Motivation

- Climate reanalysis provides consistent fields over all dimensions and across variables for several decades, but they are not conducted very often (once per decade per institution)
- Land model developments occur rapidly, and there is a need to integrate them to long, consistent time series in a cost-effective way
  - Support hydrological studies addressing global water resources
  - Provide consistent land initial conditions to weather and climate models.
  - Foster research into intra-seasonal forecasting
  - Provide dedicated datasets to support and encourage downstream land applications

Methodology

ERA5-Land fact sheet

<table>
<thead>
<tr>
<th>ERA-Int</th>
<th>Era-Int/Land</th>
<th>ERA5</th>
<th>ERA5-Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spatial resolution</td>
<td>~79 km / 60 levels</td>
<td>79 km</td>
<td>~32 km / 137 levels</td>
</tr>
<tr>
<td>Model version</td>
<td>IFS (+TESSEL)</td>
<td>HTESSEL cy3r4</td>
<td>IFS (+TESSEL)</td>
</tr>
<tr>
<td>LDAS</td>
<td>cy3r1</td>
<td>NO</td>
<td>cy4r1</td>
</tr>
<tr>
<td>Uncertainty estimate</td>
<td>-</td>
<td>-</td>
<td>Based on a 10-member 4D-Var ensemble at 62 km</td>
</tr>
<tr>
<td>Output frequency</td>
<td>6-hourly Analysis fields</td>
<td>6-hourly Analysis fields</td>
<td>Hourly (three-hourly for the ensemble)</td>
</tr>
</tbody>
</table>

Results from scout runs

- Impact on soil moisture
  - Soil moisture reanalyses: The chart shows correlation (R), anomaly correlation (aR) and Unbiased Root Mean Square Error (umNRMSE) of ERA-Interim, ERA5 and ERA5-Land reanalysis compared to in-situ stations of the USCRN and SCAN networks in the US, averaged for the year 2015

- Impact on river discharge
  - Discharge time series correlation difference ERA5-Land (no lapse rate) vs. ERA5, between Sept 2013 and Sept 2014

Final Remarks

- ERA5-Land is part of ERA5 dedicated-focus reanalysis (ocean, land, chemistry, etc.) and not a separate initiative, therefore it will cover the entire duration of ERA5.
- ERA5-Land is a Copernicus operational product following closely near-term climate (with a short delay) and not a research product
- ERA5-Land adopts a new concept being the HRES adaptation
  - via a cost-effective resolution enhancement
  - with the main benefit coming from surface description at a finer grid and a thermodynamic topographic adjustment
- ERA5-Land serves as a “baseline” (preserves hydrological consistency) towards a future land reanalysis incorporating the data assimilation methodology
- Production will start in Q1-2018 and it will be released from 2018