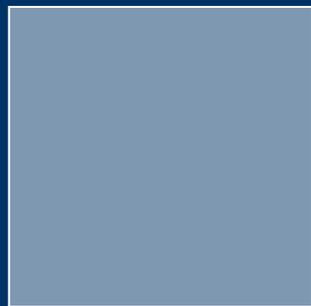




Polar View

Polar View

Snow Services and Application in Hydrology



GlobSnow User Workshop
Innsbruck, 13. Jan. 2010

Florian Appel

Vista Remote Sensing in Geosciences GmbH,
Munich, Germany

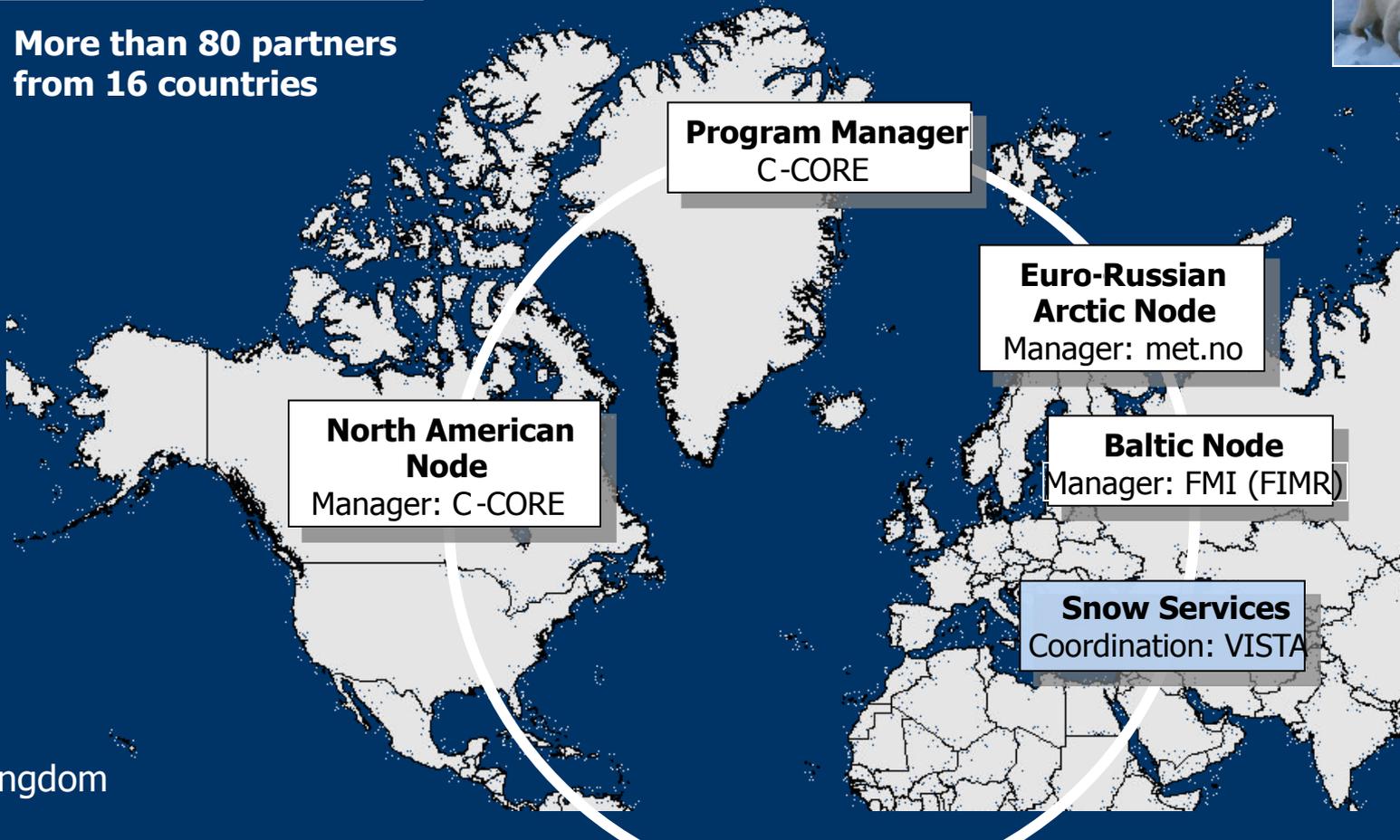


Polar View Network



**More than 80 partners
from 16 countries**

-  Australia
-  Austria
-  Belgium
-  Canada
-  Denmark
-  Estonia
-  France
-  Finland
-  Germany
-  Iceland,
-  Italy
-  Norway
-  Sweden
-  Russia
-  United Kingdom
-  USA



Global Monitoring of Environment and Security (GMES) is a joint initiative of the European Space Agency ESA and the European Commission EC



Our Users and Services



- ❖ Users include government departments, scientific institutions, northern residents, and private sector clients
 - Many contribute to the continuing development of services by participating in trials and defining requirements
- ❖ Services address operational users and science needs
 - Improved information for decision making and planning
 - Offer cost savings over alternatives
 - Provide accurate, real-time information
 - Can be customized to meet users' needs
- ❖ Services are offered in the Arctic, Antarctic, and mid-latitude areas with significant snow and ice across Europe, Russia, Canada, and the North Atlantic by an experienced team of experts

Polar View Services



Services

Sea Ice and Icebergs

- High-resolution ice charts
- Medium-resolution ice charts
- Sea ice thickness charts
- Ice forecasts
- Floe edge maps
- Iceberg detection reports
- Global sea ice products

River and Lake Ice

- Ice classification maps
- Ice cover change maps
- Annotated imagery
- Ice conditions history
- Freeze-up/melt-onset timing

Glaciers and Snow

- Glacier facies maps
- Mass-balance modelling report
- Glacier velocity maps
- Snow cover maps
- Snow water equivalent

User Concerns

Safety

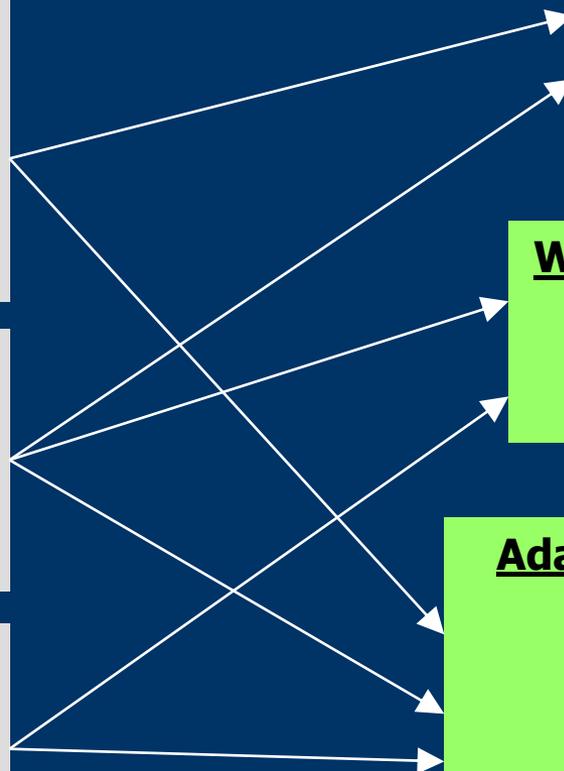
- Shipping
- Offshore operations
- Hunting and fishing

Water and Environment

- Water resources management
- Flood forecasting
- Hydropower management
- Pollution transport

Adapting to Climate Change

- Shipping
- Offshore operations
- Hunting and fishing
- Water resources management
- Flood forecasting
- Hydropower management



Polar View Snow Services Overview

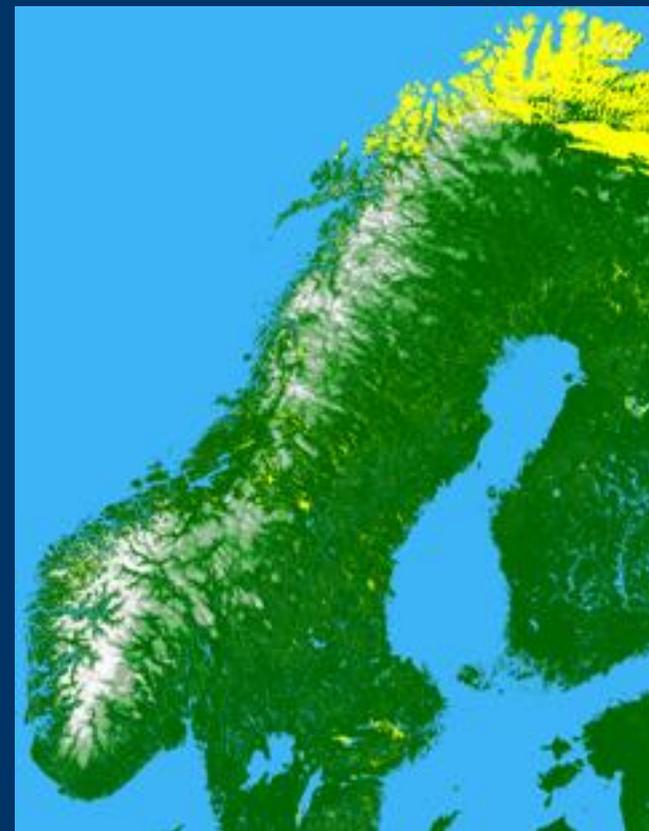
- ❖ Polar View (2005-2008) GMES
- ❖ **Polar View Extension 2009-2012**
 - Now a three-year funding extension from the European Space Agency (ESA) awarded!
 - Ongoing monitoring activities under GMES
 - Path towards sustainability
- Provision of specific service by each service provider, dedicated to his users
- Coordination activities of PV snow services
- Establish common appearance / product of PV Service Providers
- Establish 'User Executive Board'



Scandinavian Snow Cover Area Service



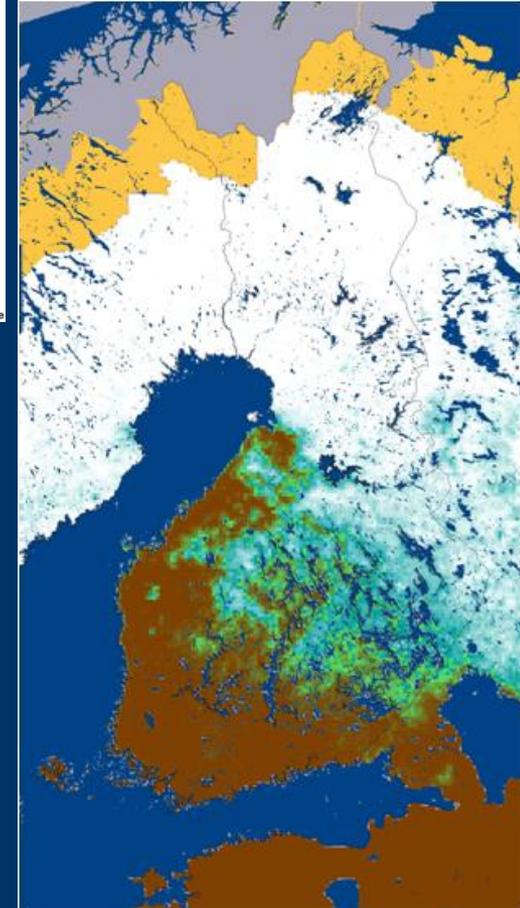
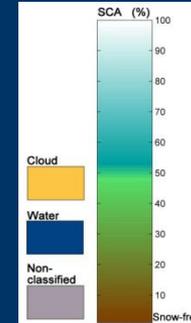
- ❖ **Provided by KSAT (Norway)**
 - Service Development and Improvements by Norut & NR
 - Snow Cover Area (SCA) product provides a percentage of snow cover per pixel based on a multi-temporal and multi-sensoral mosaic of optical and SAR data
 - Envisat ASAR and Terra MODIS images
 - Snow Cover Area (SCA) will be produced after each data acquisition during (the snowmelt season (1 April – 1 July)
 - Large interest from hydropower companies



Snow Monitoring Baltic Region



- ❖ **Provided by SYKE (Finland)**
 - Snow map service to provide NRT-information of fractional snow coverage (FSC) for the Baltic Sea drainage area during the snow melting period.
 - Use of Terra MODIS and automated processing
 - Daily product, some hours after Satellite overpass
 - Product Resolution: 0.05 x 0.05 deg
 - Users from Estonia (national) and Finland (national & private)
 - Free access from SYKE's snow map website

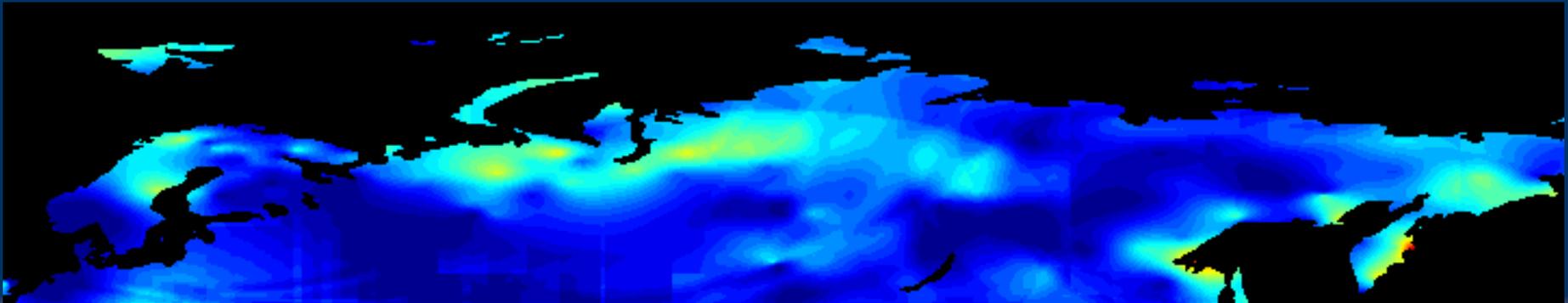
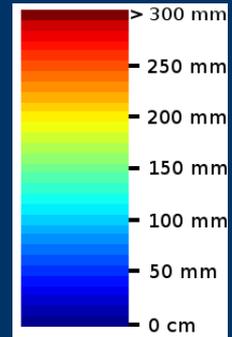


Eurasian Snow Cover



FINNISH METEOROLOGICAL INSTITUTE

- ❖ **Provided by FMI (Finland)**
 - Snow depth and snow water equivalent from passive microwave for northern Eurasia (SD & SWE)
 - Service does not receive funding within Polar View, but enhances product portfolio and the team.
 - Service running within H-SAF



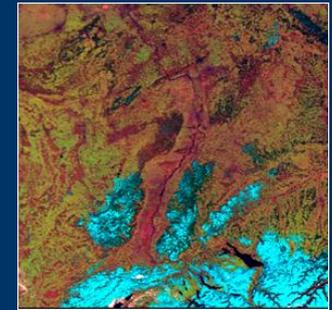
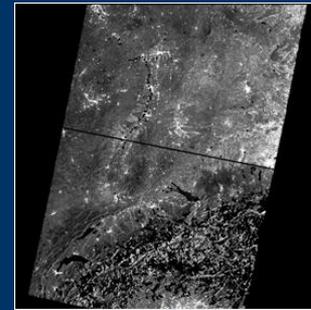
Snow Service Central Europe



- ❖ **Provided by VISTA (Germany)**
 - Snow Cover Mapping and Snow Line Estimation
 - Using operational optical and microwave EO
 - Mayor catchments in Central Europe and the Alps
- Daily products of 1km resolution
- Products delivered via password protected FTP service

Operational EO data processing

ENVISAT ASAR - NOAA AVHRR

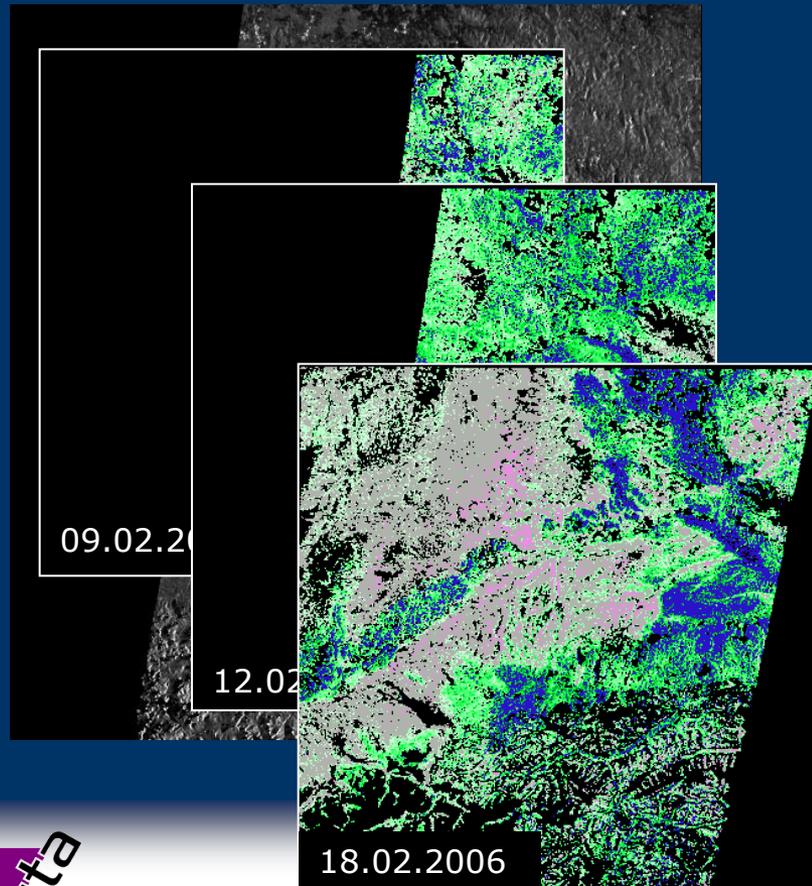


Products for Flood Forecast
snow cover- snow line - wet snow

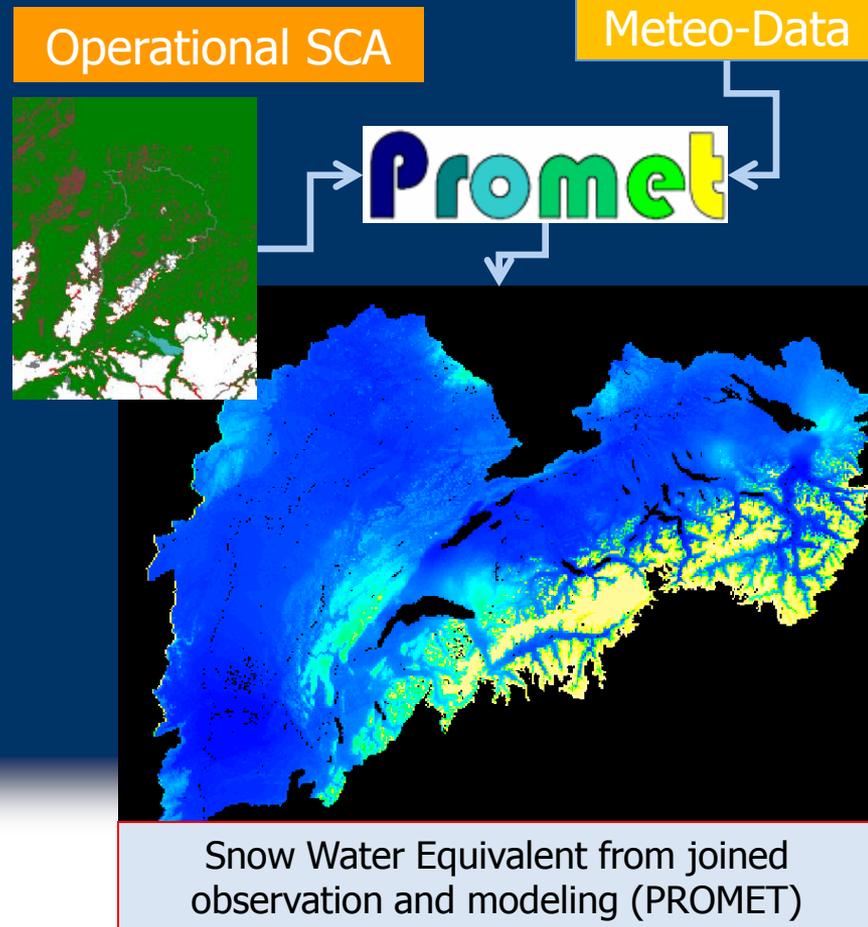


Snow Service Central Europe

- Wet Snow Detection using ENVISAT ASAR WSM



- Snow Water Equivalent using joined EO observation and water balance modeling
- only for selected catchments





Snow Service Central Europe

Users of Snow Service Central Europe

- Flood Forecast Center, LUBW Baden-Württemberg*
- Flood Information Service, LUWG Rheinland-Pfalz*
- General Administration of the Federal State of Vorarlberg* (Austria)
- German Federal Institute of Hydrology - BfG* (Germany)
- LMU Munich – Department of Geography - GLOWA
- DWD German Weather Service - SNOW
- VISTA internal

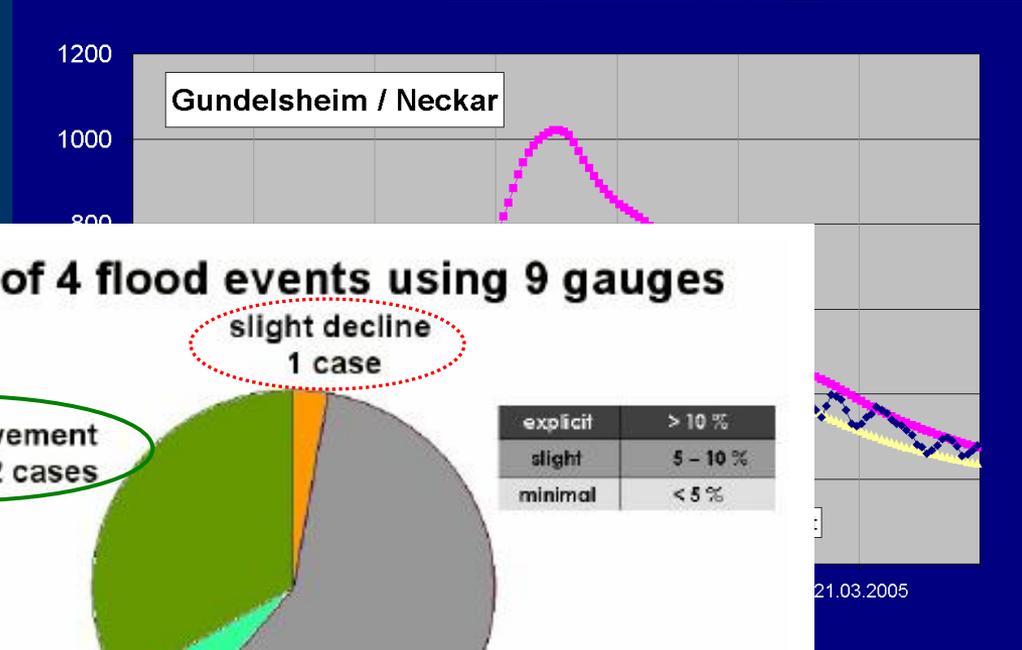
* With Service Level Agreement



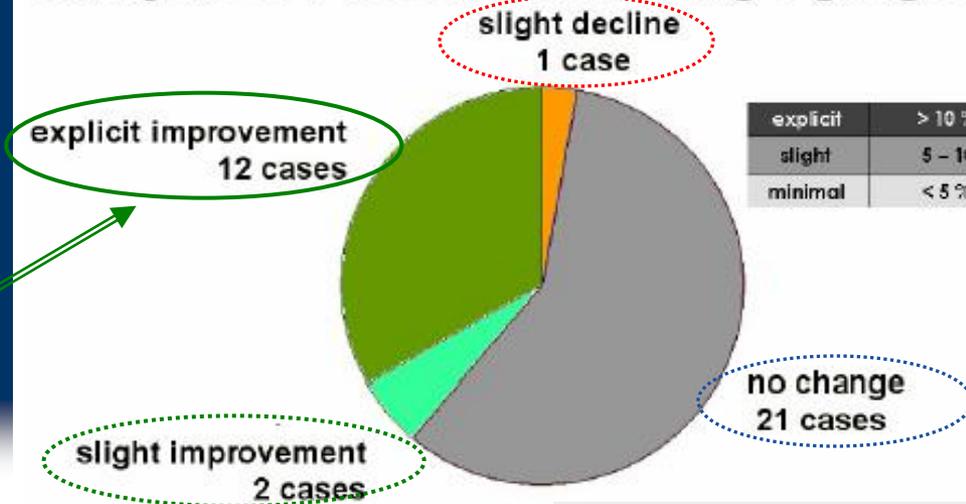
Application of Snow Products

- ❖ Improvement of Flood Forecast (LUBW)
 - Application of the LARSIM model (water balance and flood forecast)
 - comparing runs with use of operational information from daily snow cover mapping
 - Analysis of effects on runoff simulation using SCA maps from EO

Increase of forecast quality for 1/3 of the tested cases



Analysis of 4 flood events using 9 gauges



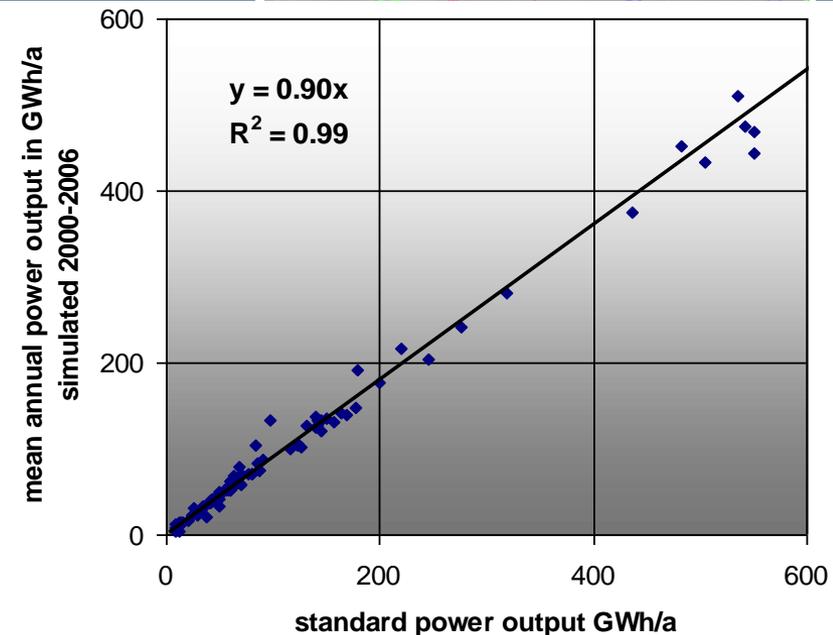
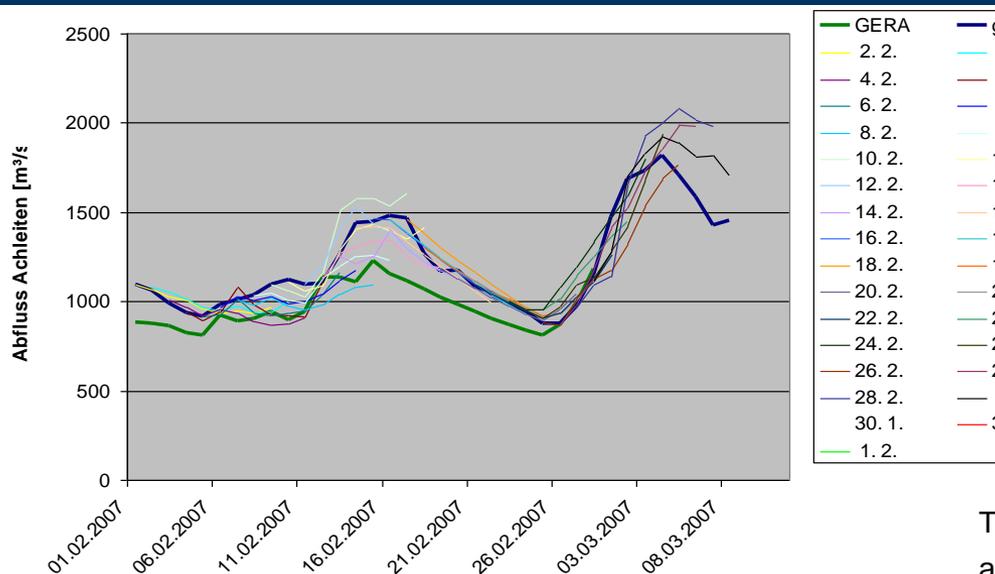
Application of Snow Products



In collaboration with



- ❖ Hydroelectric power production in the Alps (Simulation and Forecast)
 - simulation of hydroelectric power production for more than 100 hydropower plants
 - Validation of PROMET hydropower module
 - Forecast Examples: snow melt cases



The mean annual power output of 100 hydropower plants was accurately calculated with the model over the years 2000 to 2006.

Polar View Extension: Service Coordination



- ❖ Increase of information transfer between PV partners and other international snow initiatives
 - European Snow Initiatives (GLOBSNOW / H-SAF / ISSWG / ...)
 - Exchange with North American / Canadian / Russian snow services
- Organization of International Snow Workshop
 - Brussels in second half of 2010
- Extension of contacts to already targeted (e.g. early warning responsible institutions) and new user groups
- Establish 'User Executive Board'
- Coordination of Polar View snow products (Consolidated Product)

Polar View Extension: Consolidated Snow Service



- ❖ Increase of recognition of Snow Services by users targeted
 - Common appearance of the services on one platform
 - All information on services accessible from the Polar View web portal (or related server)
- ❖ Provision of consolidated product
 - Product merged / computed from results of individual services
 - Representing the weekly average snow cover of European area
 - Consolidated, decreased spatial resolution ($0.05^\circ \sim 5 \text{ km}$)
 - Minimum cloud cover achieved using a multiday – composite
 - During the service generated products will be archived

Summary



- ❖ **Polar View Snow Services will continue for the next 3 years**
 - Sustainability of services is targeted and challenging
 - Involvement of new users always welcome
- ❖ **Polar View will increase tasks for information and coordination among snow services and user community**
 - Raise of user involvement by “User Executive Board”
Tasks will start soon – everyone is welcome to get in contact
 - Targeted Snow Workshop for the second half of 2010 in Brussels
(Organized by Polar View & International Polar Foundation IPF)
- ❖ **Polar View** itself will become a legal entity – the team of experts will keep together for the future

www.polarview.org



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