

Météo-France surface downscaling reanalysis

The Météo-France reanalyses produced by the MESCAN surface analysis system are for a 4-year period, 2007-2010. In the optimal interpolation assimilation scheme, the first guess is the HIRLAM forecasts downscaled from 0.2° to 0.05° grid and is used with available conventional surface observations.

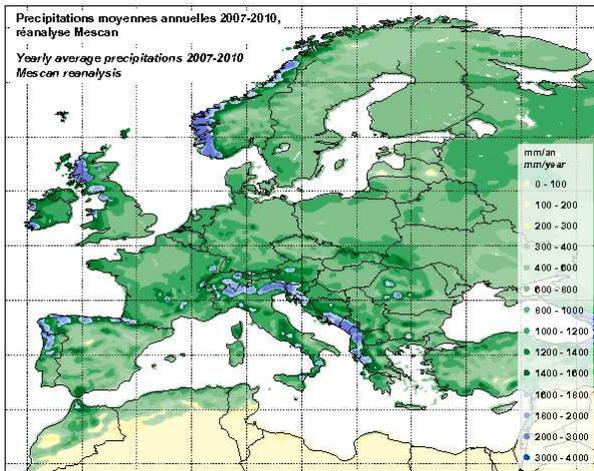
Infobox

<p>SPECIFICATIONS</p> <p>Output data sets Surface analysis of meteorological variables and downscaled surface forecast fields from HIRLAM analysis, as listed.</p> <p>Data Spatial resolution: 0.05 by 0.05° Temporal resolution: 6 hours Grid: Lambert conic conformal Format: netCDF</p> <p>Availability Area: Europe Time period: 2007-2010 Freely available for non-commercial and educational research.</p>	<p>Validation Background and analysis statistics against the independent and used observations. Differences from Mesan and SAFRAN reanalysis.</p> <p>Outlook This reanalysis is a pilot project and is not intended to be updated into the future.</p>	<p>Description and Validation Météo-France, France</p> <p>Contact Eric Bazile Météo-France, CNRM/GMAP 42, Av. G. Coriolis, 31057 France Tel.: +33 5 6107 8468 Fax.: +33 5 61 07 84 53 email: Cornel.Soci@meteo.fr and Eric.Bazile@meteo.fr web: www.meteofrance.com</p>
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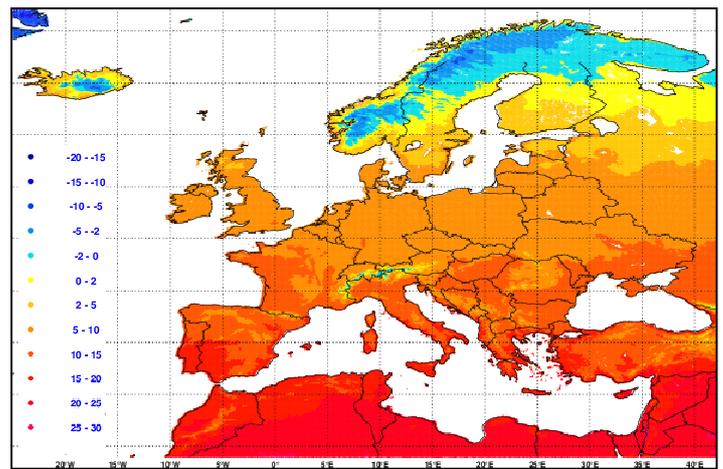
Meteorological variables:

- 6-hourly analysis of : 2-m temperature [K]
 - 2-m relative humidity [%]
- analysis of 24-h total precipitation [kg m⁻²].
- 6-hourly downscaled forecasts from HIRLAM analysis:
 - u-component of the 10m wind field [m s⁻¹]
 - v-component of the 10m wind field [m s⁻¹]
 - downward short wave flux at ground surface [W m⁻²]
 - downward long wave flux at ground surface [W m⁻²].

Example of usage: Annual average of essential climate variables



Picture 3. Annual average of 24-h total precipitation (2007-2010) based on MESCAN re-analysis.

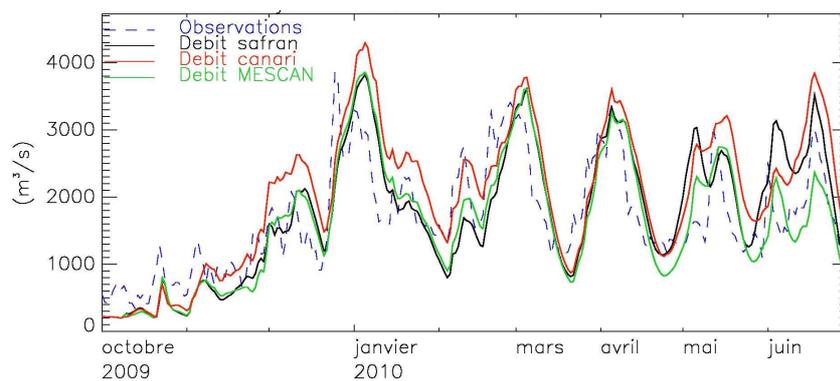


Picture 4. Annual average of 2-m temperature for 2010.

Validation methods, consistency and uncertainty:

The MESCAN system derives analyses of temperature and humidity at 2 metres four times a day and 24 hours total precipitation. The validation has been performed over France due to the availability of a high density observation network and spans a period of 9 month (October 2009 - June 2010). The quality of the screen-level variables have been verified against the observation by computing bias and rmse scores.

The accuracy of precipitation analysis have been evaluated against independent observations by computing categorical scores as Heidke skill score, probability of detection, false alarm rate, frequency bias index. In addition, the precipitation analyses have been used to force a hydrological model to simulate the river flow (Picture 5) on several watersheds. Another approach used for validation of precipitation analyses was to force a 1-dimensional multi-layer snow model to simulate the evolution of snowpack at different observation locations.



Picture 5. Daily river discharge for the Rhone river at Beaucaire for different types of forcing.

The results have shown that MESCAN system improves the screen level and precipitation fields from the forecast model but the quality of the analysis is dependent on the density of the observation network.