

eurac
research | Sentinel Alpine
Observatory

→ THE ESA EARTH OBSERVATION Φ -WEEK

EO Open Science and FutureEO

12–16 November 2018 | ESA–ESRIN | Frascati (Rome), Italy

Participatory Earth Observation
Research in the Alps

15/11/2018

Alexander Jacob, Marc Zebisch, Claudia Notarnicola, Ruth Sonnenschein, Carlo Marin, Roberto Monsorno, Armin Costa & Andrea Vianello
Eurac Research, Institute for Earth Observation, Bolzano, Italy

The SAO in a Nutshell



S2-L2A



S1 -
Backscatter



Composites



Permafrost



Glaciers



Snow



Evapo -
transpiration



Soil -
Moisture



Land Cover



Changes



NDVI



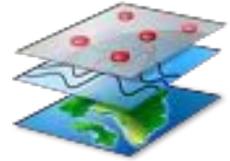
LAI



Terrain
Movements



The SAO & the „cloud“



JavaScript



mundialis



SENTINEL Hub
by SINERGISE





openEO
Grant agreement No 776242



Contact:



<http://openeo.org/>



openEO@list.tuwien.ac.at



<https://github.com/Open-EO>



[@open_EO](https://twitter.com/open_EO)



<https://www.youtube.com/channel/UCMJQil8j9sHBQkcSISaEsvQ>

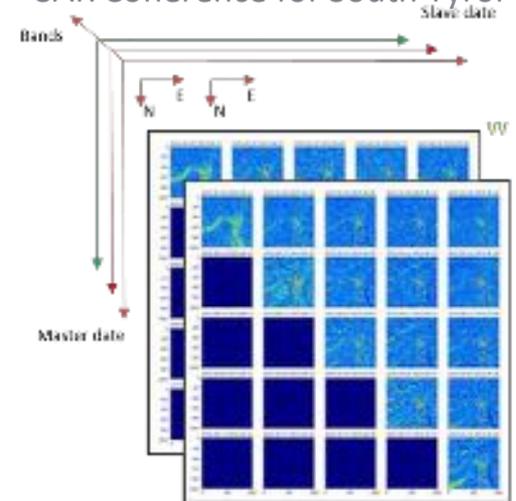


<https://www.researchgate.net/project/openeo>



<https://openeo-chat.eodc.eu/channel/public>

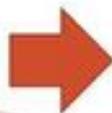
Sentinel 1 A & B
In SLC for 8 relative orbits passing
over the alps
Speckle filtered GRD pre-processed
SAR Coherence for South Tyrol



Participatory Research



Pre-processed InSAR stack sites

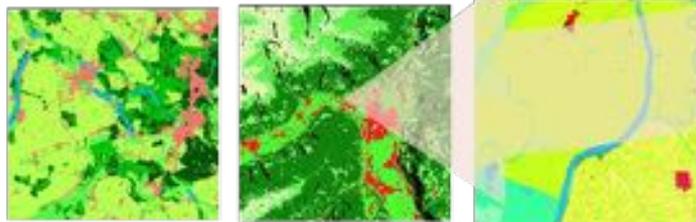


rasdaman
raster data management

ESA SEOM SinCohMap Round Robin Exercise for Exploiting Sentinel-1 Interferometric Coherence for Land Cover and Vegetation Mapping



Land-cover maps



WCS/WCPS



Alexander Jacob | EO Open Science & Future EO 2018 | 15/11/2018 | Slide 6



Alpine-wide Sentinel-2 Coverage



Sentinel-2 Data Availability

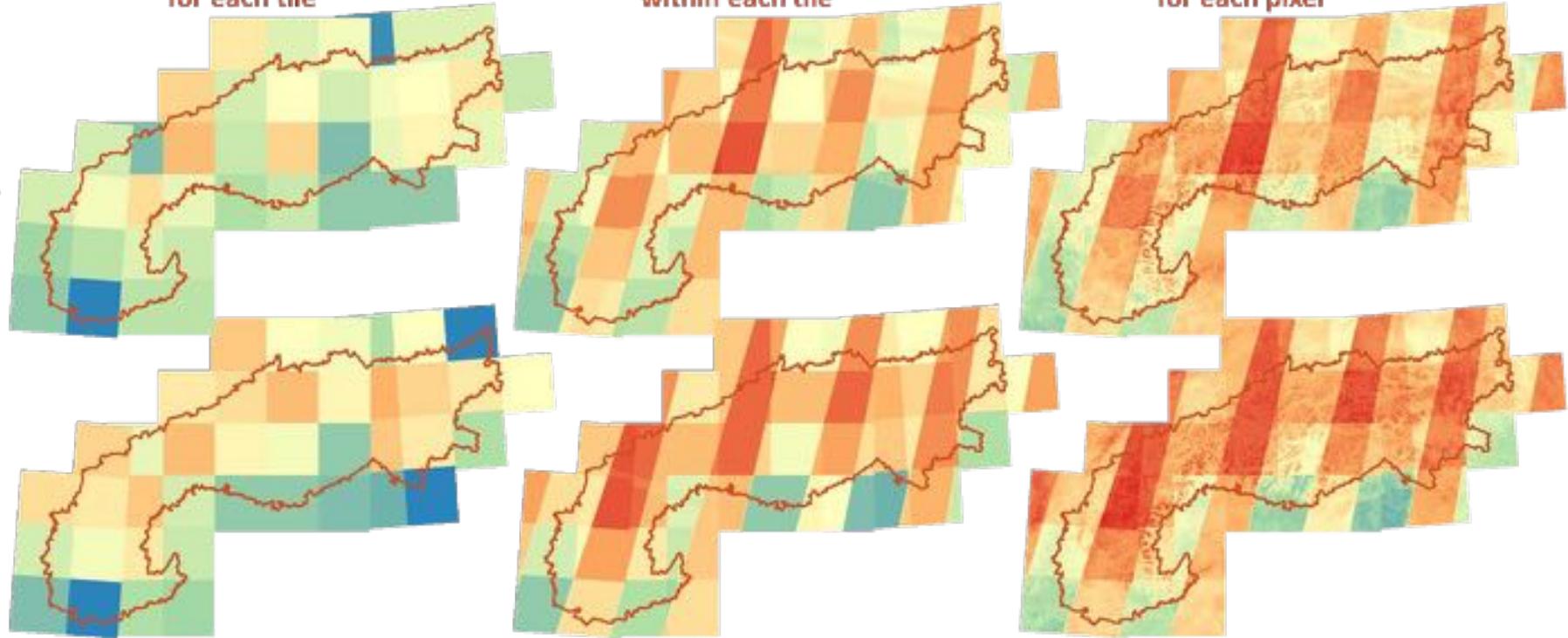


for each tile

within each tile

for each pixel

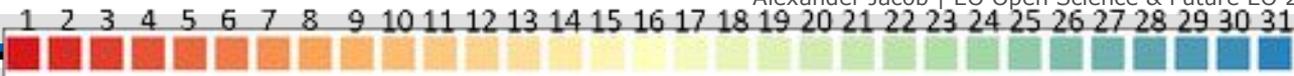
2015/2016

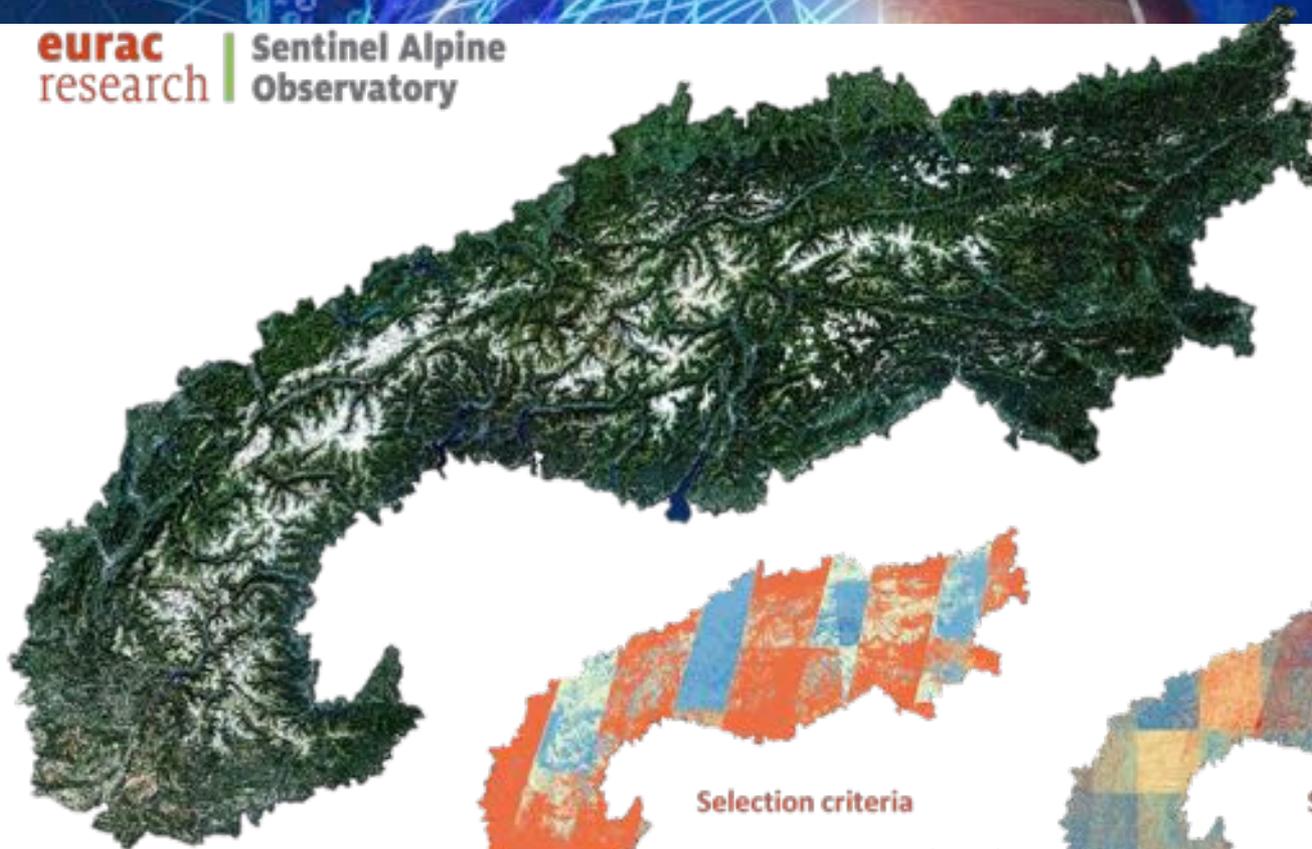


2017

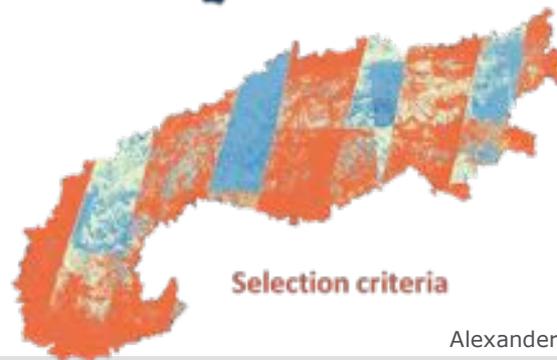
June – September, maximum 25% cloud cover

Alexander Jacob | EO Open Science & Future EO 2018 | 15/11/2018 | Slide 8

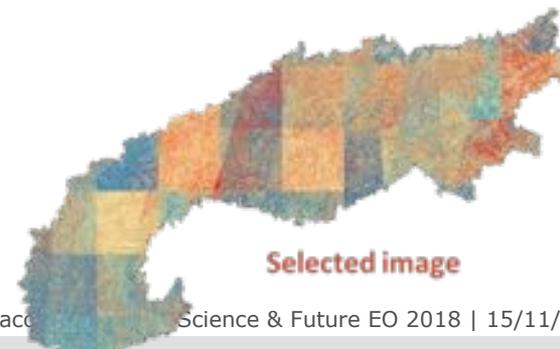




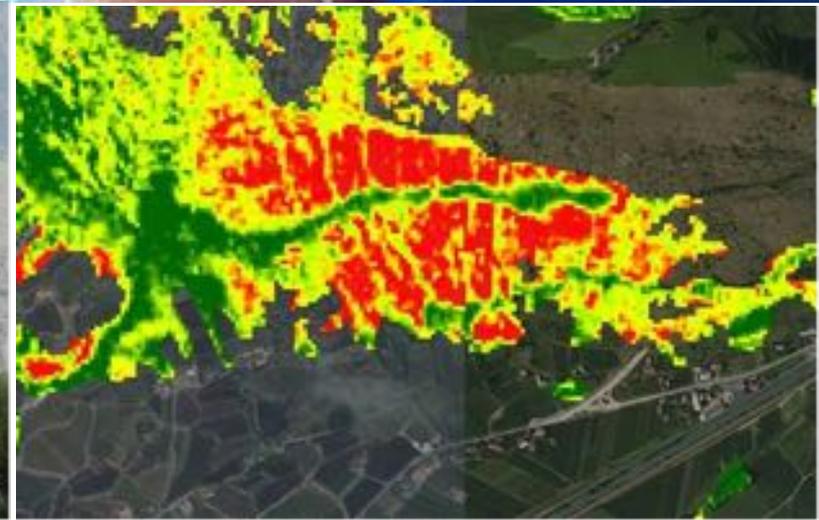
**Composite
2015/2016**



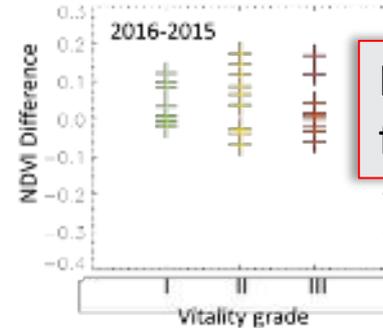
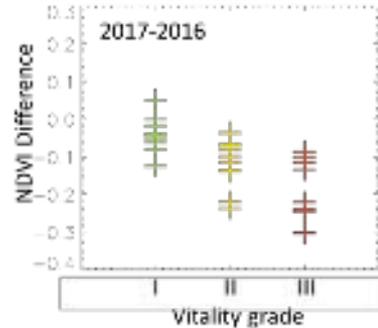
Selection criteria



Selected image



Anomaly Detection Based on Sentinel-2

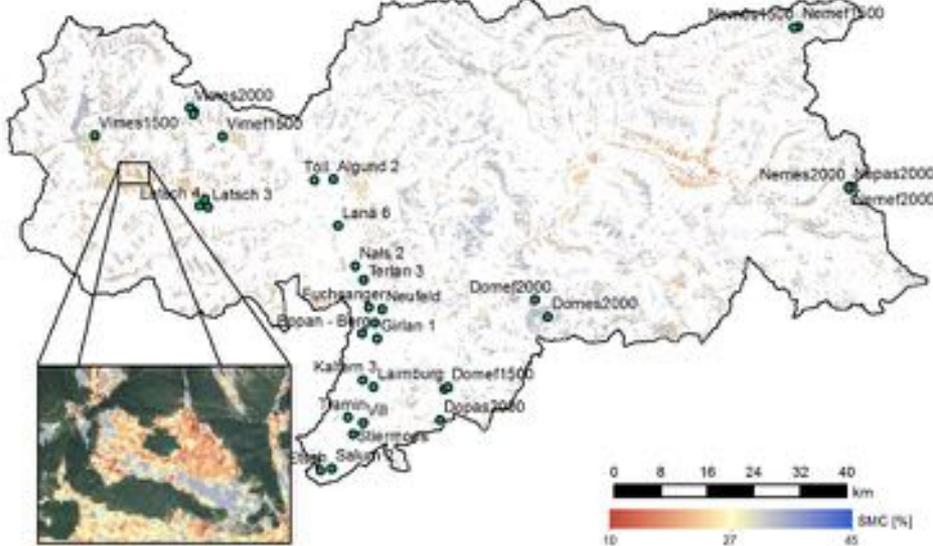


Forecast Damage Assessment
for Forest Department

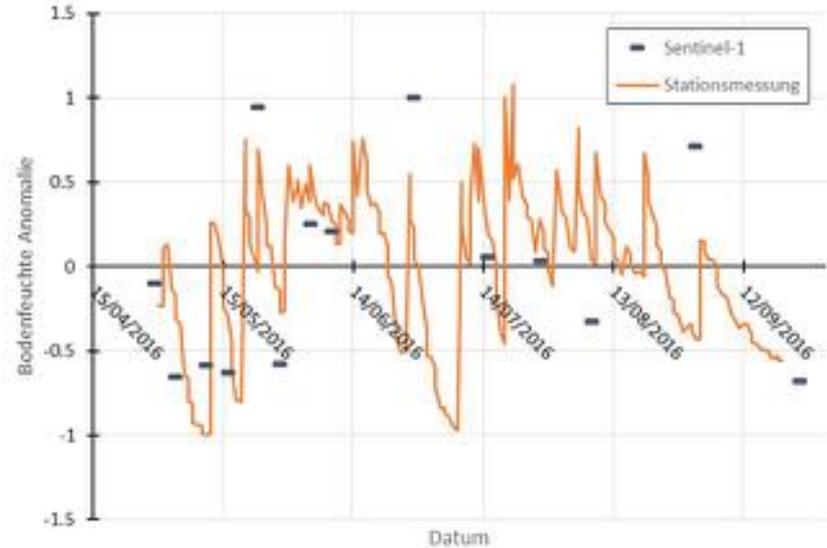
Soil Moisture Anomalies



Volumetric Soil Moisture Content
South Tyrol, June 2016



Anomaly Detection Based on Sentinel 1



Soil Moisture Anomalies – Station: Vimes 1500



Alpine wide daily snow cover maps



MODIS Aqua and Terra based
Available daily since, 2002.

Merged product of the daily acquisitions
of the two sensors.

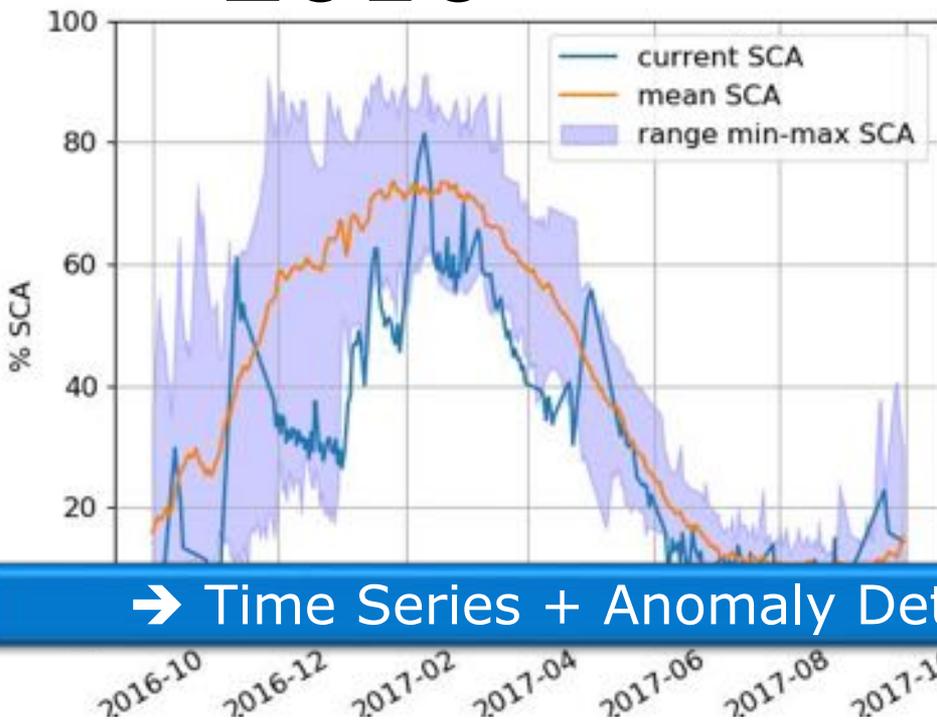
Open Data

Shared with e.g. hydrological services in
the Province of South Tyrol, for their
hydrological models.

Snow Cover dynamics in South Tyrol 2016 vs. 2017

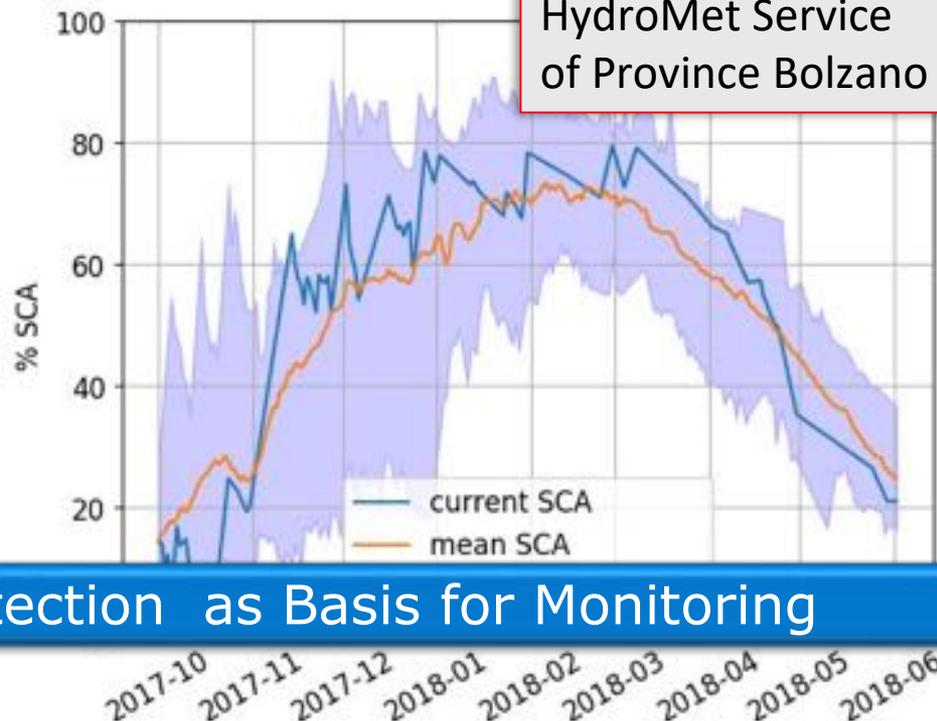


2016



2017

Snow Bulletin for HydroMet Service of Province Bolzano



→ Time Series + Anomaly Detection as Basis for Monitoring



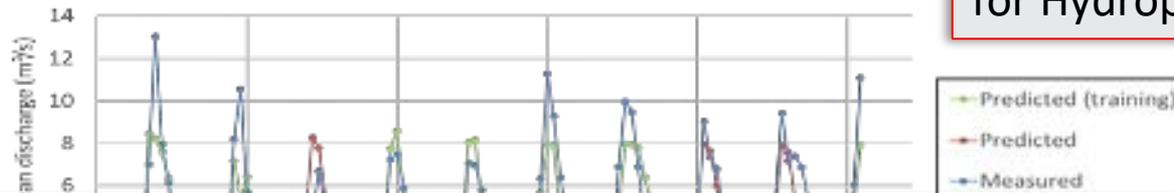
Integrated Run-off Forecast



Model (Machine Learning)

Run-off forecast for Hydropower Provider

Run-off forecast



→ Integration of different data sources – modelling and AI



**SNOW
cci**

Long time series from : AVHRR-2/3, ATSR-2, AATSR, MODIS, Sentinel-3A/B SLSTR and Spot/Proba-V Vegetation



Figure 1: Global fractional snow cover (FSC) product from Terra MODIS data from 18-22 March 2017 (generated by ENVEO, 2017).

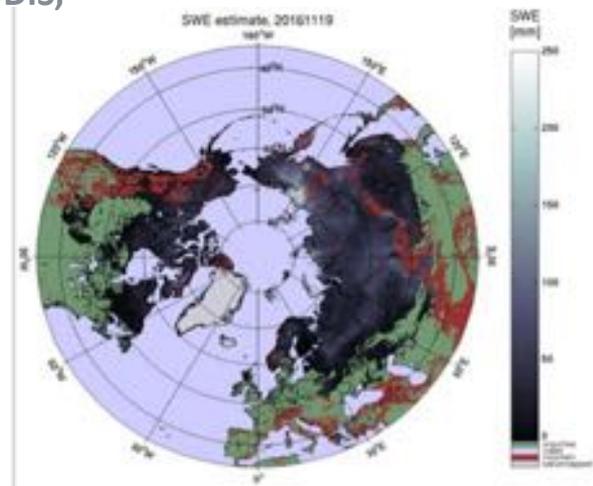


Figure 2: Snow water equivalent (SWE) on 19 November 2016 over the northern hemisphere from passive microwave data (generated by FMI, 2017).

Validation using in-situ measurements and high resolution optical data i.e., Landsat 5-7-8 and Sentinel-2 data



The SAO in the context of EO4Alps



Reserach Institutions

Private Data Provider

Reserach: Link with non-EO

Mountain Research Community

Research Networks
+ Platforms



Operational
Products

Share!

Integration
with existing
approaches

User - Local Administrations

User - Private Sector



Policy Networks



European Environment Agency



**Alpine Data and
Information Platform
Scientific Exchange**

Funded Projects!

**Expression of demand for
Alpine wide products**



Thanks a lot!

