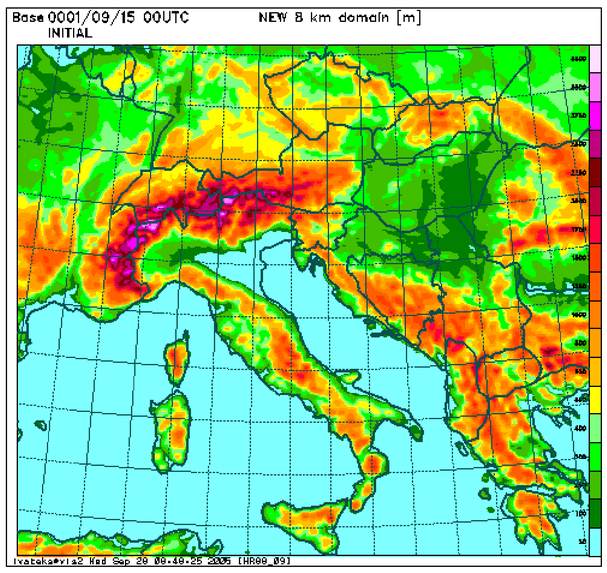
NWP in Croatian Meteorological and Hydrological Service

Current status of the operational suite

Computer (old)
- SGI ORIGIN 3400 16 x 400 MHz IP35 Procesors, Main memory 12 Gb
- OS IRIX 6.5, Open PBS as queuing system

Domains
- resolution: 8 km, 37 levels
- from December 1st 2005
- 229x205 (240x216) grid points
- Corners: SW (36.18,3.90)
  NE (50.68,26.90)
- resolution 2 km, 15 levels
- 6x 72x72 (80x80) gridpoints
- 1x 97x72 (108x80) gridpoints



LBC
- model ARPEGE
- Internet and RETIM2000
- coupling frequency 3 hrs

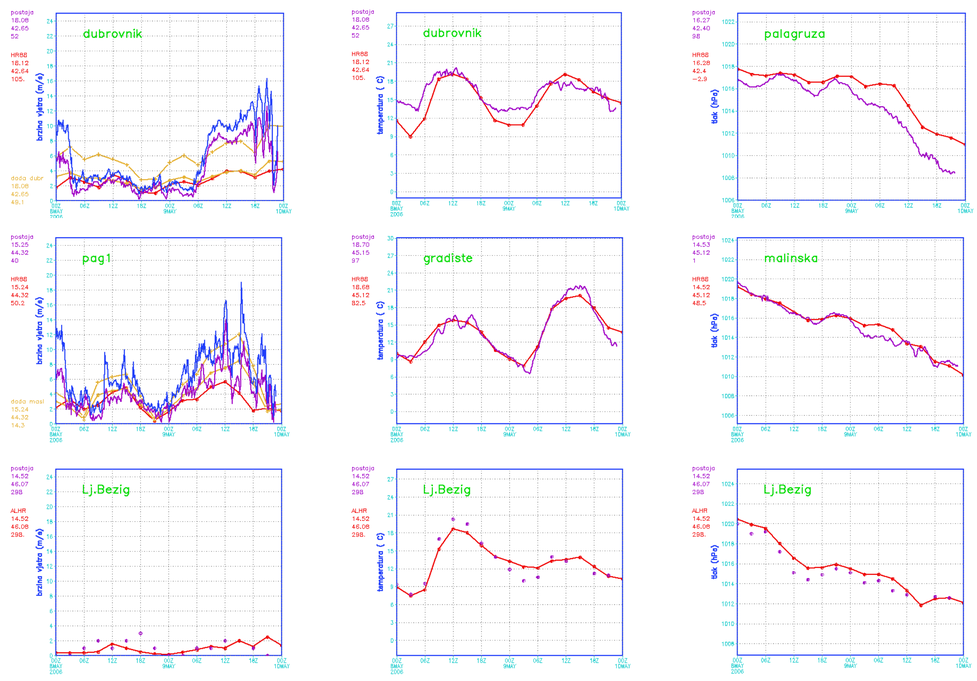
Model set-up
- AL28T3 with SLHD
- Xu-Randall cloudiness scheme with random overlap
- mean orograhy with changed gravity wave drag
- Digital Filter Initialisation

Visualisation
- numerious meteorological surface field and fields on pressure levels
- meteograms and HRID's
- verification agains SINOP data and automatic measurement stations data

Products on Internet
- http://prognoza.hr/aladin_prognoza_e.html

http://www.dhmz.htnet.hr/prognoza/aladin_prognoza_e.html

New verification
- hourly verification against automatic meteorological station
  - 50 points for wind, 26 for 2m temperature and 9 for pressure
- houry verification agains SINOP data from neighbouring countires



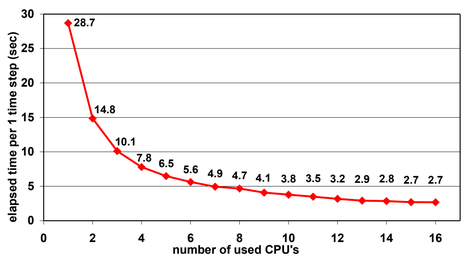
left-10 m wind & wind gust, midlle-2 m temperature, right-mslp pressure

purple measurements, blue wind gusts, red direct model output at 8 km, orange with filled circles 10 m wind orange with + sign 10 m wind gusts

Figures: verification for automatic meteorological station and SINOP data from neighbouring countires

New computer

SGI Altix LSB-3700 BX2 Server with 16x Intel Itanium2 1.6GHz/6MB, 32 GB standard system memory, 2x146 GB/10Krpm SCSI disk drive, OS SUSE Linux Enterprise Server 9 for IPF with SGI Package, Intel Fortran & C++ compilers, PBS Pro for LINUX,



Scalability test results. For the perfect machine double number of CPU ½ time for time step. For 6 CPU 5.6151 sec for perfect machine on 12 CPU 2.80755, in reality 3.1714 sec.

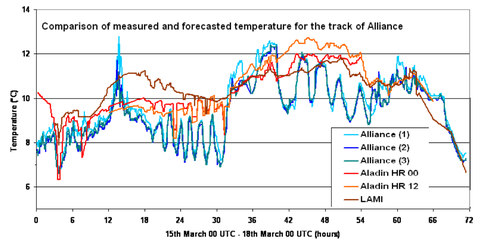
Aladin code (including a version of Alaro) is ported. Better optimisation of code is still missing. Some roblems were solved during compilations as accvimp and accvimpd shold not be optimized with Intel compiler version 9.0. PALADIN, emoslib, gribeuse are installed too. Thanks a lot to Jure Jerman for help. Porting of gmkpack is postponed due to coompilations problems. Prolongation of the forecast up to 72 hours is planed in near future when operational suite will be moved to new computer.

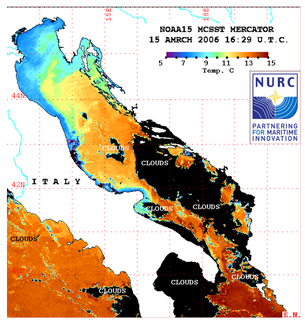
DART cruise (Dynamics of the Adriatic in the Real Time)

From 28th February till 28th March 2006 the central Adriatic was a subject of an interdisciplinary research under DART acronym using NRV Alliance as a platform. Aladin/HR forecast fields were used for driving ocean and wave model forecast operationally. It was also used for planning the schedule of sensitive operations. Already the first results show potential for improving atmospheric forecast using better ocean data. The cold current along the Italian coast of 7 °C is 6 °C colder than the nearby waters of open Adriatic cooling the air above and supporting formation of fog that was not recognized in the model forecasts.

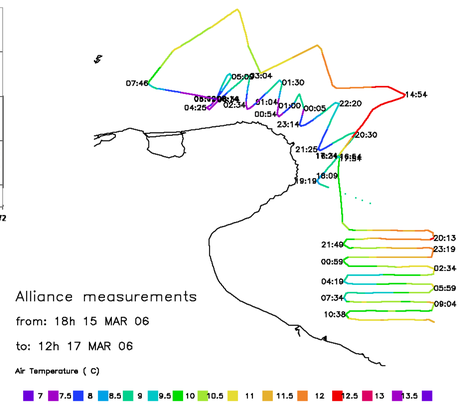
Naval research vessel Alliance

Retrieval of meteorological buoy





Sea surface temperature measured from NOAA satellite (left)

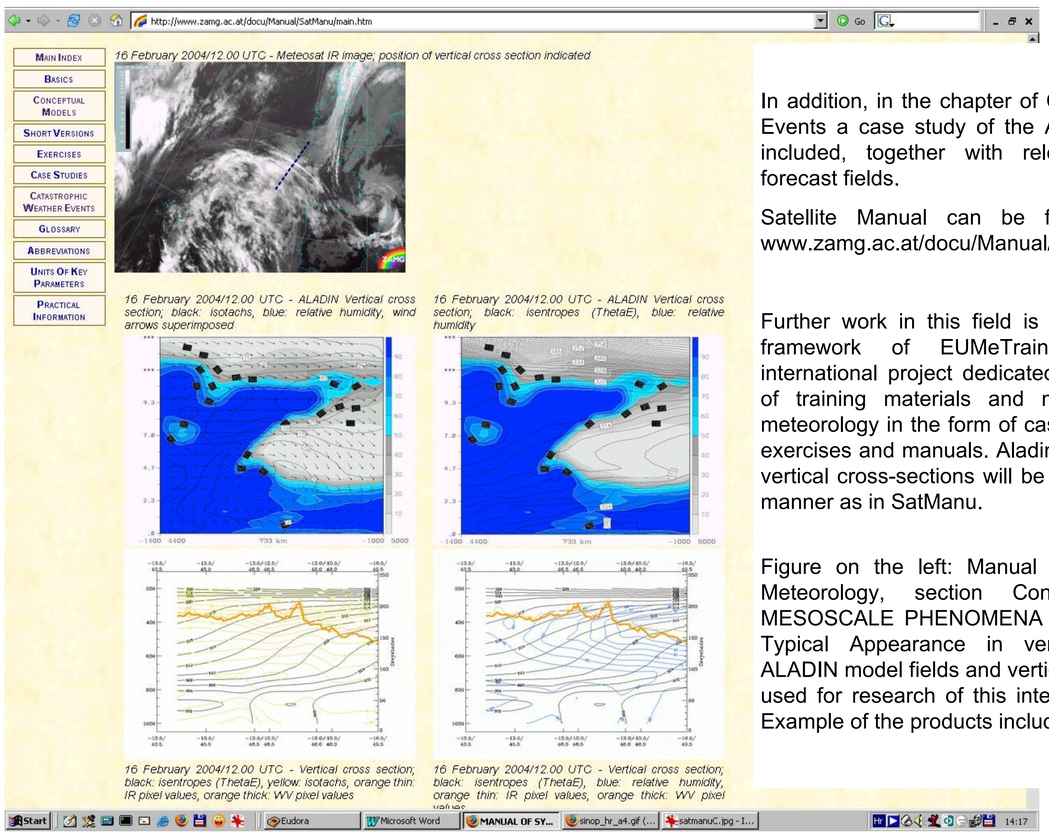


Comparison of Aladin/HR (00 and 12 UTC) and LAMI forecasts for the track of Alliance with measured values from the 3 sensors on the ship (top left).

Trajectory of Alliance colored in the shades showing measured temperature (top right).

SatManu

Weather analysis and forecasting department of Croatian Met Service participates in EUMETSAT's satellite and synoptic meteorology projects. For SatManu (2003-2005), a new conceptual model of Jet Fibres was investigated and some Computer Aided Learning materials were produced. Together with ECMWF, Aladin fields and cross-sections were used for research of this interesting small-scale phenomenon. Some of Aladin products were included in the Manual, in chapters Typical Appearance in Vertical Cross Sections and some related Exercises.



In addition, in the chapter of Catastrophic Weather Events a case study of the Adriatic Hail Storm is included, together with relevant Aladin model forecast fields.

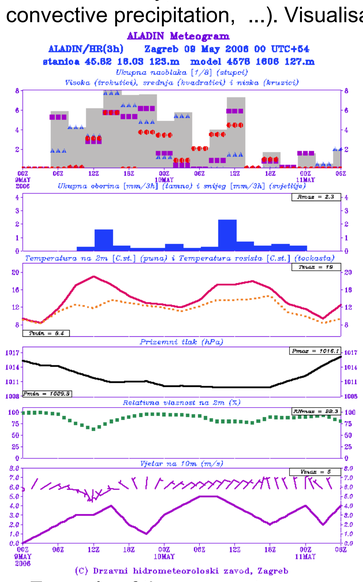
Satellite Manual can be found on the web: www.zamg.ac.at/docu/Manual/SatManu/main.htm

Further work in this field is continuing within the framework of EUMeTrain (2005-2009), an international project dedicated to the development of training materials and methods for satellite meteorology in the form of case studies, interactive exercises and manuals. Aladin horizontal fields and vertical cross-sections will be included in the same manner as in SatManu.

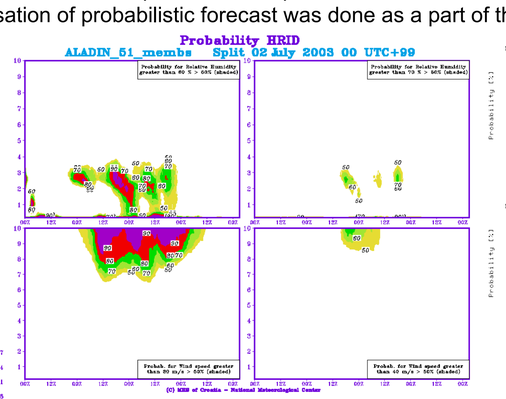
Figure on the left: Manual of Synoptic Satellite Meteorology, section Conceptual Models - MESOSCALE PHENOMENA - Jet Fibres, chapter Typical Appearance in vertical cross-sections. ALADIN model fields and vertical cross-sections are used for research of this interesting phenomenon. Example of the products included in the Manual.

New meteograms and visualisation of probalistic forecasts

New meteograms of "surface parameters" up to 54 hours were developed that should be more user-friendly for not meteorologists, showing: total, low, medium and high cloudiness, total precipitation and snow, 2 m temperature and dew point, msl pressure, 2 m relative humidity, 10 m wind direction and wind speed. Some special fields are still missing (surface temperature, wind gusts, convective precipitation, ...). Visualisation of probabilistic forecast was done as a part of the Downscaling of the ECMWF EPS.

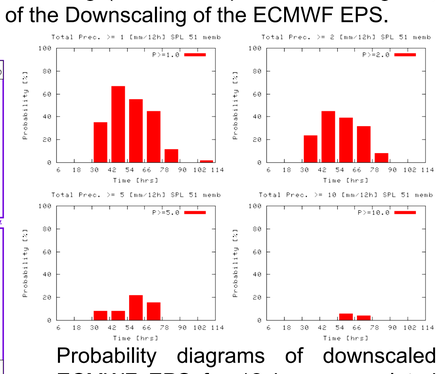


Example of the new meteogram



Probabilistic HRID from downscaled Aladin/EPS

Idea was to use HRID as diagnostic tool for potentialy extreme weather events. On figure above areas with RH greater than 60 or 70 % and probability greater than 50 % are shaded. Area with wind speed greater than 30 or 40 m/s and probability greater than 50 % are shaded.



Probability diagrams of downscaled ECMWF EPS for 12 hrs accumulated precipitation to exceed 1, 2, 5 and 10 mm/12 hrs.

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