

Review of HIRLAM/HARMONIE SURFEX activities

Ekaterina Kourzeneva*,
Mariken Homleid, Trygve Aspelien, Tomas
Landelius, Magnus Lindskog, Patrick Samuelsson,
Kalle Eerola, Bin Cheng, Laura Rontu, Homa
Keyrollahpour, Carl Fortelius, Margarita Shoulga,
Jean Portemer, Ulf Andrae

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Education

- Nordic SURFEX course

Norrköping, 25-28 of November

... to continue?



Operational status

- **HARMONIE-37**

DA: CANARI + OI_MAIN

in hor: OI for screen level temperature, relative humidity, and SWE, bilinear interpolation for SST

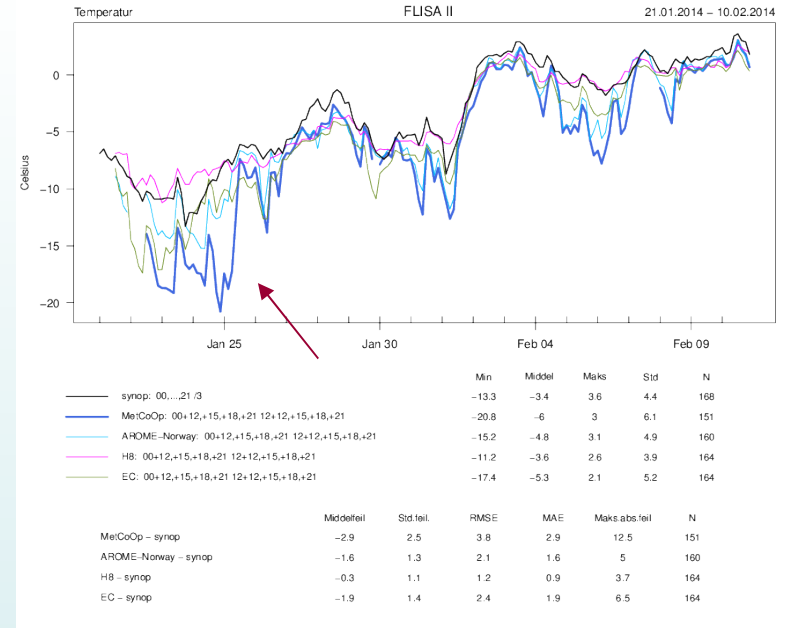
in ver: OI for soil temperature and soil moisture

obs: SYNOP, OSTIA

Operational status

• **HARMONIE-37,38**

physiography:
ECOCLIMAP(I/II),
FAO soil map, GTOPO



surface layer fluxes: CANOPY

surface schemes: SURFEX6.1, 7.2, 7.3
4 tiles - water and sea, urban, nature; ISBA 3L, 1
layer in snow

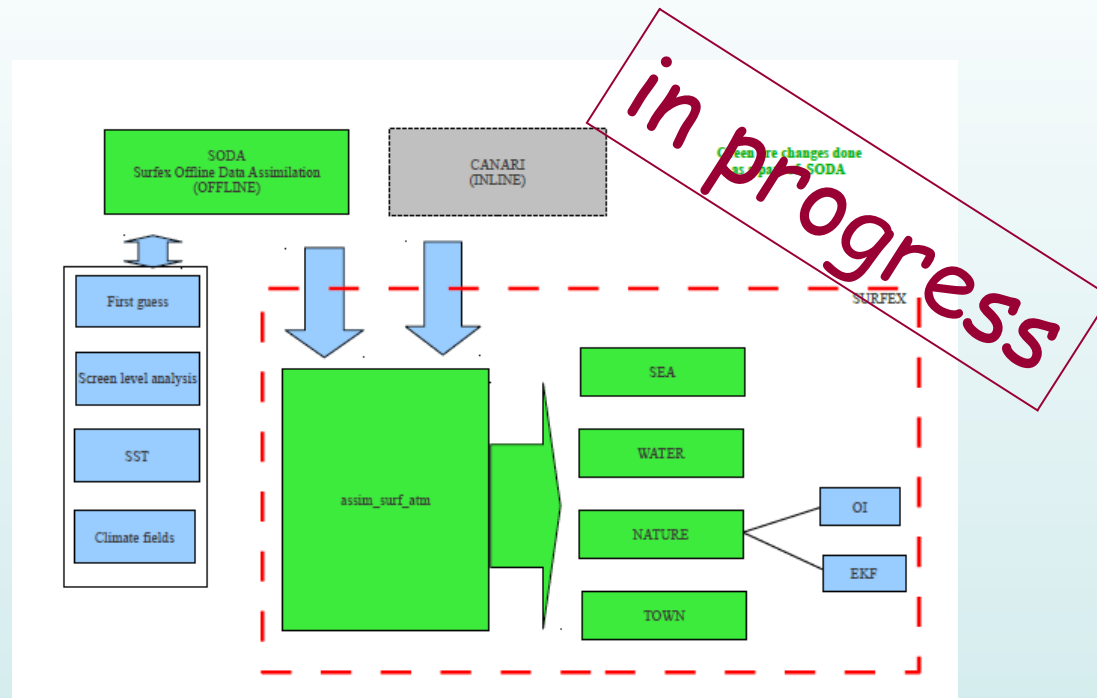
Cold bias in night
winter time
conditions - SBL
problem?

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19 Mar. 2014



R&D: Technical

SODA:



the default method in HARMONIE since 37h1.2,
huge reduction of running time for large domains

R&D: Soil and vegetation, DA

- in ver: Exp. with EKF, EnEKF, particle filter, ASCAT and SMOS data ... - planned to continue, but ...
- in hor: **EURO4M**
 - Prototype of En2DVar as a CANARI replacement (so far only tested for t2m with NMC ensemble)
 - Improved CANARI with empirical non-isotropic and inhomogeneous structure functions: MESCOAN
 - Experiments with MESCOAN and SURFEX

R&D: Snow modeling

MEB:

- testing over Europe comparing with ISBA, good results for timing of snow melt and river discharge peak, but too much difference in Southern Europe
- tuning of physiography parameters (Sodankylä): optimization setup with a cost function to compare with some observed quantities (SWE and fluxes)

CROCUS: used for avalanches and snow drift on roads in Iceland (SNAPS project) and in Norway

R&D: snow DA

in hor:

- to assimilate SE obs from NESDIS (but too smooth for HARMONIE) or Land-SAF, or new SE from Globsnow, or MODIS (positive experience in Iceland) - planned
 - for SWE, to assimilate retrievals using HUT model as obs operator? EUMETSAT fellowship application: a roadmap - planned
- in ver: EKF for SWE - planned

Ideas how to assimilate SAR data
Snow COST application!

R&D: Ice modeling

Simple ice scheme (Sea ice a la HIRLAM):

more people involved, web page created

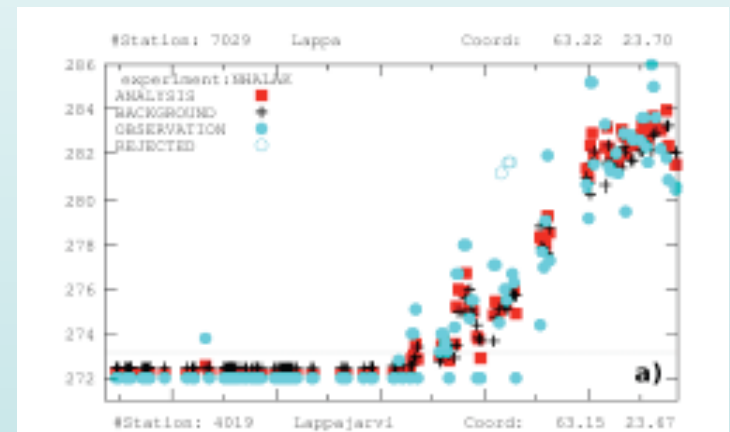
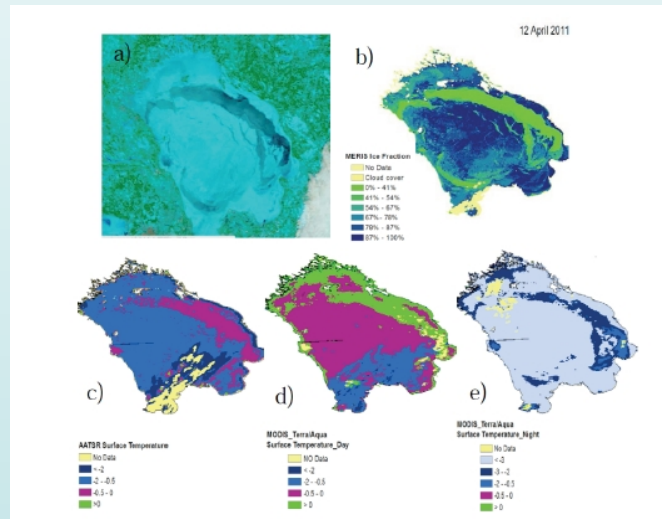
HIGHTSI: - planned

R&D: Lake modeling

- to test FLake in 2D, SURFEX7.3, 7.2, HARMONIE 38-40 - planned
! Problems with lake fraction in ECOCLIMAPII and pgd, comes from Covers 549-556.
- to include new versions of the lake database into SURFEX and HARMONIE - planned
- to include improved lake climatology into SURFEX and HARMONIE - planned

R&D: Lake DA

- In hor: exp. with MODIS obs of LST and ice fraction: problem of quality control!
Planned: quality control of satellite data, new structure functions for OI (others than for SST)



R&D: Lake DA

- **In ver:** EKF exp. with in-situ+MODIS obs: role of obs in early spring! Cross-validation, preliminary statistics of errors (+ bugs fixed)
- **Planned:** testing with deep water temperature obs, include into SURFEX and HARMONIE

Lake	<i>I</i> , %	Bias		RMS	
		REF	EKF	REF	EKF
Inari (14 m)	97.9	-2.0	0.1	5.0	1.0
Saimaa (11m)	96.8	-1.1	0.0	3.7	1.1
Tuusula (3m)	97.5	0.8	0.9	2.9	1.4
Lappa (7m)	95.9	0.2	0.5	2.9	1.5

R&D: Urban modelling

TEB: intercomparison study

-SURFEX

-SUEWS (U Helsinki)

-CLM-U (KU Leuven)

year 2012, SMEAR III tower at suburban area
and Hotel Tornii at city center

R&D: **Physiography**

- **ECOCLIMAP II** in HARMONIE: testing for Norway
- **GLDBv2**: indirect estimates of the mean lake depth for the Southern Hemisphere, to include into SURFEX, HARMONIE - **planned**

R&D: Physiography

- Evaluation of **ECOCLIMAP II** against local data: Maanmittauslaitos karttapaikka, Finland, coastline also
CORINE Finland, CORINE Europe, GlobCover, GSHHS (global coastline)

Types of errors:

- Displacement error in ECOCLIMAP II!
- Inland seas (sea => lake)
- Missing small lakes/islands
- Gross errors

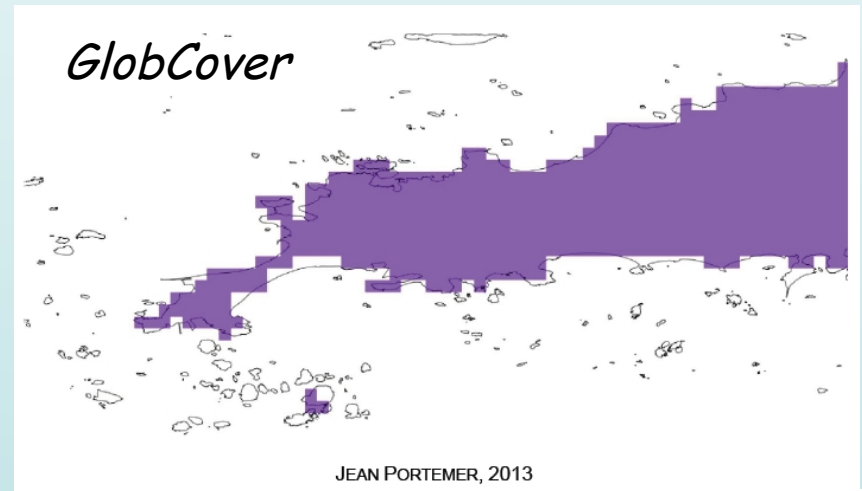
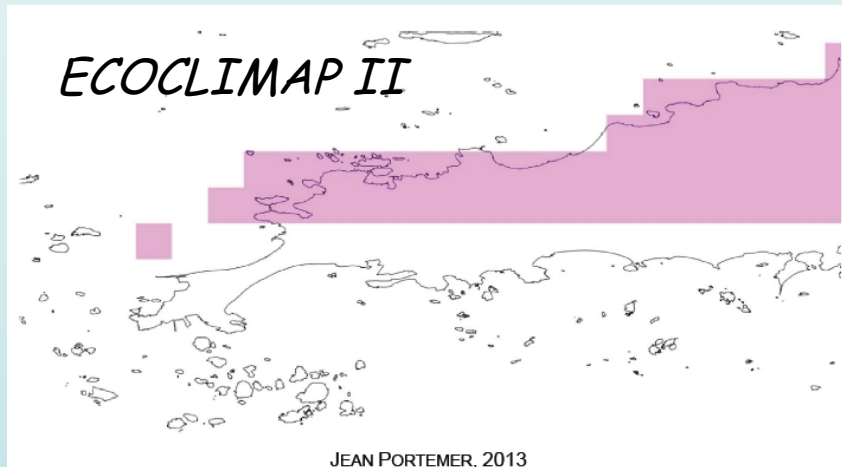
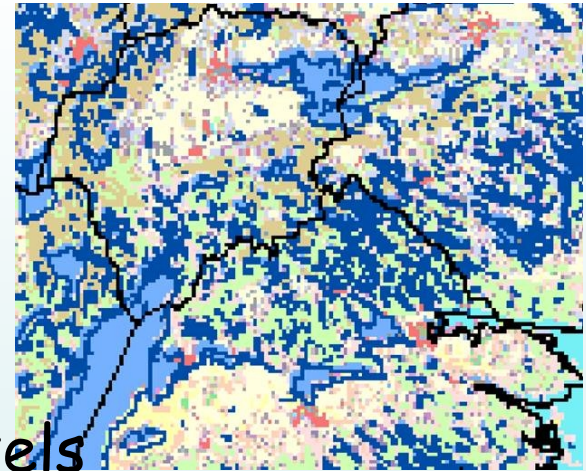
How pressing is the problem?

		ECOCLIMAP		
		%	Land	Lake
CLC Finland	Land	75.193	3.374	0.666
	Lake	3.108	5.290	0.004
	Sea	0.281	0.026	12.057

JEAN PORTEMER, 2013

R&D: Physiography

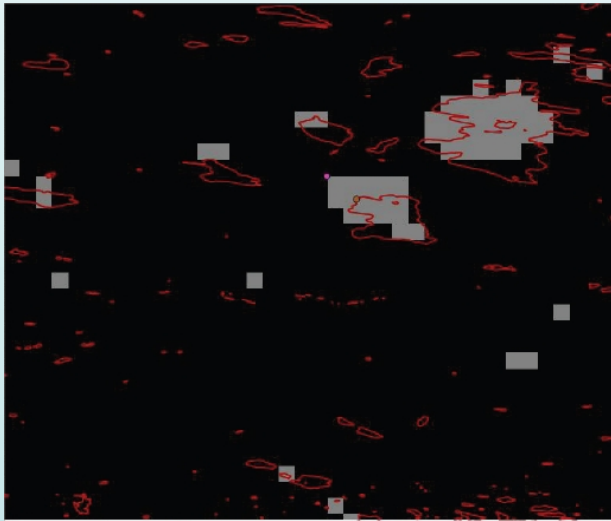
- Displacement in ECOCLIMAP II
 - GlobCover - 5.008% of wrong pixels
ECOCLIMAP II - 7.460% of wrong pixels
- The same was found at SMHI over Sweden



R&D: Physiography

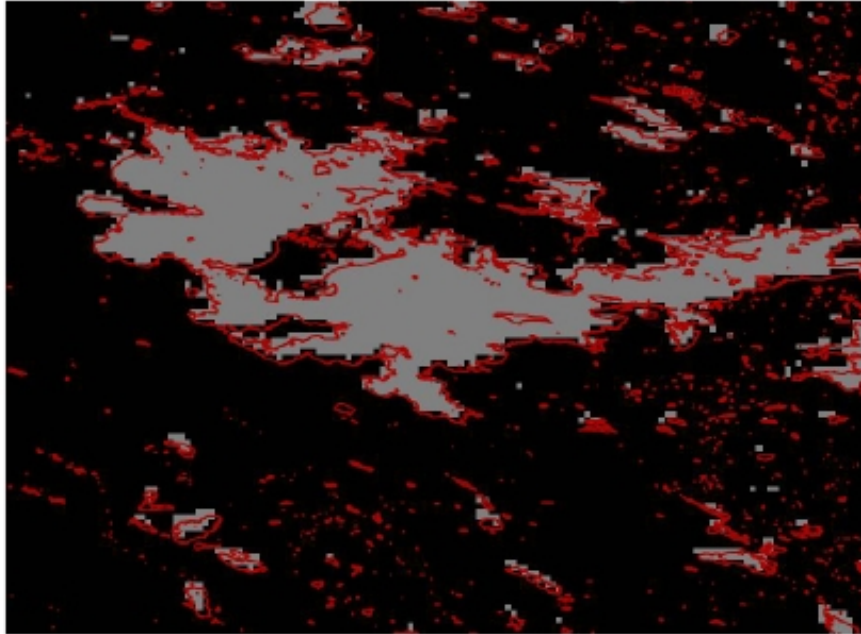
- To correct the shift with an affinity transformation?

$$\begin{pmatrix} i_{shifted} \\ j_{shifted} \end{pmatrix} = f \begin{pmatrix} i \\ j \end{pmatrix} = \begin{pmatrix} a & b \\ d & e \end{pmatrix} * \begin{pmatrix} i \\ j \end{pmatrix} + \begin{pmatrix} c \\ f \end{pmatrix}$$

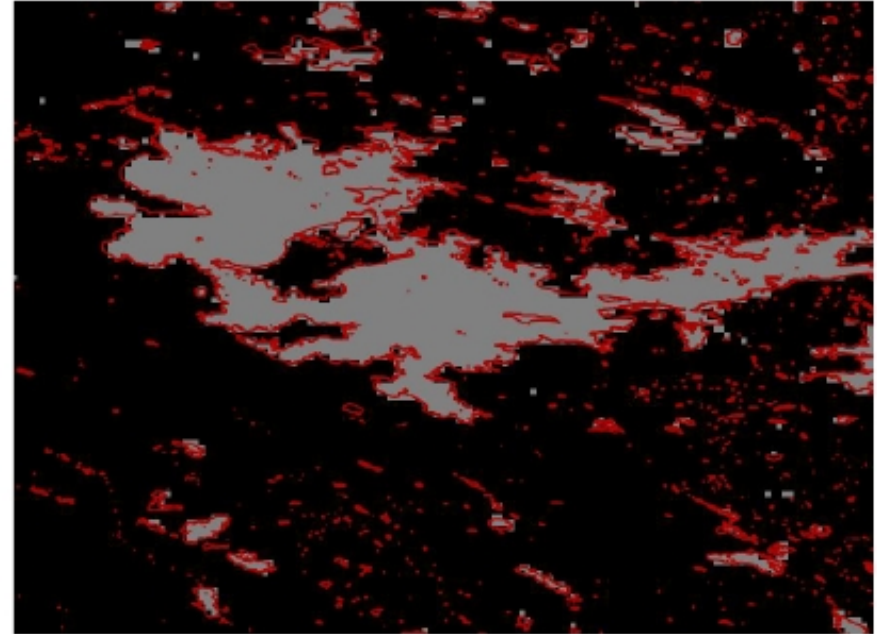


R&D: Physiography

ECOCLIMAP II orig.



ECOCLIMAP II corrected



ECOCLIMAP II orig. - 7.460% of wrong pixels

ECOCLIMAP II corrected - 6,663% of wrong pixels

GlobCover - 5.008% of wrong pixels



*Candidate for
the new physiography?*

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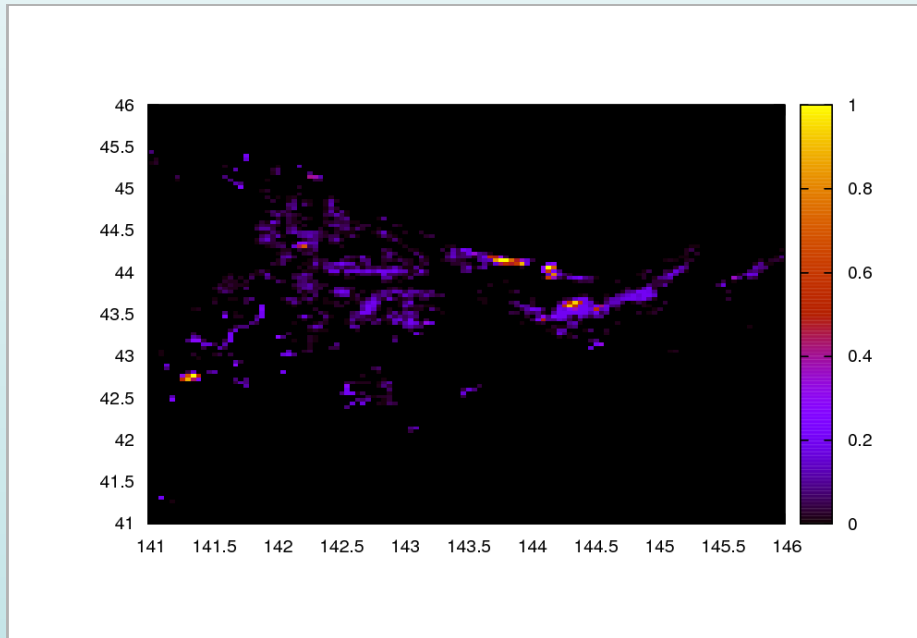


R&D: Physiography

- Exp. with ECOCLIMAP I: sharp gradients in the land use type along Finnish-Russian border, false lakes in Bielorussia => bias in V10m up to 3 m/s in HARMONIE

R&D: Physiography

- Philosophy of fractions of tiles within Covers => inconsistency with other datasets (lake database).
Solution: not to use this approach for lakes.



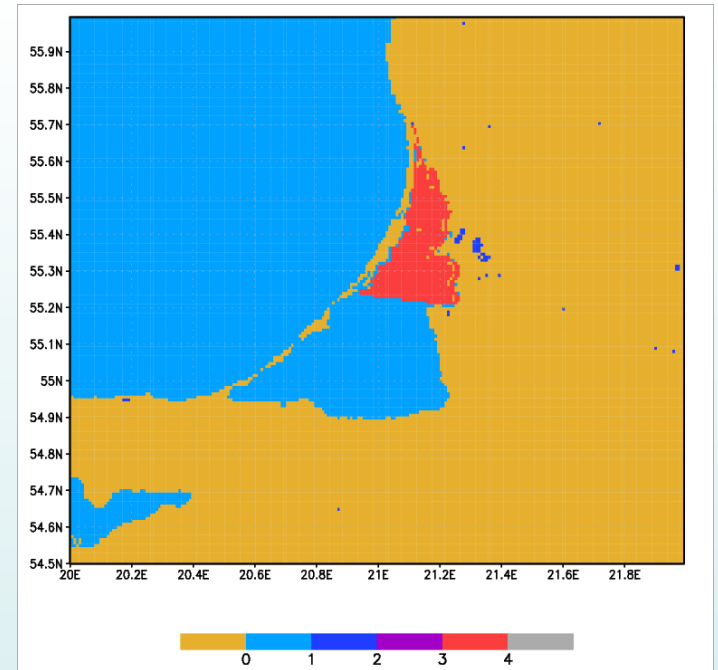
Hokkaido, fraction of lakes

R&D: Physiography

- Covers 549-556:
(INLAND WATERS1-6)
correspond to:
river estuaries, coastal lagoons,
glaciers and permanent snow,
lakes and salt pans

Solution:

to fix the binary cover map
for glaciers and permanent snow,
lakes and salt pans and
to refer to river estuaries and coastal lagoons as
"sea". Fixing is done

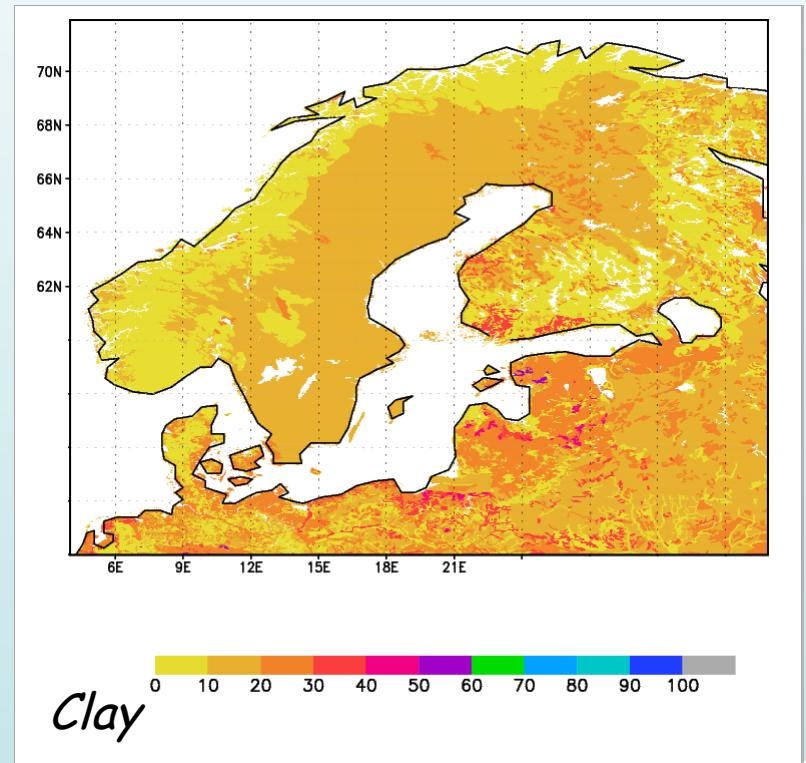
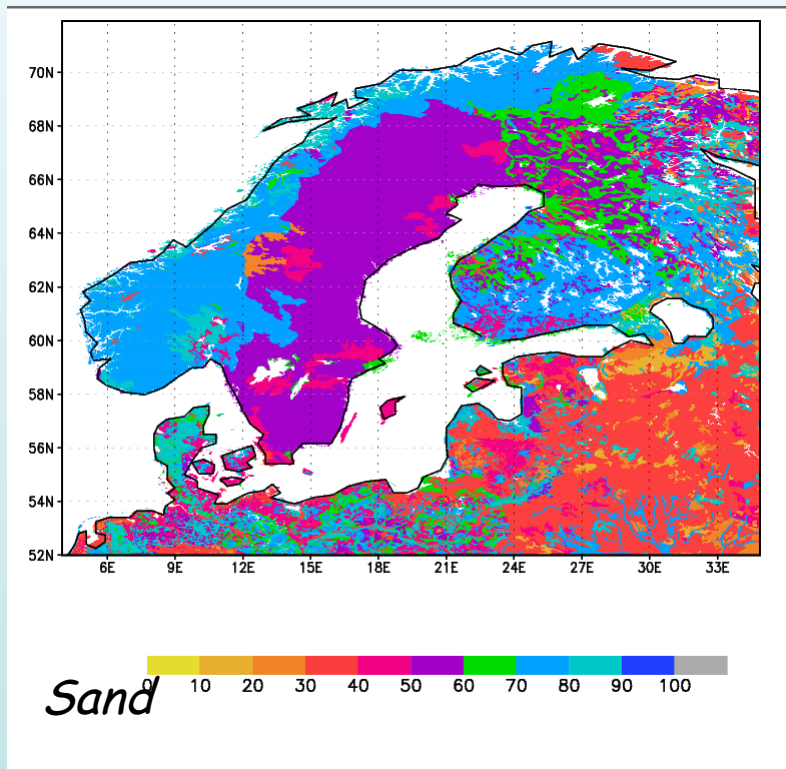


Curonian lagoon, Covers:

552 (50% land), 554 (2% land), 555 (3% land), 556 (20% land)

R&D: Physiography

- Evaluation of new soil maps for Nordic region: too smooth data in Sweden and Norway. Due to difference in classification?





Thank you!

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19 Mar. 2014

