February 2012 winter conditions in Croatia

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During February 2012 cold weather, intensive precipitation and gale force wind disturbed traffic and deteriorated living conditions. Temperatures measured on stations at the Adriatic coast and islands fell below 0°C and stayed low for two weeks. Although strong and severe bura wind prevented accumulation of snow on ground, snow heights reaching above 0.5 meter were measured. Due to low temperatures, snow cover persisted for the whole month.

The cold weather period was a consequence of an anticyclone stretching from Finland and Russia to NW Europe and low pressure above the Mediterranean. During February 2012, several cyclones have passed over the Tyrhennian and Ionian seas, and a vortex formed over the Adriatic on occacions. Consequently, bura (northeast) wind blew almost continuously during the first two weeks with strength varying from strong to gale. Wind weakend as a polar low moved from Norwegian sea over Scandinavia southeast towards the Black Sea on 14th to 16th February 2012.

The operational forecast of Aladin Croatia uses 3DVar for the upper air and OI for surface data assimilation in 8km resolution. The forecast is further dynamically downscaled to 2km resolution. Forecast of the 24 hourly precipitation from 8 km model run (accumulated since 06 to 30 hour forecast starting from 00 UTC analysis) is compered to the rain gauge measurements (circles) and sum of the hourly TRMM data for the same 24 hours. TRMM precipitation data are from 3B41RT version 6 obtained through the Giovanni web interface from NASA.

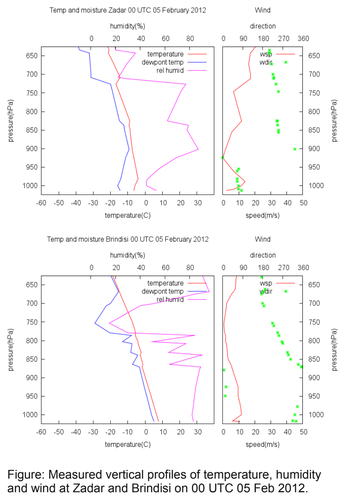
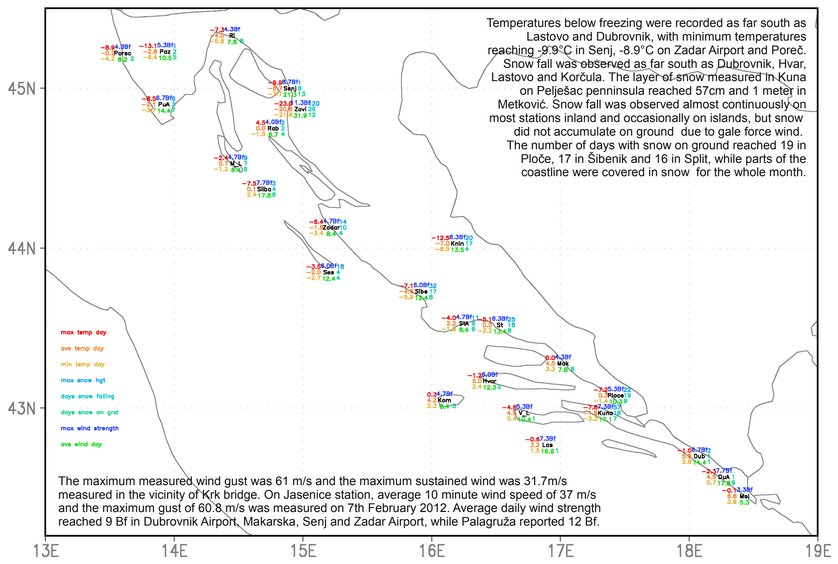
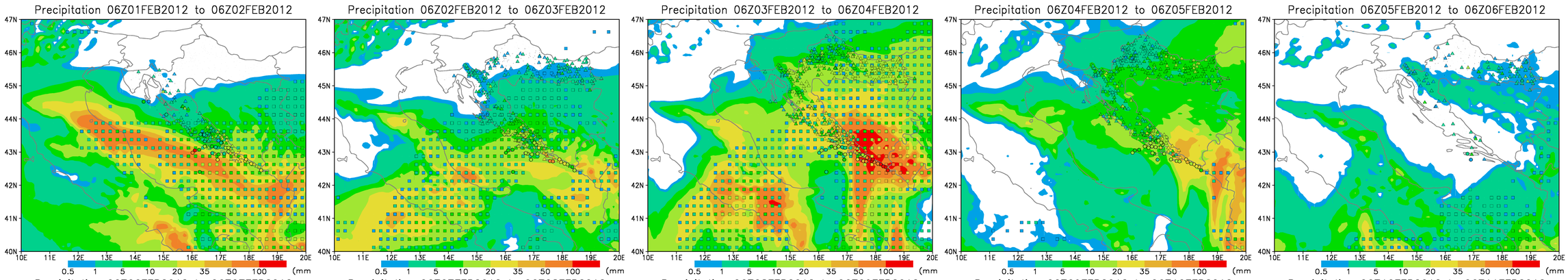
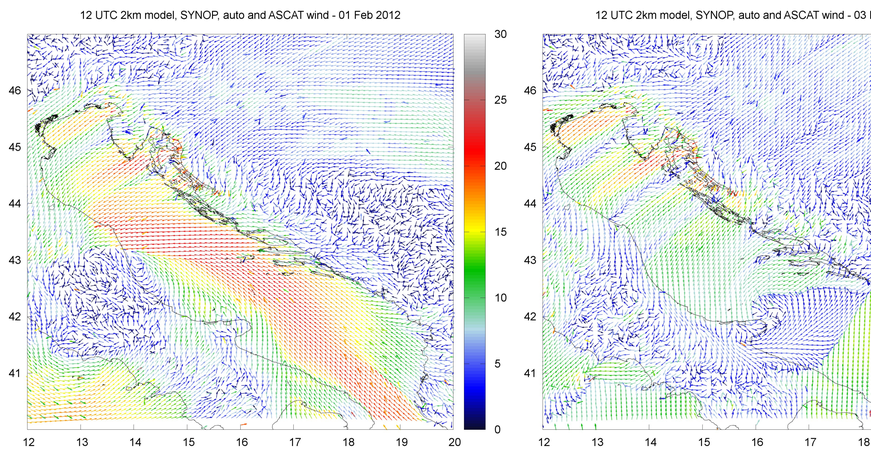


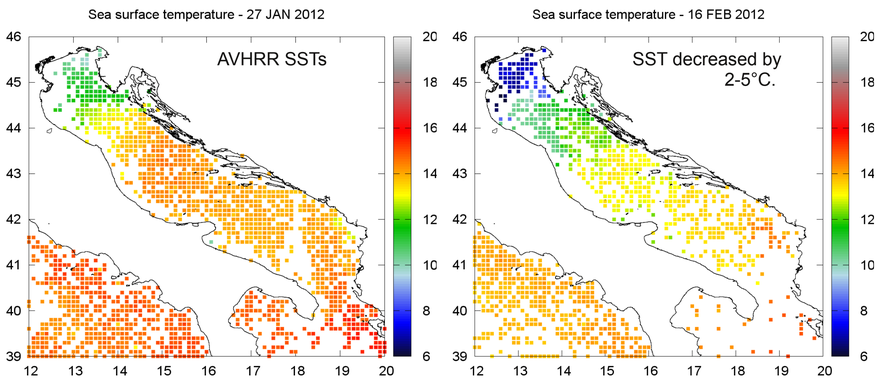
Figure: Measured vertical profiles of temperature, humidity and wind at Zadar and Brindisi on 00 UTC 05 Feb 2012.







Forecast 2km resolution wind (every 4th arrow is shown), wind measurements from SYNOP and automatic stations and METOP ASCAT wind data as available from Ocean Watche web interface at NOAA. Wind over NE Adriatic is continuously strong to severe and from northeast. Intensive southern wind on 4th corresponds to intensive rainfall in Dubrovnik.



The precipitation figures show accumulated 24 hourly precipitation from the operational 8km ALADIN model forecast (shaded background), measured on raingauges (triangles if snow, circles if rain) and accumulated from TRMM data (squares). ALADIN model was run with the advection of rain and snow and diagnostic convection scheme. Measurements from raingauges were taken in strong and severe wind conditions that affect the measured values, especially in snow conditions. Measurements on automatic gauges (not distinguished in figures above) suffered from icing and strong wind. Finally, TRMM data are computed using cloud properties as input, this procedure has been designed to estimate the tropical rainfall. The performance of this procedure in cold weather with snow might be less than ideal.

Figures below show measurements of 2m temperature, pressure reduced to mean sea level, wind speed and direction in 10 minute interval from the automatic stations close to Adriatic sea. Instruments suffered damage due to severe weather conditions, such as icing on instruments, power shortage due to accumulation of snow on solar panels and some instruments got blown away by the gale force wind either partially or completely. The anemometer in Bakarac suffered icing. Consequently, instrument showed wind speed decrease when it was increasing according to the model forecast and surrounding stations. Then wind blew part of the ice off. Wind speed increased by 8m/s in 10 minute interval. Ice accumulated again and after one day wind speed decreased to zero. Finally, anemometer was blown away.