It can be seen that both the measured and the theoretical values cover approximately the same areas.

The measurements [1] have a 2 minute time resolution, which is comparable to the time steps in a new verification measure showing the potential of high resolution models.

Operational models at DMI October 2012

<table>
<thead>
<tr>
<th>Model</th>
<th>SKA</th>
<th>Hirlam</th>
<th>K05</th>
<th>Hirlam</th>
<th>T15</th>
<th>GLA</th>
<th>Harmonie</th>
<th>DKA</th>
<th>Harmonie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal res.</td>
<td>0.03</td>
<td>0.05</td>
<td>0.15</td>
<td>2 km</td>
<td>2.5 km</td>
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<tr>
<td>Vertical res.</td>
<td>925</td>
<td>925</td>
<td>925</td>
<td>925</td>
<td>925</td>
<td></td>
<td></td>
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<tr>
<td>Boundary fields</td>
<td>ECMWF</td>
<td>ECMWF</td>
<td>ECMWF</td>
<td>ECMWF</td>
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<tr>
<td>Forecast length</td>
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<td>48 h</td>
<td>48 h</td>
<td>36 h</td>
<td>36 h</td>
<td></td>
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<tr>
<td>Run interval</td>
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<td>6 h</td>
<td>6 h</td>
<td>6 h</td>
<td>6 h</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

The models displayed in Fig.1 are:

- DKA: Harmonic model with surface data-assimilation
- GLA: High resolution Harmonic for SW Greenland using surface data-assimilation
- SKA: Main deterministic model for the Scandinavian-North Sea area using 3D-VAR
- K05: Main forecast model for Greenland based on Hirlam
- T15: Large scale Hirlam model for the purpose of emergency-preparedness.

Plans 2013:
- The NWP plan may be summarized by the following bulletts:
  1. Expansion of the Harmonic model GLA further to the north
  2. Introduction of 3-hourly data-assimilation cycles for Harmonie DKA
  3. Experiments with Harmonic on larger model domains similar to SKA
  4. Operational use of new verification measures showing the potential of high resolution models
  5. Data-assimilation experiments with both Hirlam and Harmonic.
  6. Focus on `moist data´ including data from radar.

A note on how empirical global radiation data can improve the parameterization of cloud-radiation interactions in LAMs

We have made a test of a typical NWP algorithm for calculation of global radiation – the total down-welling solar irradiance at the surface – against a 5-year data set of measured global radiation and scattered horizontal irradiance (SHI) at the surface.

The measurements [1] have a 2 minute time resolution, which is comparable to the time steps in a high resolution LAM. The SHI and global radiation have been measured using a solar tracking disk. The data have also been integrated to 1 hour values for comparison of this time scale.

A verification scheme considering `significant´ or `extreme´ weather and upscaling principles

Significant Weather Score (SWS), a new score for use in numerical weather prediction (NWP) verification, has been defined and tested in idealized cases and in preoperational conditions using data from high resolution limited area models run at the Danish Meteorological Institute (DMI), and from the global NWP model run at the European Centre for Medium range Weather Forecasts (ECMWF). The verification with SWS is user oriented and designed for high resolution numerical weather prediction. SWS verifies model results against weather observations considered `significant´ to users. It typically defines, as indicator of significant weather, high values and low values of selected meteorological parameters to be verified over a certain geographical model domain, making use of spatial upscaling principles to take into account effects of phase errors in space and time when comparing model results with point observations from a synoptic network. The scheme has been found easy to implement in an operational NWP environment. The preliminary test results indicate that the SWS score has a good potential to show the added value of high resolution Harmonic and Hirlam against ECMWF model when verifying precipitation forecasts.

SWS=(1 + \sum_{i=1}^{Jmeo} )/( 1 + K )

where the two integers, \( J_{meo} \) and \( J_{tot} \), measure the success of predicting meteorological events with mesoscale model and with reference model, respectively, and \( K \) denotes the number of events in consideration. For a single deterministic forecast a successful prediction of a specific event is assigned a value of 1, and a failure is given a value of 0.

References