



ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

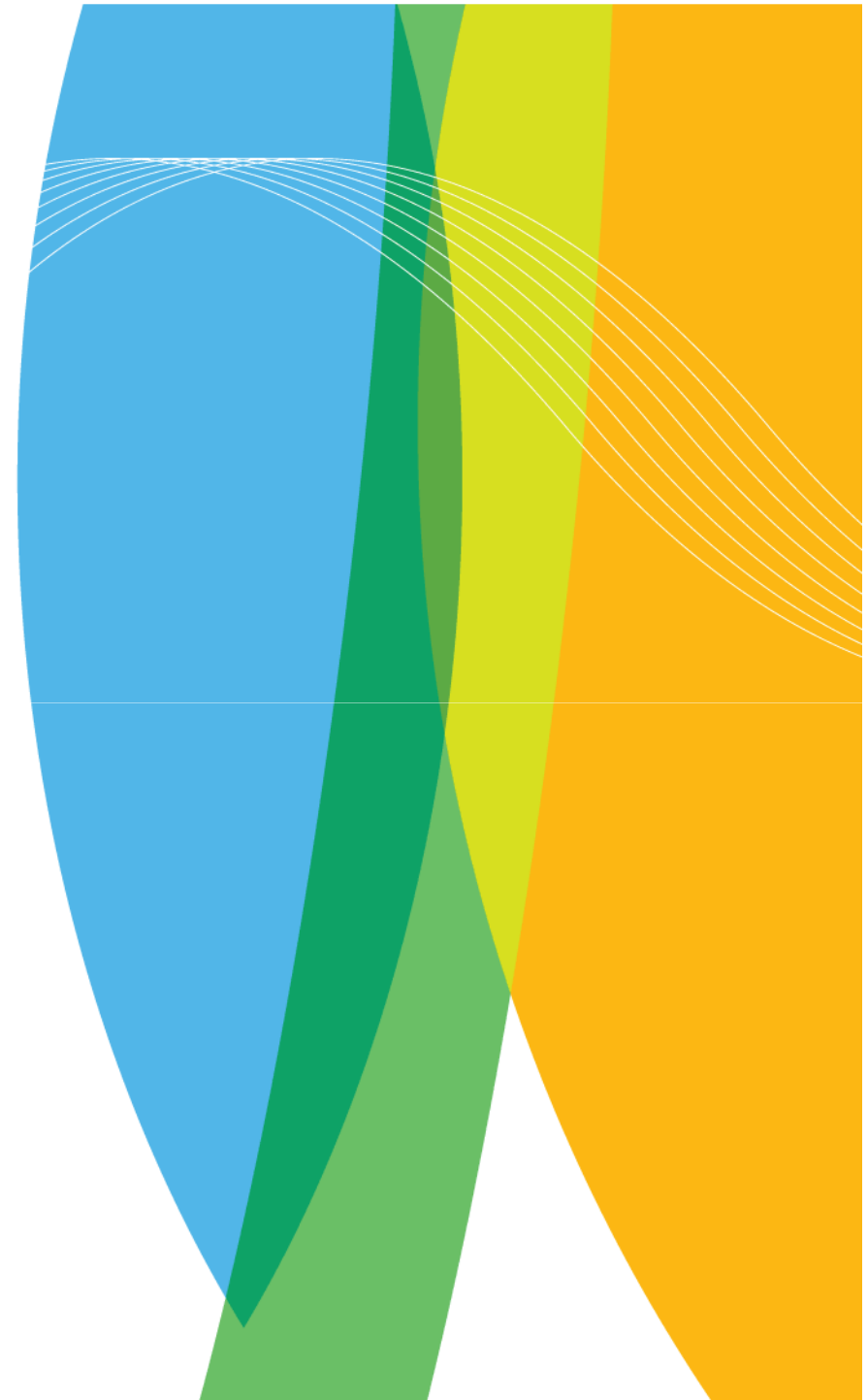
SRNWP@FMI

**31st EWGLAM and 16th SRNWP
meetings**

28th Sept. -1st Oct. 2009

Glyfada

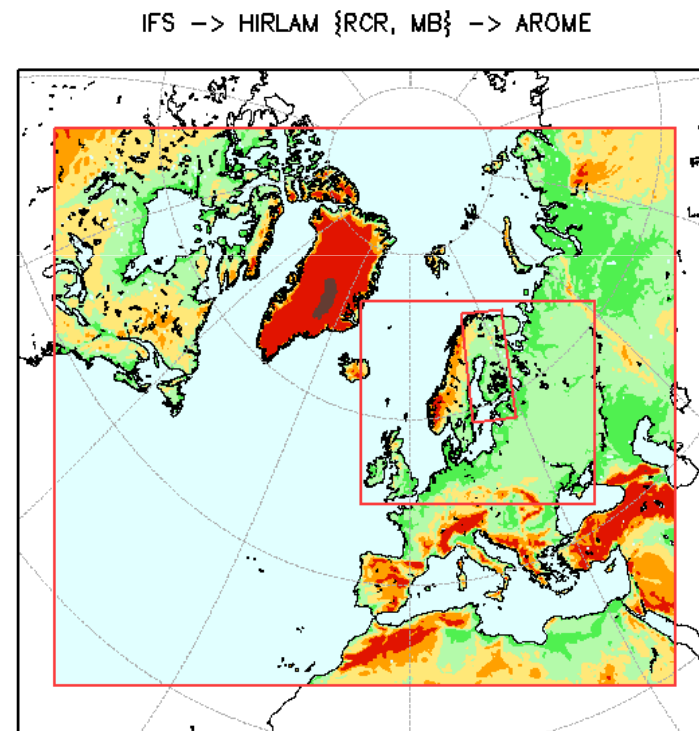
Carl Fortelius and the NWP team





Numerical weather prediction systems

- **IFS (ECMWF)**
 - Synoptic scale medium-range and long-range
 - LBCs for in house LAMS
- **HIRLAM Forecasting System**
 - Short-range
 - Down-stream applications
 - LBCs for high-resolution LAMs
- **HARMONIE Forecasting System**
 - High-resolution short range
- **LAPS analysis system**
 - Frequent meso-scale analyses
 - Experimental





Details of HFS version 7.2

| Analysis | | Forecast model | |
|---------------------------|--|------------------------|--|
| Upper air analysis | 4-dimensional variational data assimilation | Forecast model | Limited area grid point model |
| Version | HIRLAM 7.2 | Version | HIRLAM 7.2 |
| Parameters | surface pressure, wind components, temperature, specific humidity | Basic equations | Primitive equations |
| Horizontal grid length | 0.15 degrees on rotated lat-lon grid | Independent variables | longitude, latitude, hybrid level, time |
| Domain | 582 x 448 grid points | Dependent variables | log. of surface pressure, temperature, wind components sp. humidity, sp. cloud condensate, turbulent kinetic energy |
| Levels | 60 hybrid levels | Horizontal grid | Arakawa-C |
| Observation types | TEMP, PILOT, SYNOP, SHIP, BUOY, AIREP, ATOVS AMSU-A brightness temperatures | Horizontal grid length | 0.15 degrees on rotated lat-lon grid |
| Background | 3 h forecast from previous cycle | Integration domain | 582 x 448 grid points |
| Assimilation window | 6 hours | Levels | 60 hybrid levels |
| Observation windows | 1 hour | Integration scheme | Semi-Lagrangean semi-implicit, time step 360 s. |
| Data cut-off time | 2 h for main cycles, 4 h 20 min for intermediate cycles | Orography | Hirlam physiographic data base, filtered |
| Assimilation cycle | 6 h cycle, reanalysis step every 6 h to blend with large-scale features of the ECMWF analysis. | Physics | * Savijärvi radiation scheme * Turbulence based on turbulent kinetic energy * Rasch-Kristjansson condensation scheme * Kain-Fritsch convection scheme * Surface fluxes according to drag formulation * Surface and soil processes using mosaic approach |
| Surface analysis | Separate analysis, consistent with the mosaic approach of the surface/soil treatment | Horizontal diffusion | Implicit fourth order |
| | * sea surface temperature, fraction of ice | Forecast length | 54 hours |
| | * snow depth | Output frequency | Hourly |
| | * screen level temperature and humidity | Boundaries | * "Frame" boundaries from the ECMWF optional BC runs |
| | * soil temperature and moisture in two layers | | |



The HARMONIE Forecasting System

- **AROME cycle cy33h1, <http://www.cnrm.meteo.fr/arome/>**
- **Initial state and LBCs: HIRLAM MB**
- **24 hour forecasts initialized at 00 and 12 UTC**
- **300x600 grid points, distance 2.5 km**
- **40 levels**
- **Output every 15 minutes**
- **Post processing includes a radar reflectivity simulator and comparison with measurements in real time**



The Finnish Wind Atlas

- **Monthly fine-resolution wind climatology for Finland**
- **Multi-decadal climatology estimated by 48 representative months**
- **Massive meso-scale modelling (AROME)**
- **Commissioned by the Ministry for employment and economy**
- **Partners: FMI, Danish Technical University, VAISALA**
- **Link:**
http://www.winterwind.se/Winterwind2008/P14_Tammelin_Winterwind_2008.pdf