**SRNWP at FMI**

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**Operational 2019**

As a member of a Nordic MetCoOp cooperation with Norway and Sweden, FMI participates in developing and running a common higher-resolution ensemble prediction system called MEPS based on non-hydrostatic convection-permitting Harmonie-Arome developed in a code cooperation with Météo-France and ALADIN. MetCoOp also develops an hourly updated rapid refresh cycle based on Harmonie-Arome, currently running in a pre-operational mode.

Forecast production within MetCoOp is distributed among the participating institutes. Additionally, FMI continues to run hydrostatic NWP model HIRLAM with horizontal resolution of 7.5 km. It is maintained at version 7.4 but not developed any more.

**Harlequin ladybird (Harmonia axyridis) invasion into the UK**

**Background**
- Harlequin ladybird (Harmonia axyridis) is an invasive alien species in Europe, becoming rapidly widespread following its first record in England in 2003.
- It is native to Eastern Asia, but has been introduced as a biological control agent, e.g., in the USA and Europe. Unfortunately, it eats not only aphids but also, e.g., larvae of native ladybirds causing their demise.
- Anthropogenic transport by ships and planes is known, but could atmospheric events explain the dispersion to the UK better?

**Material and methods**
- Atmospheric models (NWP + AD) have been used to estimate potential routes of the Harlequins from continental Europe to the UK.
- SIAM ADM (http://siam.fmi.fi/) and ECMW’s IFS (http://www.ecmwf.int/)
- The SIAM footprints from the early records in England in 2004 (Fig. 1)
- The SIAM forward simulations from the known source areas in France, Belgium and the Netherlands for 2004-2005 (Fig. 2)

**Results**
- SIAM suggests that harlequin ladybirds can cross the English Channel 1-2 times a week on average during the study period.
- If the weather is favourable, Harlequins can fly over the English Channel in 1-3 hours, which is a fully feasible flying time.
- The SIAM results are consistent with early harlequin ladybird records.
- Year 2005 was a more favourable for crossing the English Channel than 2004. After 2005, Harlequins spread rapidly in the UK.

**Want more?**
- Siljamo, P., Ashbrook, K., Comont, R., Skjøth, C.: Do atmospheric events explain the arrival of an invasive ladybird (Harmonia axyridis) in the UK? https://doi.org/10.1101/20151101 (preprint)

**Satellite based cloud ingest for nowcasting**

**Case-study 10 September 2019: Convective precipitation with thunder over Southern Finland**

- The MetCoOp HARMONIE-Nowcasting (MNWC) system is running at every hour, with a short cut-off (15 min) of observations
- Current setup is using first-guess from MEPS and a short-range forecast (+9h) is produced at 2.5 km resolution, with GRI2 output every 15 min
- The short-cutoff-time (15 min) penalizes conventional observations but the frequent analysis cycle gives more satellite data.
- Ingest of MSG-NWCSAF cloud information at the start of the forecast improves the convection initialization. This has been implemented into MNWC, together with short-cutoff GNSS observations
- Assimilation of AMV’s, Mode-S and public NetAtmo observations, as well as use of GridPP and increased vertical/horizontal resolution, are being considered for future development of the MNWC

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**FLake verification in HIRLAM**

Lake surface state in the FMI operational HIRLAM for years 2012-2018 was validated against observations from Finnish Environment Institute. The lake freezing was generally well simulated while melting occurred too early and maximum summertime water temperatures were overestimated.

Fig. 1 shows the observation points used: lakes with both lake surface water temperature (LSWT) and lake ice freeze-up/melt-up dates (white); lakes where only dates available (black). Lakes where also ice thickness and snow depth measurements were used (Lappajaari, Kipsijärvi and Simpelejärvi) are surrounded with a large white circle.

As an example, Fig. 2 shows time-series of the observed, analyses forecast LSWT at the Kipsiäjärvi observation location (20.82 E, 69.01 N) for 2014-2015 based on 06 UTC data. Markers are shown in the inserted legend. Observed freeze-up date (blue) and break-up date (red) are marked with vertical lines.

**Reference**