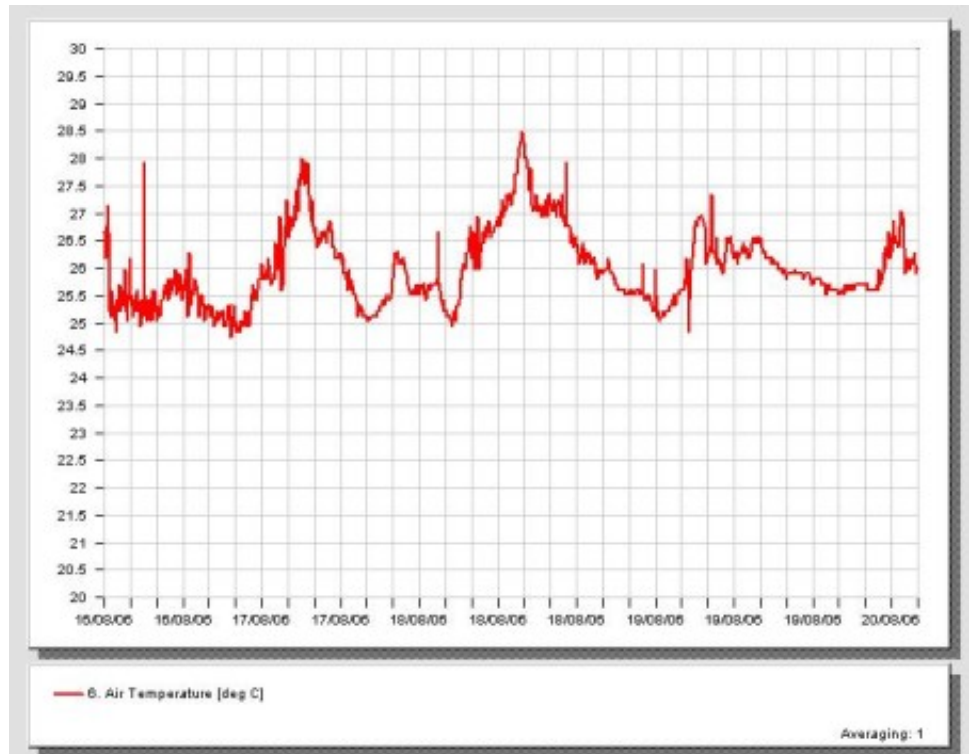


Meteo Buoy



Buoy

- data available only after retrieval from the Sea

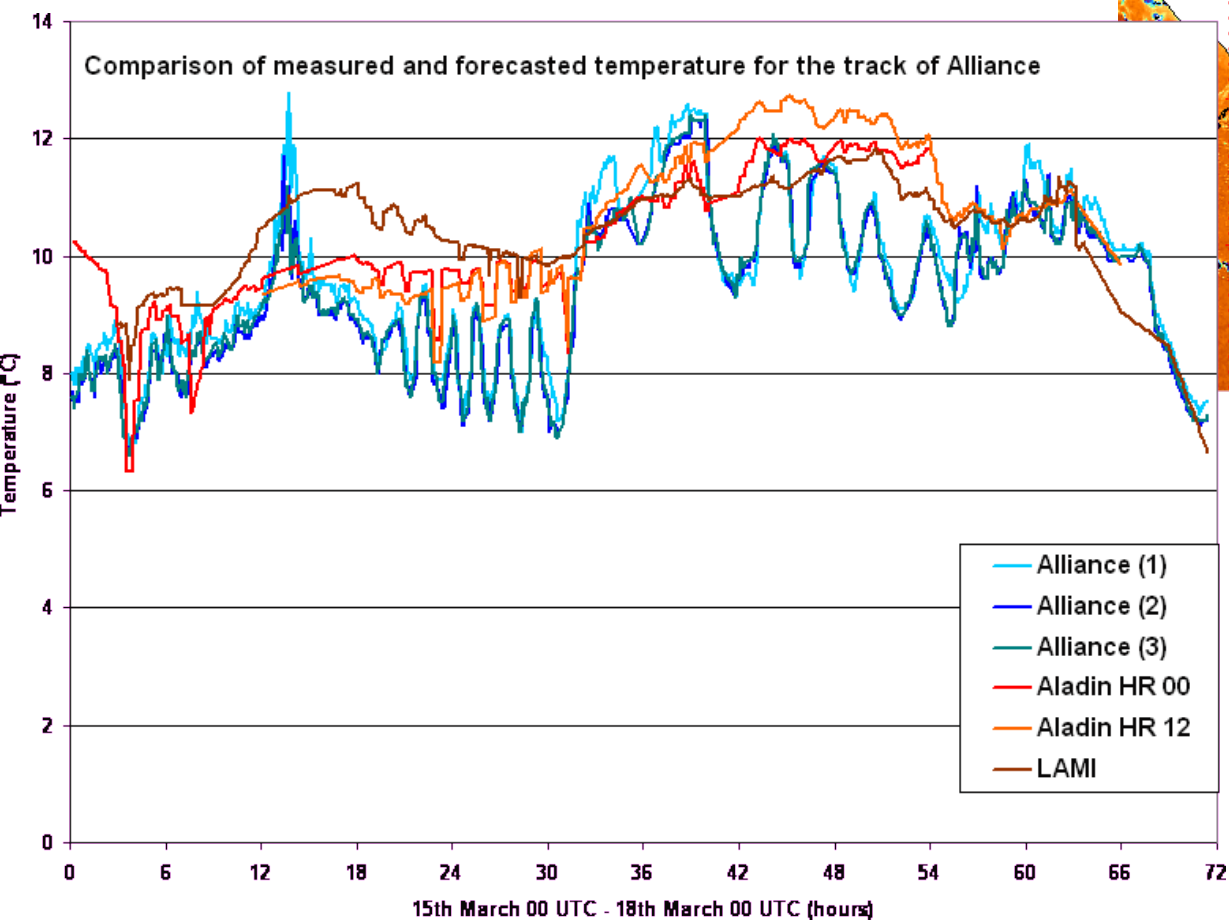
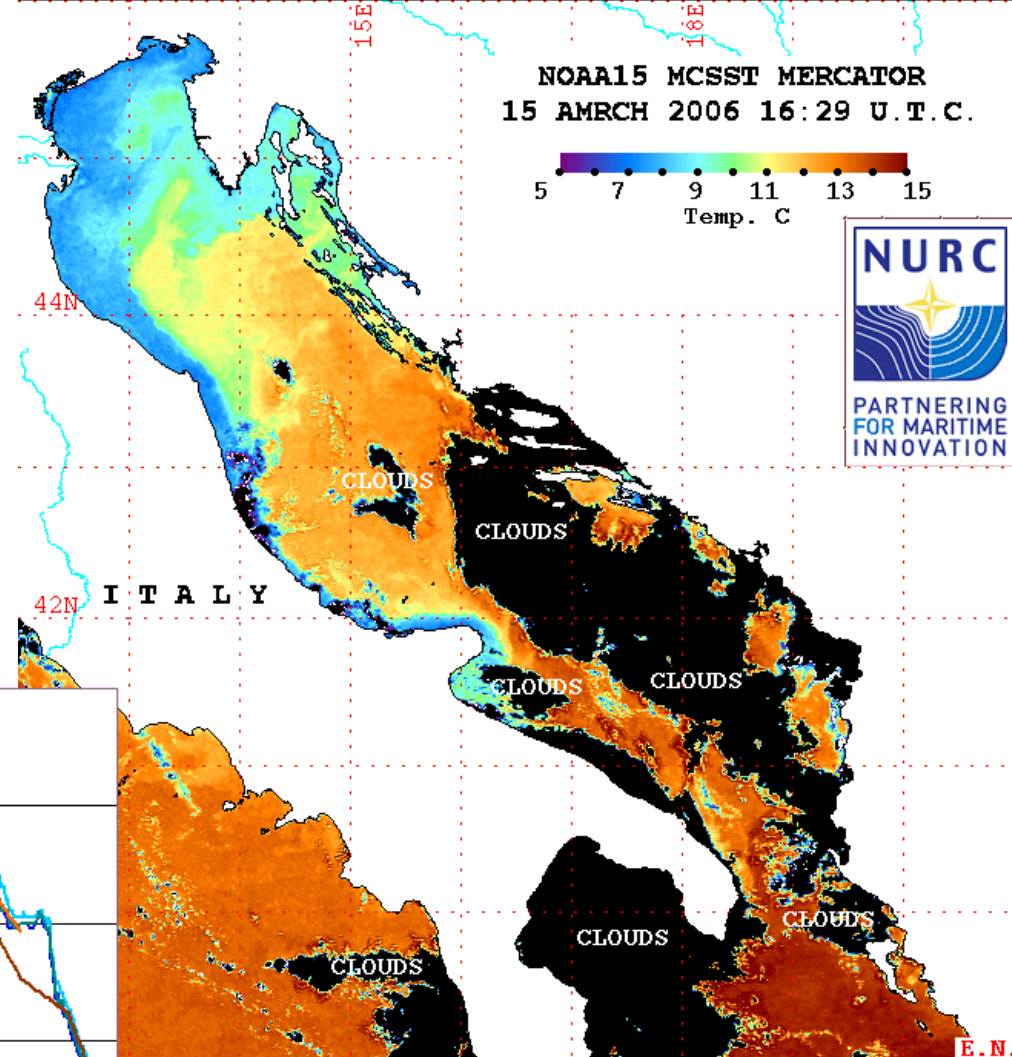


First results

- higher wind variability in space (and time) than predicted
- cold sea current along Italian coast does not exist in atmospheric model SST – unpredicted fog

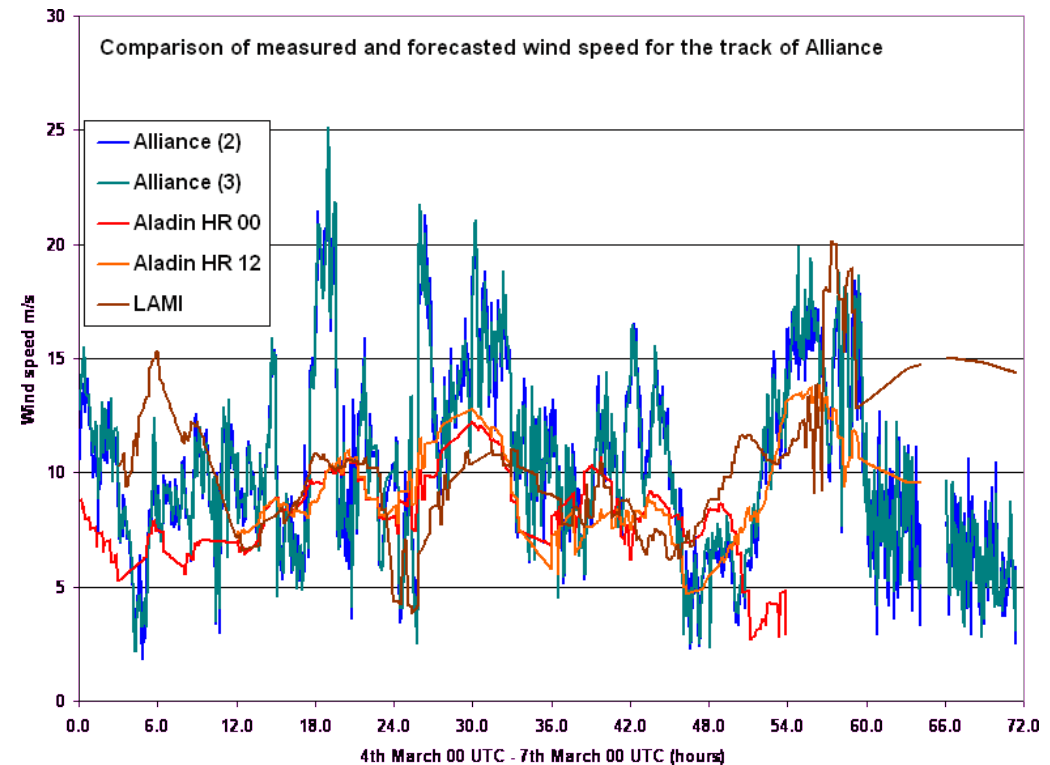
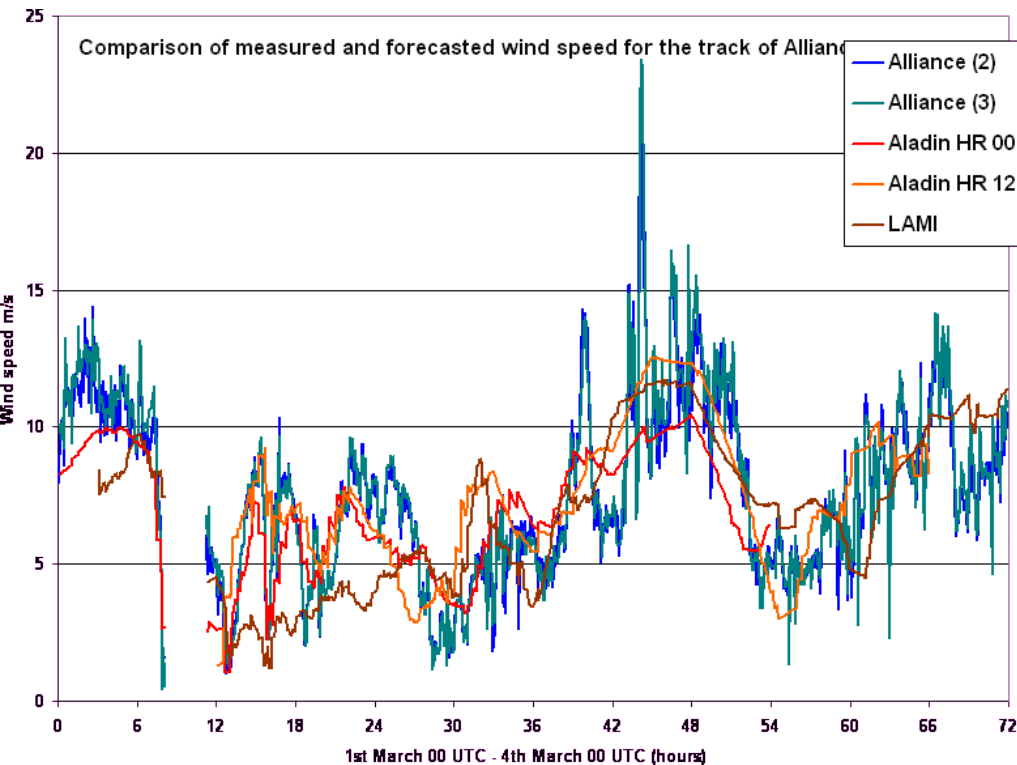
Cold current and fog

- cold current along the Italian coast of the Adriatic



Hight wind variability

- wind variability in space (and time) much larger than predicted



Future work

- Wind
 - higher resolution wind forecast
 - Alaro TKE scheme
- Cold current
 - use SST from ocean model
 - assimilate SST in high resolution
 - Alaro and prognostic moist variables
- Measurements
 - adjust for the position and movement of the ship