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Remote sensing of snow cover using spaceborne EO-data: from regional to global scale, NRT and time-series applications

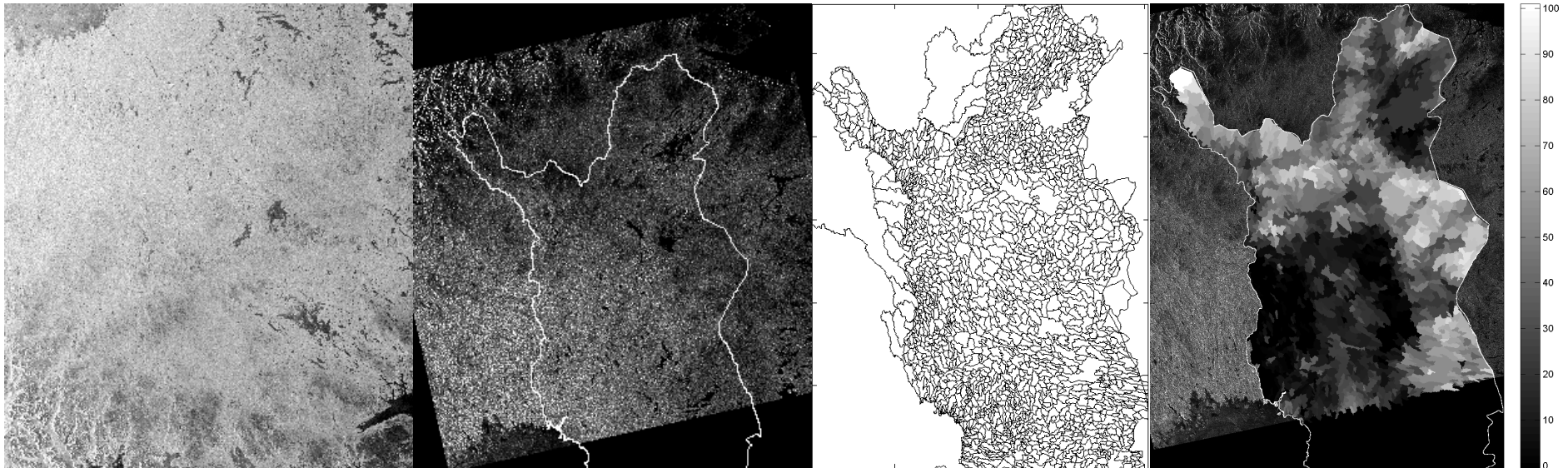
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Lemmetyinen, Anna Kontu, Juha-Pekka Luntama**

FMI, Arctic Research





SCA monitoring – C-band SAR data

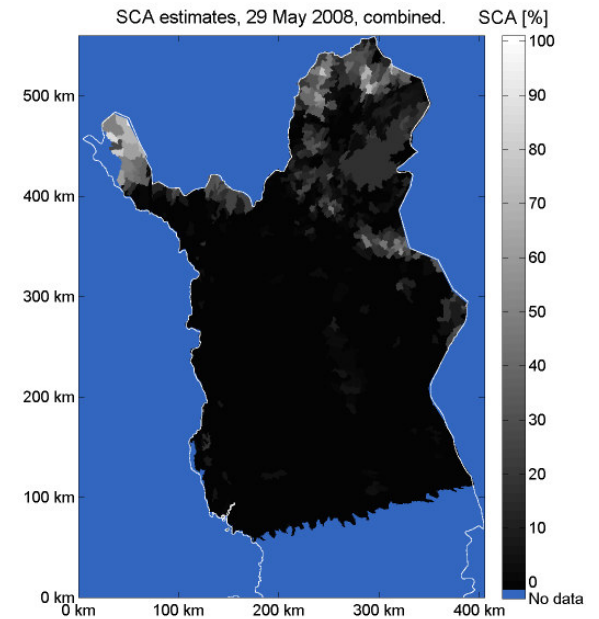
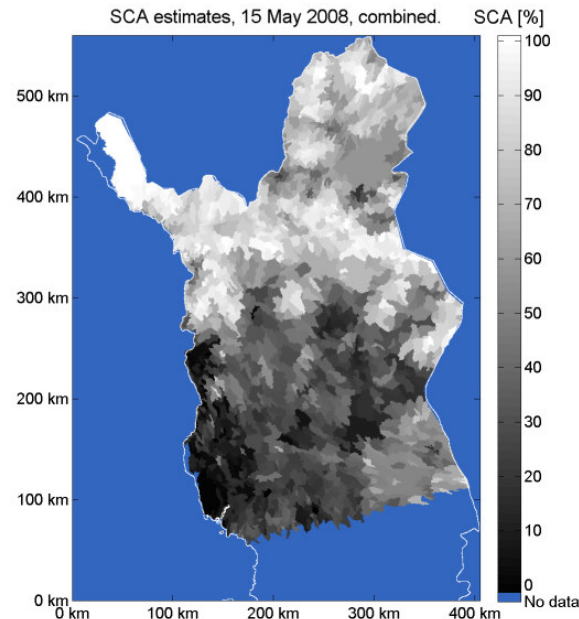
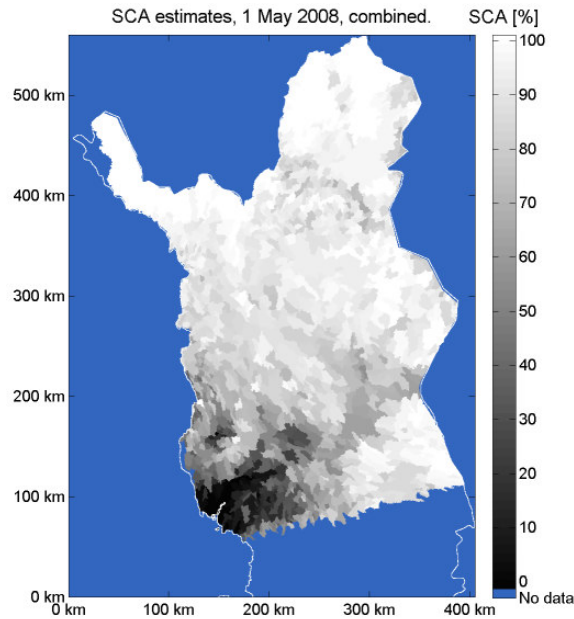


- **C-band SAR-based method to determine the fraction of snow-covered area during the snow-melt season**
- **Designed for operational hydrological simulations and forecasting**
 - SCA is used as an input for river discharge and flood management (SYKE)
- **Method utilizing wide-swath SAR-data, designed for boreal forest zone**
- **Unlike the baseline optical method, not affected by illumination/cloud conditions**



SCA monitoring – C-band SAR data

- **Recent R&D activities: 2004 – 2009, (work started during 1990: Koskinen & Pulliainen)**
 - Works on both VV- and HH-polarizations and wide-swath data (inc.angles 20° - 49°)
 - A fully automatic processing utility: from raw data to end products ~15 min
 - Used operationally by SYKE (along with optical EO-based method)
 - Recent publications: 5 Journal articles + conference articles, Ph.D. Thesis

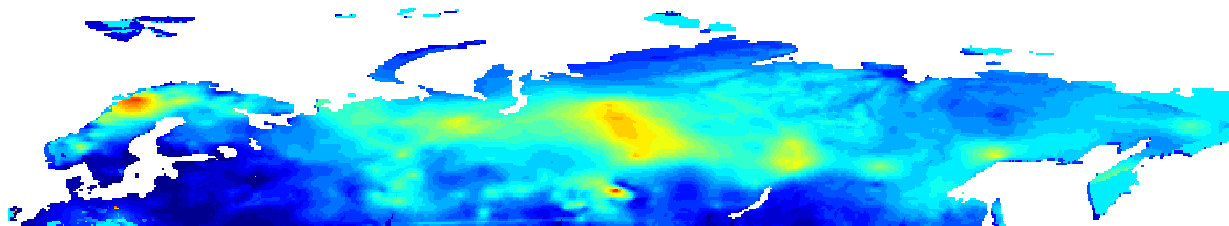




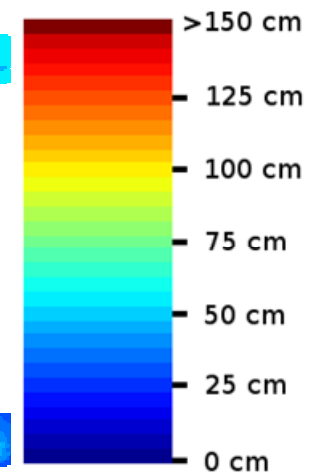
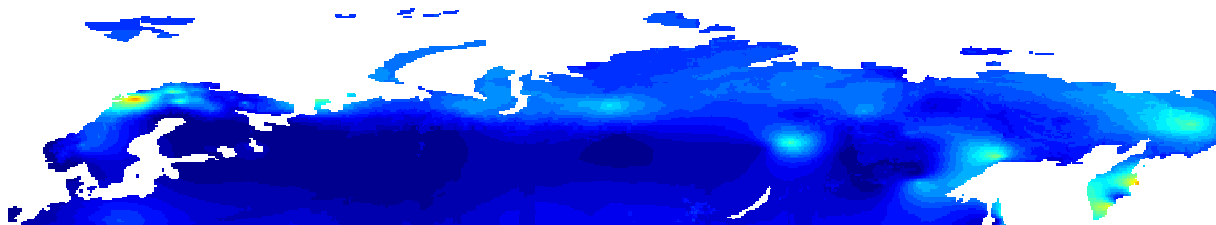
GlobSnow SWE, NRT / 20+ yrs time series

- **GlobSnow: 3 year ESA project with FMI, NR, ENVEO, GAMMA, SYKE, EC and Norut**
 - Purpose: Operational SWE & SE monitoring (+FCDR) on a global scale
- **SWE product, assimilation of microwave radiometer and weather station data:**
 - Data from SSM/I & AMSR-E, spanning 1987 – 2010 + an operational NRT product
 - Covering Northern Hemisphere (excluding: mountains, Greenland, snow on ice)

8.3.2007



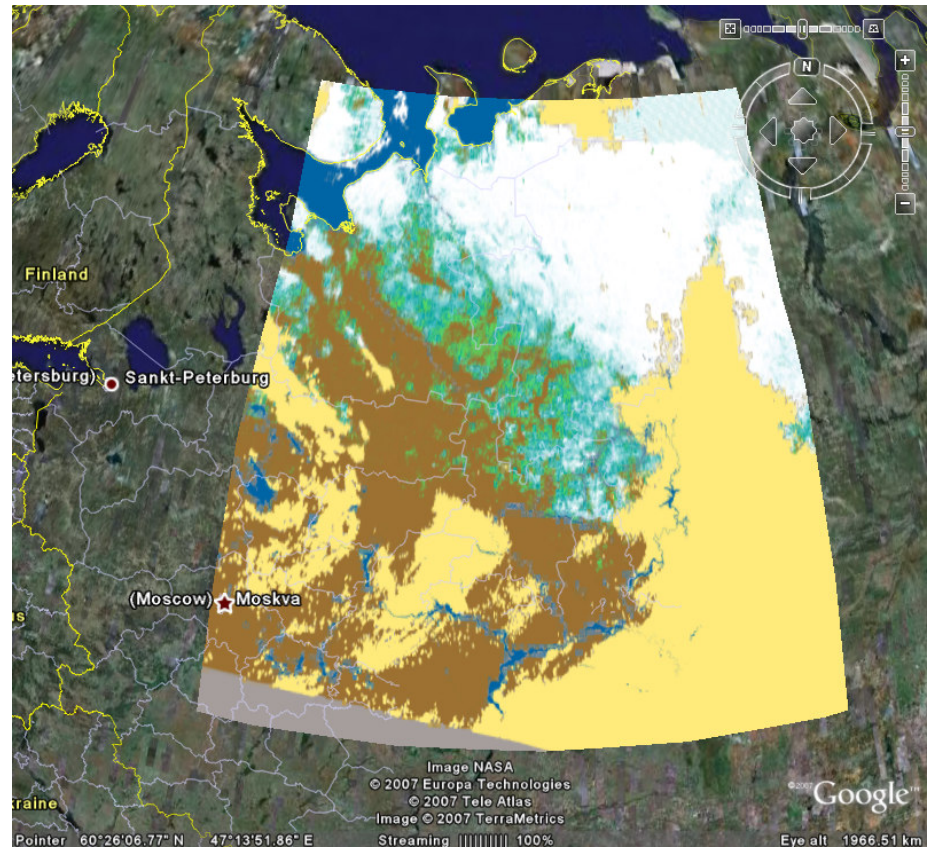
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GlobSnow SE, NRT / 15+ yrs time series

- **Snow Extent (SE) based on optical EO-data (+ ASAR for mountains)**
 - Data from ESA ATSR-2 & AATSR, spanning 1995 – 2010 + an operational NRT product
 - Covering NH + SH (excluding: Antarctica, Greenland, snow on ice)





Other current snow projects (FMI/ARC)

The projects are lead by J.Pulliainen

Snow remote sensing team: M.Takala, J.Lemmetyinen, A.Kontu, J.-P. Luntama & K. Luojus

- **SnowClim (SA)**
 - Comparison of EO-based snow data with climate model simulations
- **SnowCarbo (EU)**
 - Utilization of EO-based data for carbon balance (sources & sinks) mapping
- **Carb-Bal (SA)**
 - Similar to SnowCarbo, additional emphasis on national aspects
- **FloodFore (Tekes)**
 - Improved flood forecasting and hydrological information (SWE/SCA) using the available information sources (EO-based, ground-based, etc.)
- **Kara-X (Tekes)**
 - Ice/snow conditions on Kara-Sea, (Snow on ice using SAR/radiometers/scatterometers)
- **GPM (SA)**
 - The influence of snow on EO-based precipitation measurements (NASA GPM mission)