NWP at Meteorological and Hydrological Service of Croatia in autumn 2016

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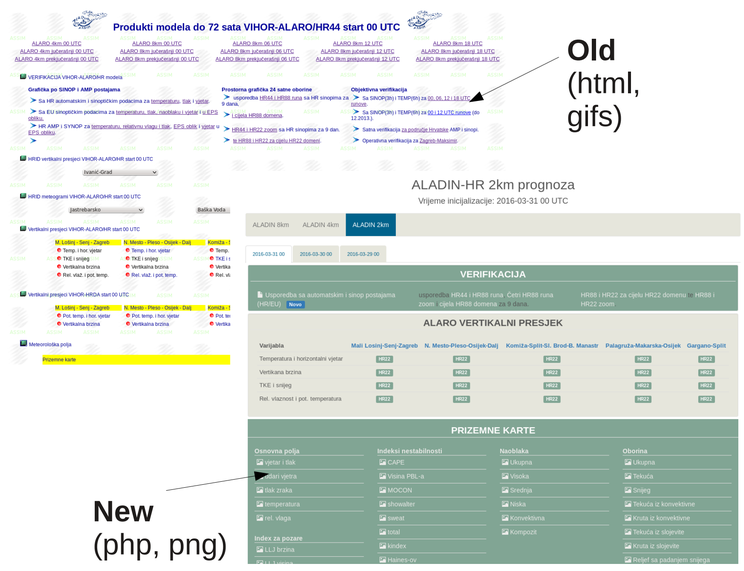
INTRODUCTION

The operational model version used is AL38T1 with ALARO0 physics for 8, 4 and 2 km resolution forecasts. Operational forecasts run for:

- 8 km res, 360 sec, 4 times per day, 3D-Var and surface OI, 3h cycling, to 72 hours, LBCs: IFS, 37 levs.
- 4 km res, 180 sec, hydrostatic in parallel, only from 00 UTC up to 72 hours, 3D-Var and surface OI, 3h cycling, LBCs: IFS, 73 levs.
- 2 km dynamical adaptation, 60 sec time-step, hourly, up to 72 hours,
- 2 km non-hydrostatic run, 60 sec time-step, using AL36T1 with available ALARO0 developments, from 06 UTC up to 24 hours.

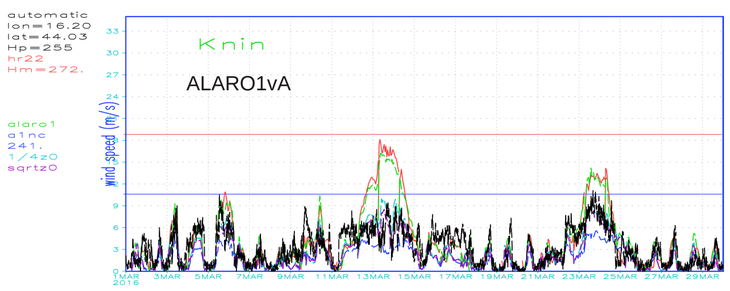
New interface to the model products

The web interfaces on the internet (password protected) and intranet as well as the scripts that generate plots and tables there have been severely modified in order to produce plots of higher quality for the operational visualization products and simplify future changes (maintained by local Aladin staff, lot of work, no science).



ALARO1vA

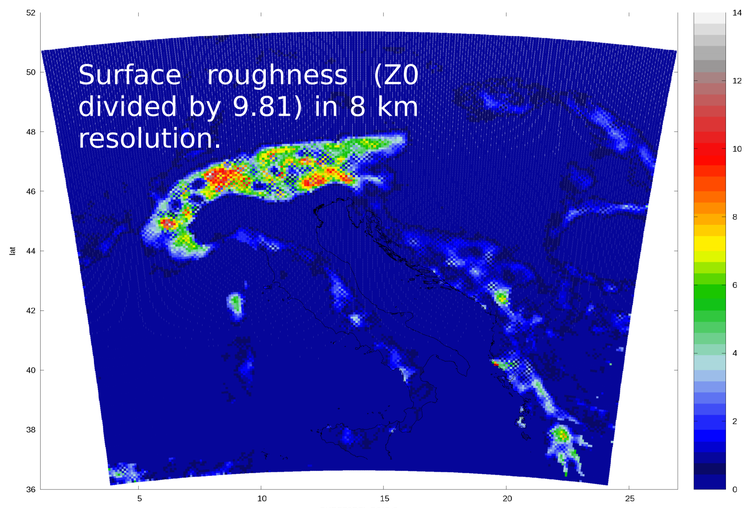
ALARO1vA modifications were ported to CY38T1. Tests were performed on the same month, March 2016, as for alternative physiography fields. So far, the tests reveal higher sensitivity to the change in physiography than to more advanced physics parametrisations. Particularly, the 10 m wind in severe weather conditions is very sensitive to the surface roughness.

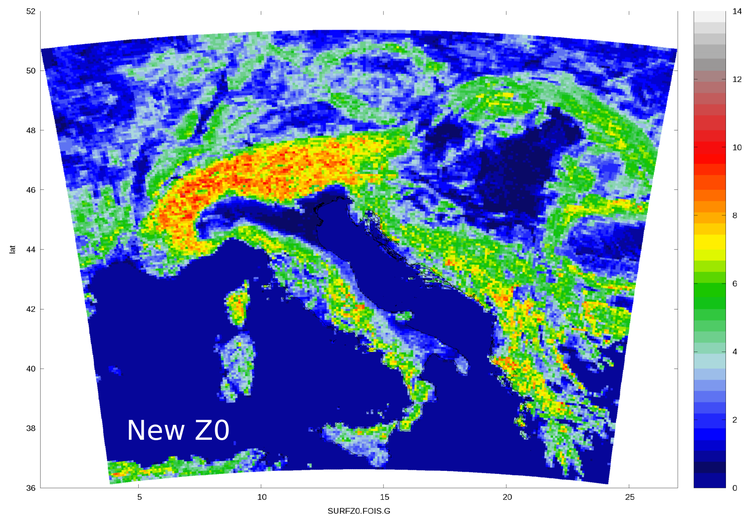


Wind speed at 10m: measured (black), operational 2km NH forecast using ALARO0 (red), using ALARO1vA and operational z0 (green), ALARO1vA with new z0 (blue), new z0*0.5 (green), new z=*0.25 (light blue), new z0*0.33 (orange) and 0.5*sqrt(gz0) (purple) for March 2016 station Knin (above) and Lokvine (below).

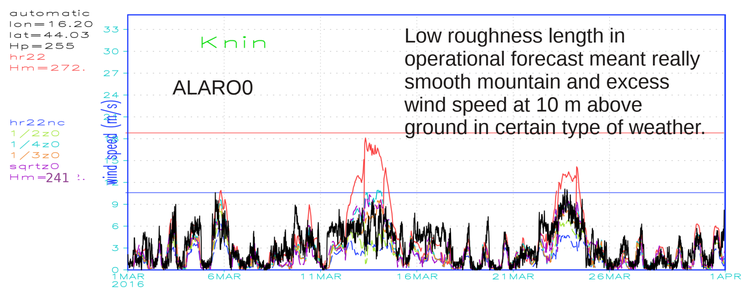
NEW PHYSIOGRAPHY FIELDS

Surface roughness (Z0) exhibited a chessboard pattern over the Alps and other mountains. This was considered unnatural and could affect the forecast quality there. This parameter was computed from the new database as the square root of the standard deviation of topography times g. The values are higher above the mountains.

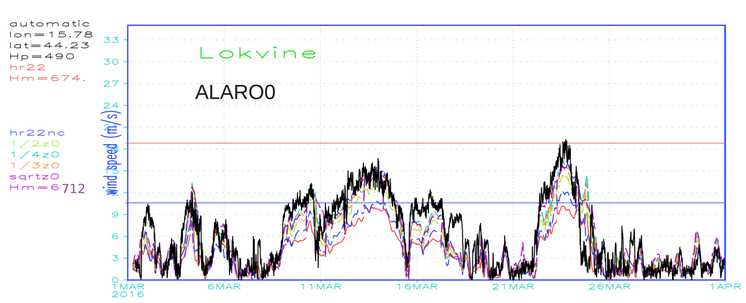




The impact of modified roughness length was tested by running 31 forecasts in 8 and 2 km resolutions starting from 00 UTC for March 2016. The forecast of wind at 10m above ground depends on the roughness length. The introduction of new, rougher surface reduced the wind speed in most cases with strong to severe bura wind (that blows from northeast therefore from land to sea). The reduction in wind speed varies from place to place, at few places, it increased.

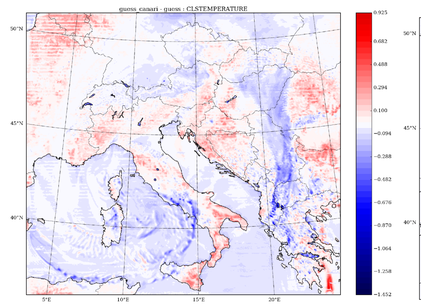


Wind speed at 10m: measured (black), operational 2km NH forecast (red), using new z0 (blue), new z0*0.5 (green), new z=*0.25 (light blue), new z0*0.33 (orange) and 0.5*sqrt(gz0) (purple) for March 2016 station Knin (above) and Lokvine (below), all using ALARO0.

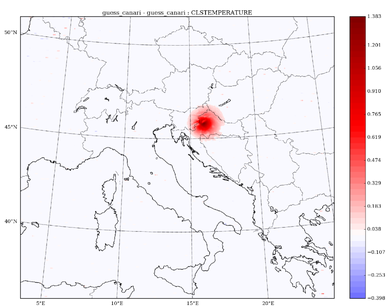


TESTS WITH SURFACE DATA ASSIMILATION

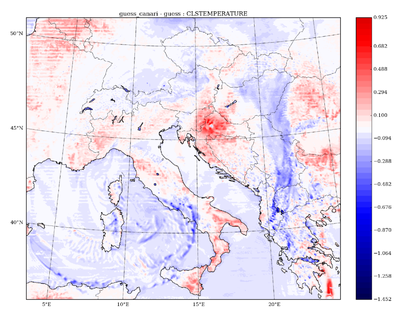
- usage of logical switch LDIRCLSMOD=.T./.F. was tested
- tests showed that 2m temperature is different in case when it is diagnosed from model fields (LDIRCLSMOD=.T.) compared to case when it is read directly from FA file (LDIRCLSMOD=.F.) => different analysis increment
- LDIRCLSMOD was set to .T. in CANARI and SCREENING



Difference between off-line fulpos T2m and in-line fulpos of T2m

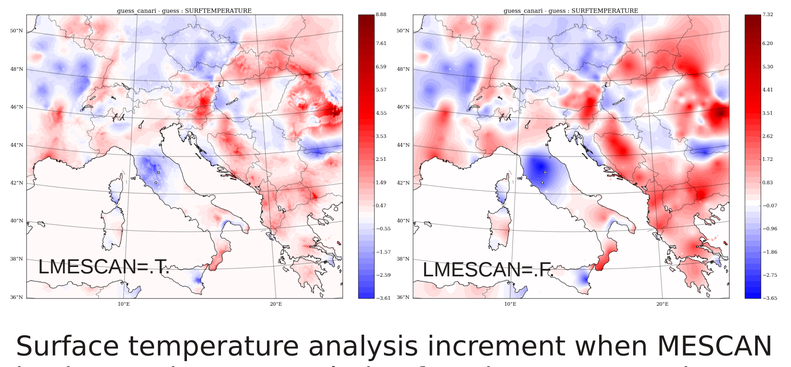


Single obs analysis increment compared to diagnosed T2m

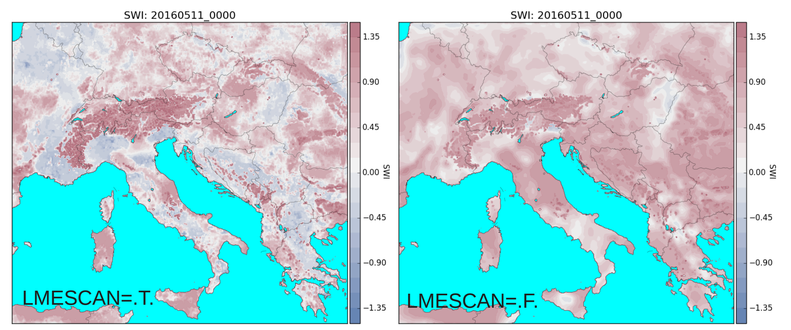


Single obs analysis increment compared to in-line fulpos of T2m

- new MESCAN background error correlation function for T2m and RH2m dependent on difference in height and land-sea differences between two locations were tested



Surface temperature analysis increment when MESCAN background error correlation functions were used (LMESCAN=.T.,left) or not (LMESCAN=.F.,right).



Soil wetness index after ~6 weeks of data assimilation cycle with LMESCAN=.T. (left) and LMESCAN=.F. (right).

20 years of ALADIN project in Croatia

In 2015 we also celebrated 15 years of running operational forecast using ALADIN model.
These anniversary is celebrated by a special issue of Croatian Meteorological Journal (Vol. 50, also a nice round number) featuring a number of articles describing several features from the past, the current status of the operational suite and recent developments. Hard copies are already printed and the articles are online at http://hrcak.srce.hr/hmc.