Surface aspects in HIRLAM

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EWGLAM/SRNWP Meeting
05-08 Oct. 2015, Belgrade

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Contents

Operational

R&D

- Soil and vegetation
- Snow
- SST and Sea ice
- Lakes
- Urban
- Orographic radiation
- Physiography
- Documentation

Operational status: HARMONIE-38h1.1

DA:in hor: OI for screen level temperature, relative humidity and snow depth, bilinear interpolation for SST
in ver: OI for soil temperature and soil moisture
obs: SYNOP + national stations for snow in Norway, planned in Finland and Sweden, OSTIA
physiography:
ECOCLIMAP(II), FAO soil map, GTOPO
surface layer fluxes: CANOPY
surface schemes: SURFEX7.2, 4 tiles – water and sea, urban, nature; ISBA 3L, D95 scheme for snow

Operational problems:

- Unrealistic deep soil T under snow in some points – sort of instability – wrong weights in DA - solved
- Artifacts in snow analysis – coastal stations – QC - ?
- Melting of permanent snow in Iceland - ?

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R&D: Soil and vegetation

Goal: to run advanced snow schemes in operational

- Tests with ISBA-DIF ongoing
- Snow-on-veg. MEB is now possible with ISBA-FR
  - thanks to Aaron Boon!
- Plans to test ISBA-FR+ES+MEB
- More serious plans for Soil DA for ISBA-DIF!

Soil Scheme	Soil DA	Snow scheme	Snow-veg scheme	Snow DA	Application
FR	OI/EKF +OI(Canari)	D95	none	snowOI(Canari)	NWP
		ES	MEB	[(snowOI/VAR/EKF)] +snowOI(Canari)	NWP
			none	[(snowOI/VAR/EKF)] +snowOI(Canari)	NWP
		CRO	MEB	[(snowOI/VAR/EKF)] +snowOI(Canari)	NWP
			none	[(snowOI/VAR/EKF)] +snowOI(Canari)	NWP
	none	D95	none	none	climate
		ES	MEB	none	climate
			none	none	climate
		CRO	MEB	none	climate
			none	none	climate
DIF	(OI/VAR/EKF) +OI(Canari)	D95	none	snowOI(Canari)	NWP
		ES	MEB	[(snowOI/VAR/EKF)] +snowOI(Canari)	NWP
			none	[(snowOI/VAR/EKF)] +snowOI(Canari)	NWP
		CRO	MEB	[(snowOI/VAR/EKF)] +snowOI(Canari)	NWP
			none	[(snowOI/VAR/EKF)] +snowOI(Canari)	NWP
	none	D95	none	none	climate
		ES	MEB	none	climate
			none	none	climate
		CRO	MEB	none	climate
			none	none	climate

Plans: IMproving PRedictions and management of hydrological EXtremes - IMPREX - the surface soil moisture from ASCAT

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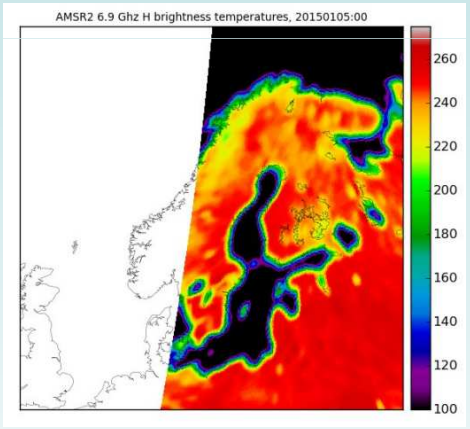
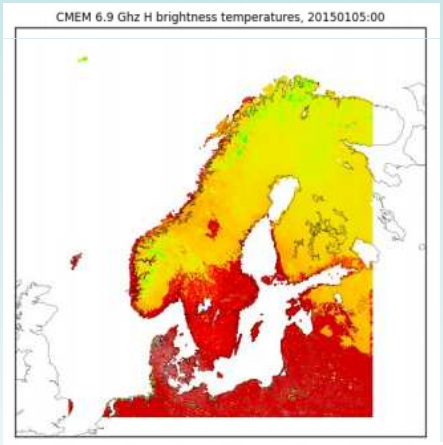
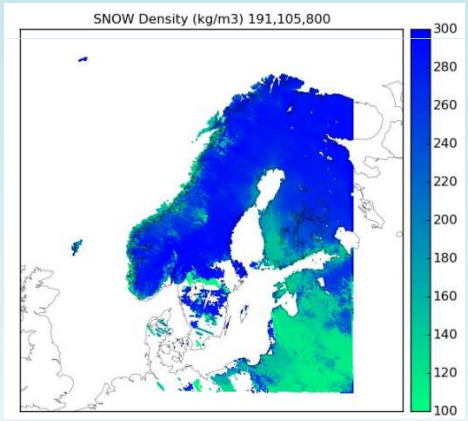
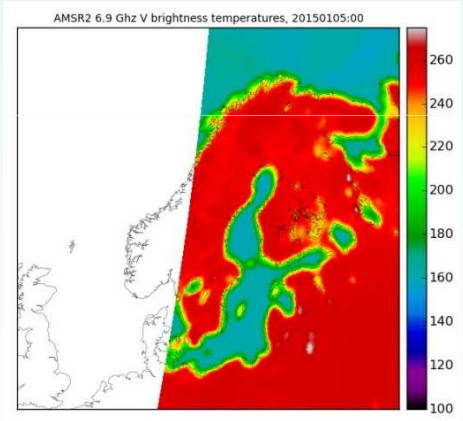
R&D: Snow

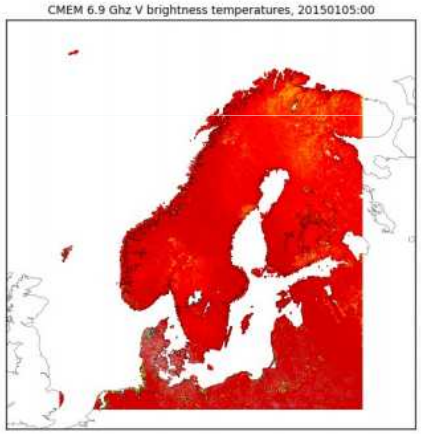
- First steps towards assimilation of AMSR2 (microwave) brightness temperatures to get SWE
- Emission model CMEM (ECMWF) is used as obs operator

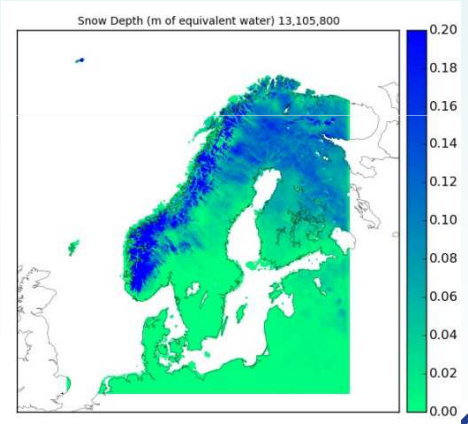












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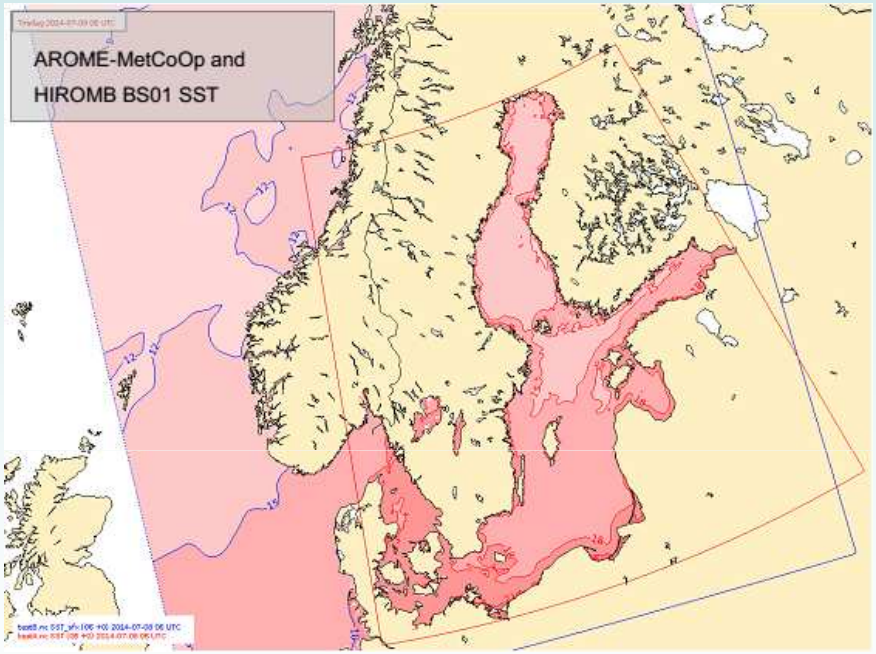
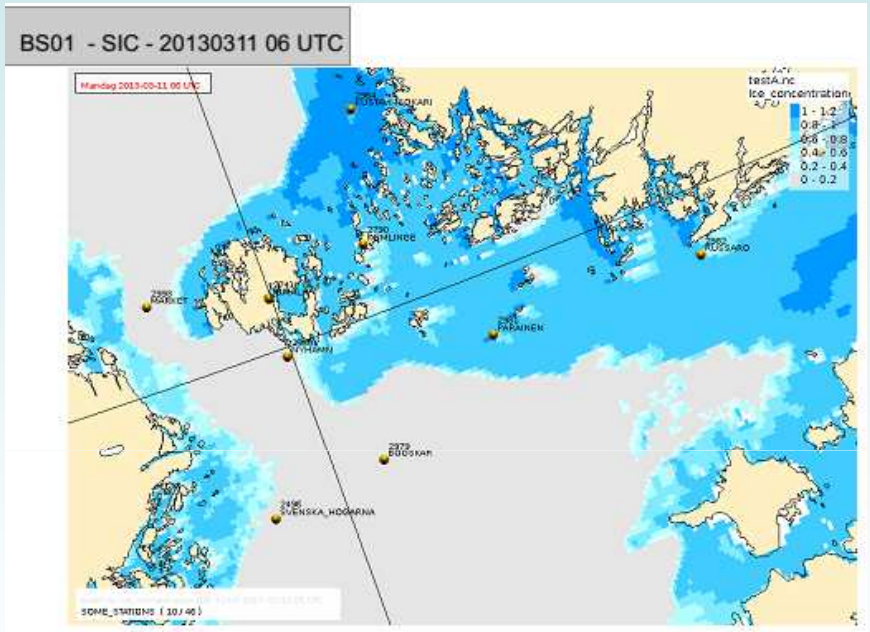
R&D: SST and Sea ice

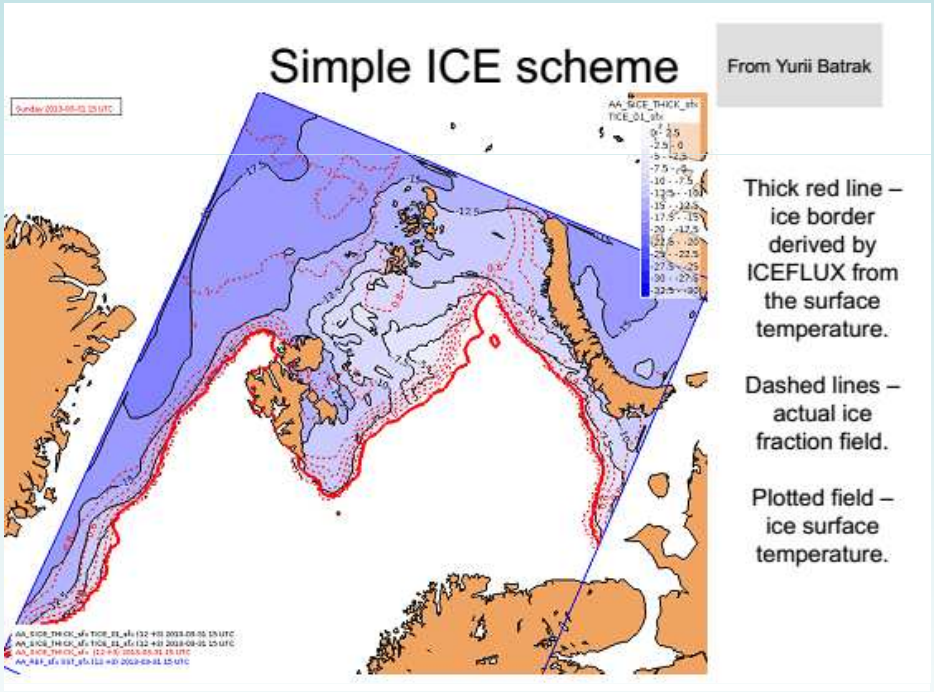
- SST and SIC from HIROMB for Baltic Sea – better resolution and quality than OSTIA, better scores for coastal stations

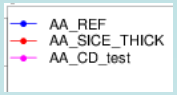


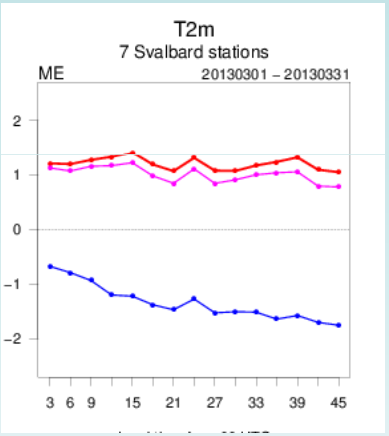


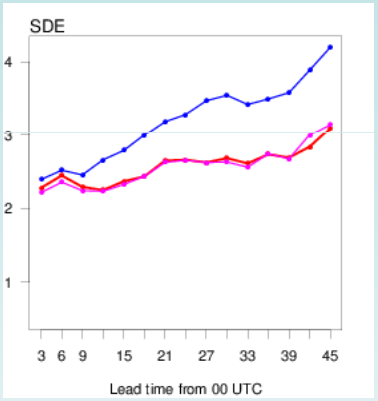
R&D: SST and Sea ice

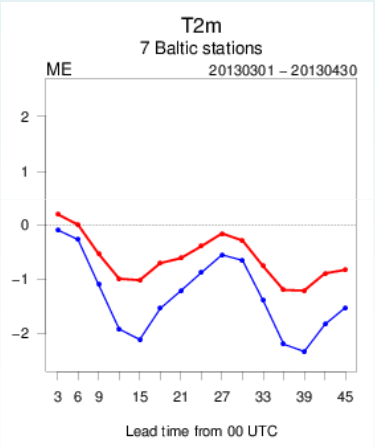
- SICE pre-operational (MetCoOp), also Arctic
- Additional drag caused by ice obstacles

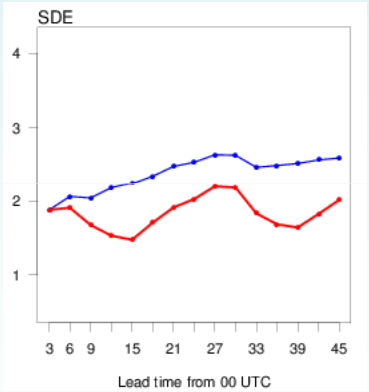


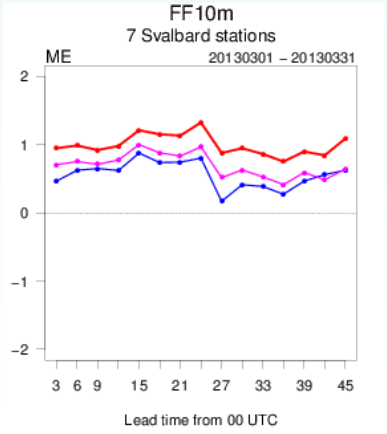












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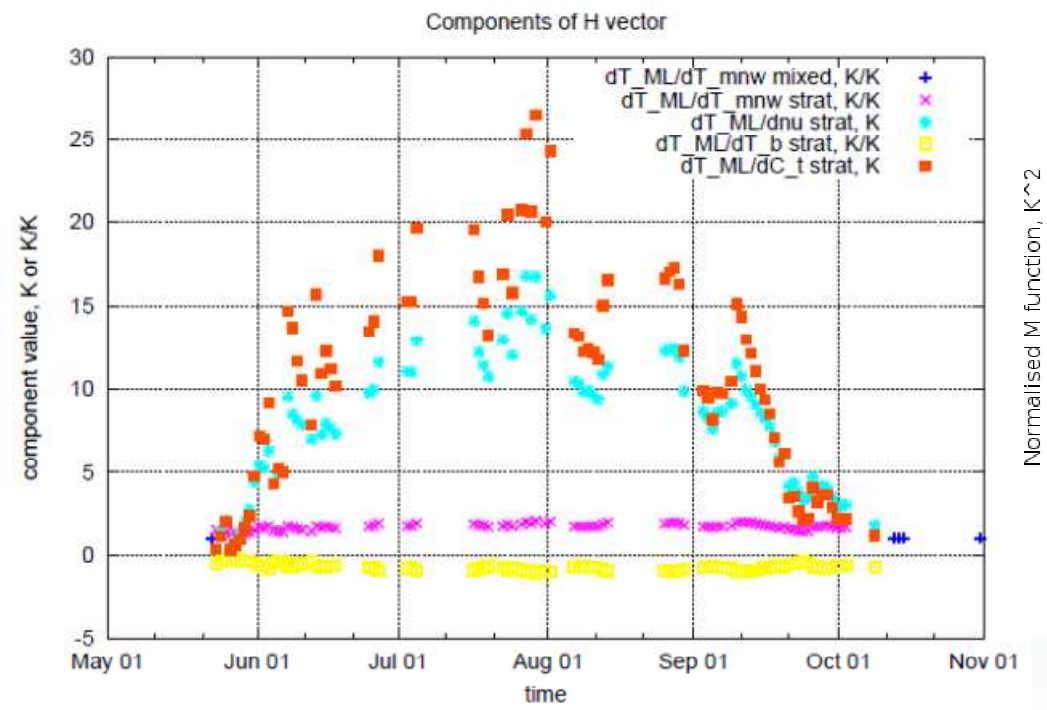
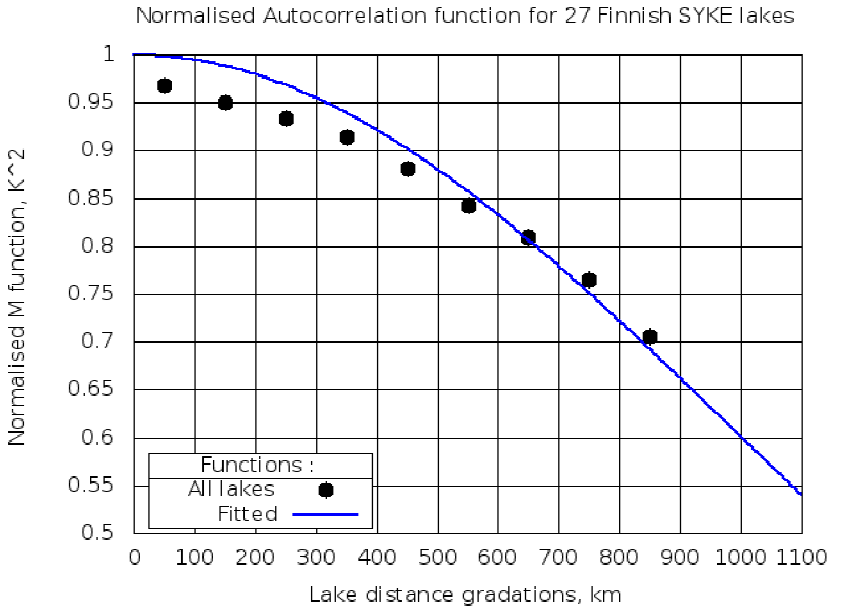
R&D: Lakes

- FLake in 2D, SURFEX7.3, HARMONIE 38-40 –ongoing
- GLDBv3.1 included
- Tests in Antarctica
- Study of EKF Jacobians
- Structure functions for LST from obs





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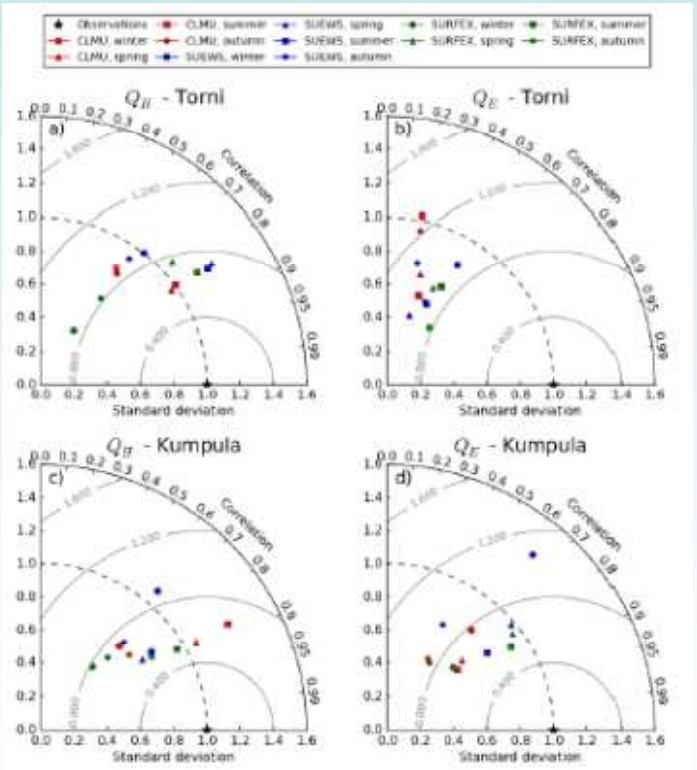
Lake Inarijärvi, 14.3 m

R&D: Urban

Intercomparison study
-SURFEX, SUEWS
and CLM
- obs: year 2012,
SMEAR III tower
and Hotel Torni
- fluxes,
much attention to
snow and
winter stability



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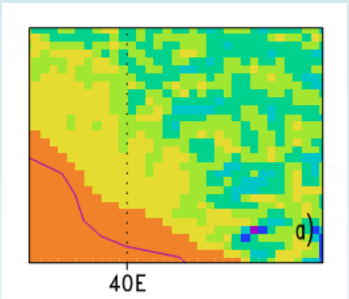
R&D: orographic radiation

- Experiments over Caucasian mountains

Sky view factor without (a) and with (b) distance averaging

a)



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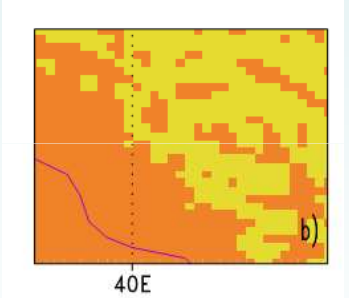
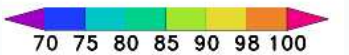
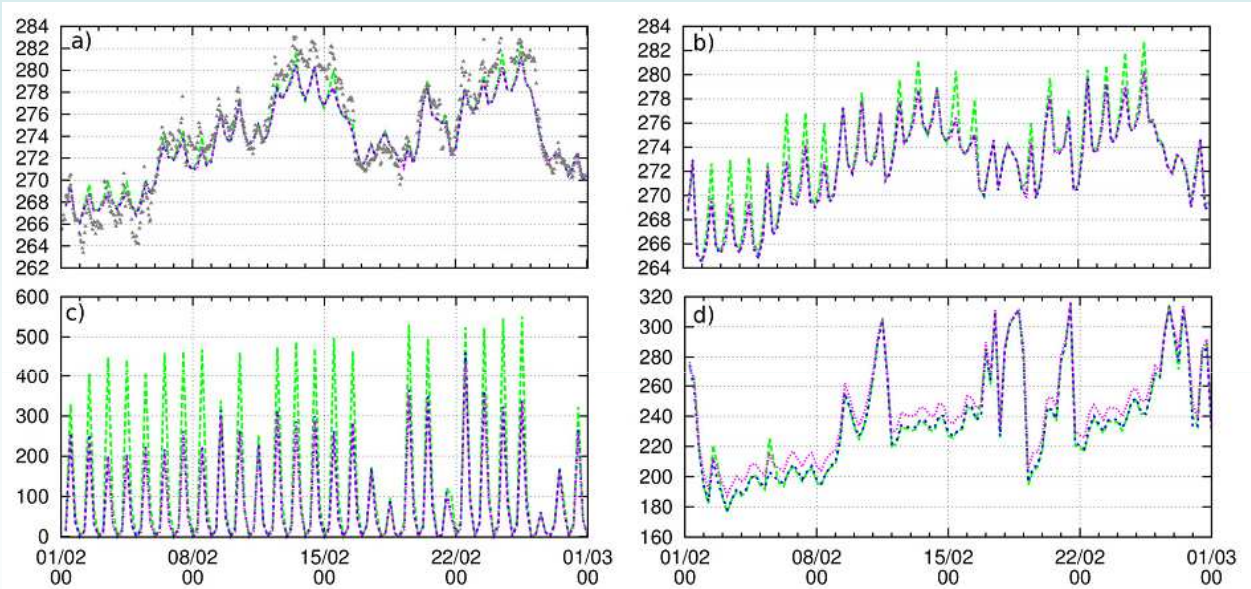




a)T2m, b) T_surf, c) SWD, d) LWD
grey – obs,
green – no ororad,
magenta – with ororad



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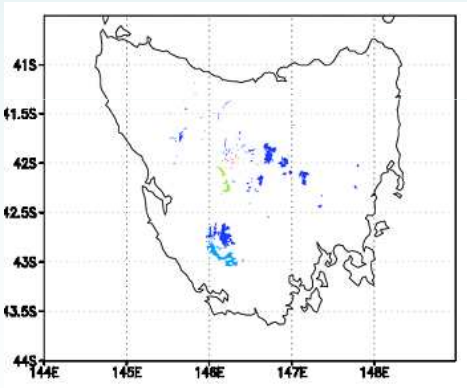
R&D: Physiography

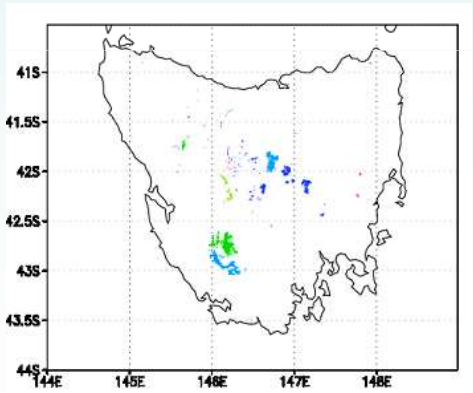
GLDB

- problem with large rivers in **GLDBv2** detected and fixed
- **GLDBv3 released:** indirect estimates of the mean lake depth for the Southern Hemisphere
- first steps towads fine resolution, Globcover
- GLDBv3.1 – bathymetry for 1 419 Finnish lakes (thanks to Charlotte Moisette!)

Tasmania



GLDBv2 and GLDBv3



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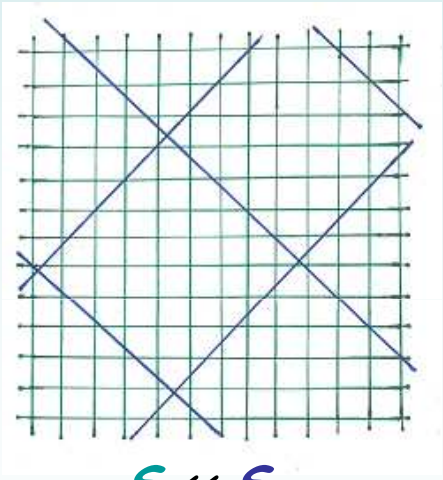
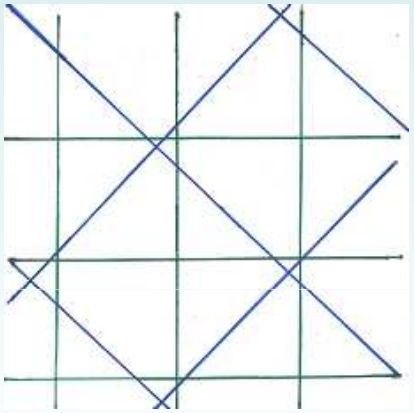
R&D: Physiography

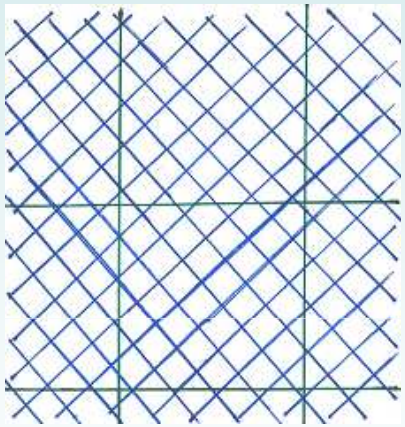
- Discussion about physiography for very fine scale: from aggregation to interpolation
- Resolution of atm model: **2.5 km**
  of surface data: **1.0 km**
  Is aggregation meaningfull?
- Mathematical aspect, coding aspect



S << *s*
aggregation



S ≈ *s*
weighted average



S >> *s*
interpolation

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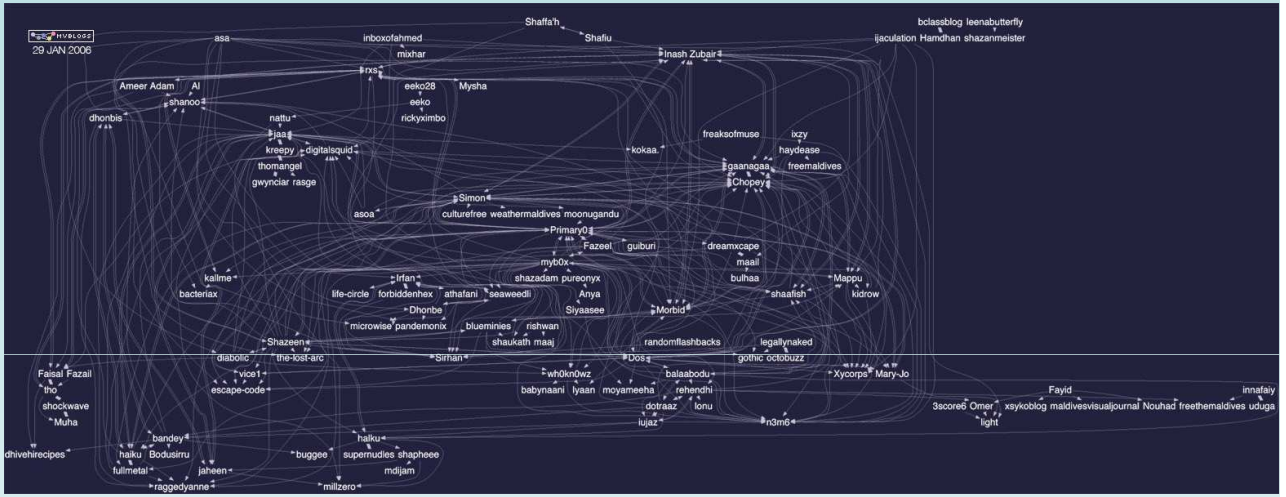
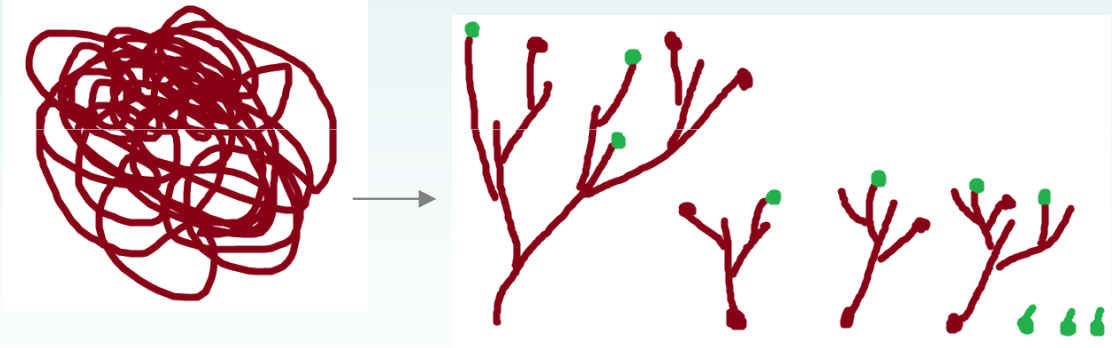
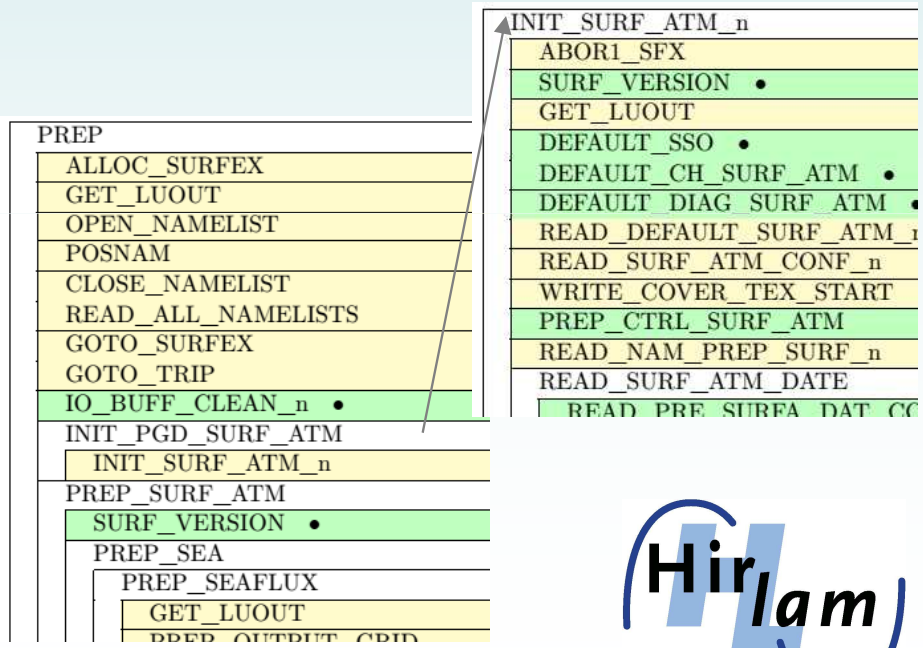
R&D: Documentation

- How to see the code structure?
- DOXYGEN: lists, graph …
- to unravel the graph: make several graphs of one plain routines, utils, blocks - ongoing







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Thank you!

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