Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Descartes
research

Update from Descartes Research Group

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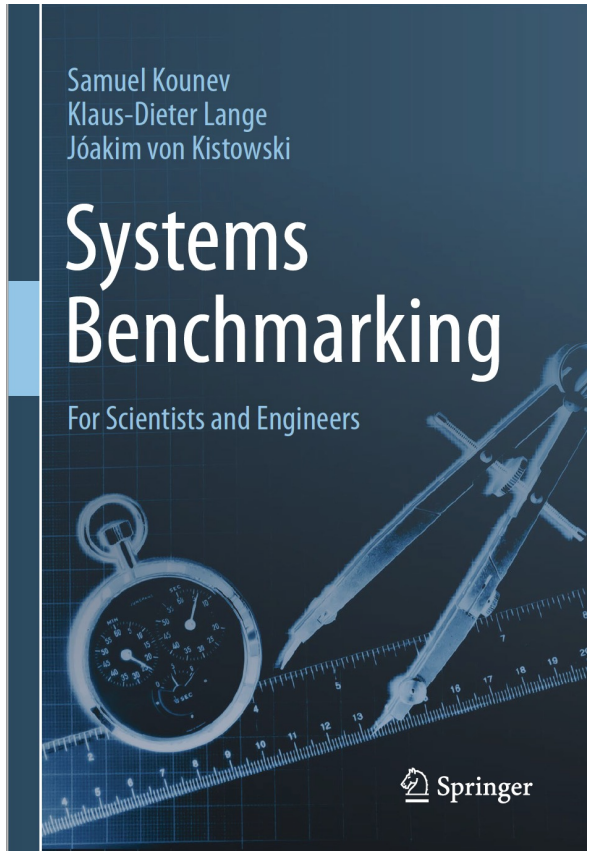
Chair of Software Engineering

SSP 2022, Stuttgart, November 8, 2022

New Course on Systems Benchmarking

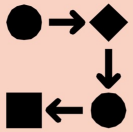
- Theoretical and practical foundations
- Both a textbook and a handbook on benchmarking
- Includes modern applications, case studies, and latest research based on input from over 40 benchmarking experts
- Teaching materials available on request
- Credits: Numerous (under-)graduate students (2006-2022):



http://benchmarking-book.com

Software Engineering Group

Software Architecture



- Distributed Systems
- DevOps
- Modeling & Simulation
- Performance Engineering

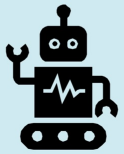
Benchmarking & Experimental Analysis

- Performance
- Energy Efficiency
- Security
- Dependability

Vision of Self-Aware Computing

Autonomic Systems

- Self-Adaptation
- Self-Organization
- Self-Protection
- Artificial Intelligence



Predictive Data Analytics

- Statistical Modeling
- Machine Learning
- Time Series Forecasting
- Critical Event Prediction

Research Areas

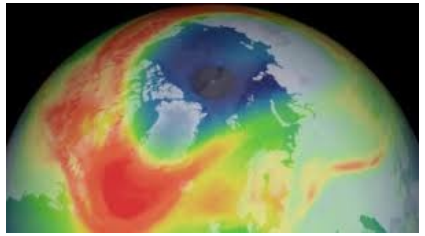
Internet-of-Things / Cyber-Physical Systems

- Mobile networking and communication
- Transport / logistics
- Predictive maintenance
- Robot localization & people detection

Data Centers

- Cloud computing
- Green IT
- Security
- Resilience and robustness

Earth Observation

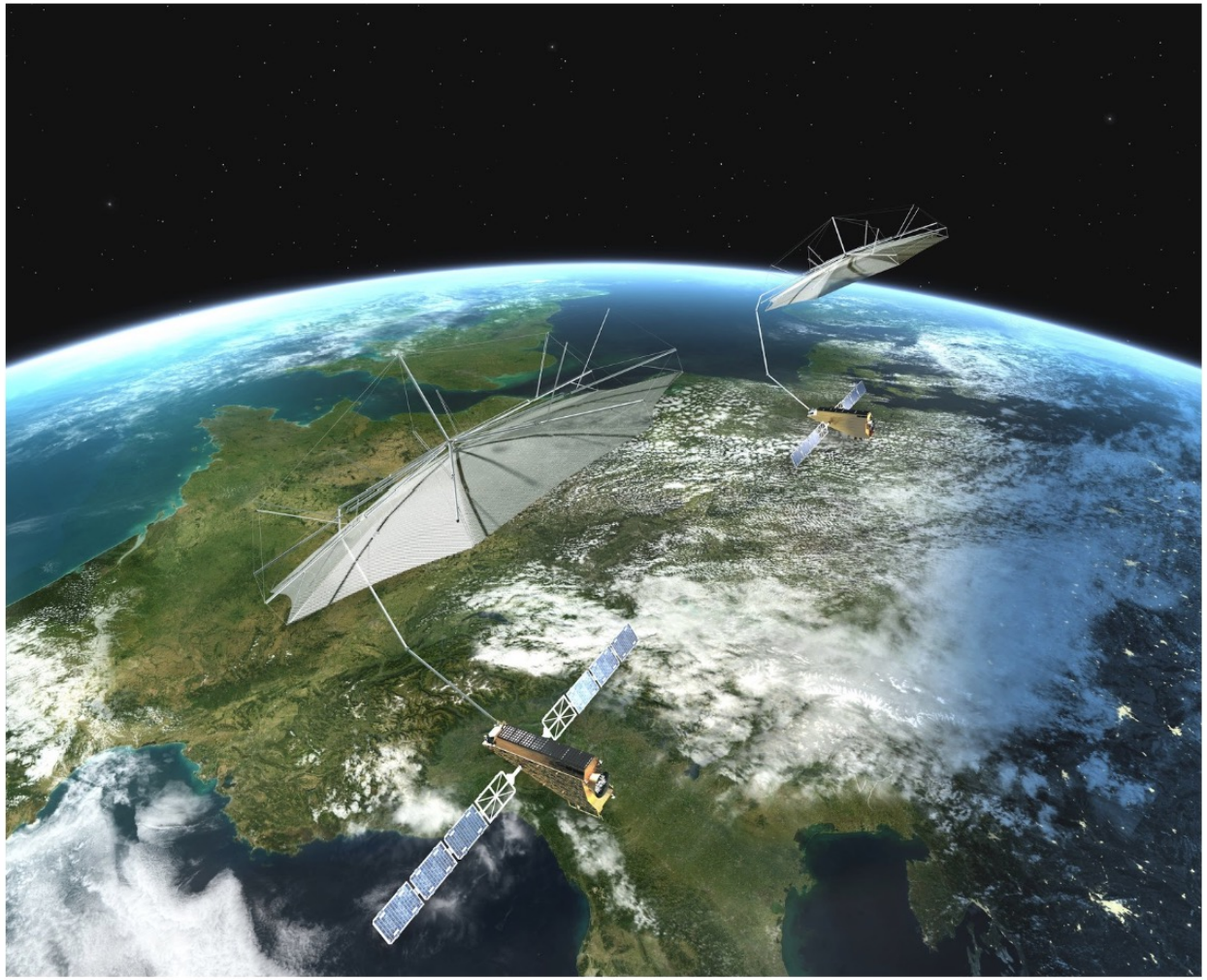


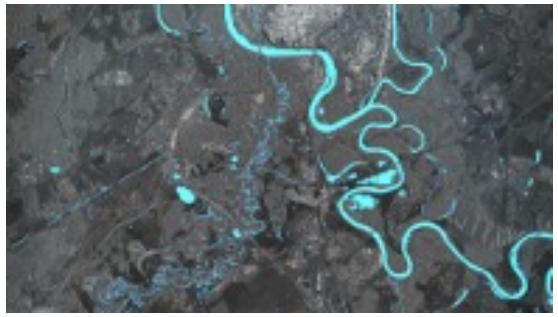
- Scientific computing
- Scalable data processing
- Satellite image analysis

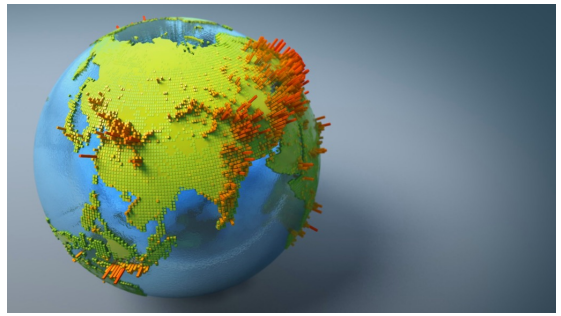
Medicine and Sports Science

- AI-based decision support systems
- Telemedical and real-time AI systems
- ML-based pattern recognition for vital time series

Earth Observation (EO)







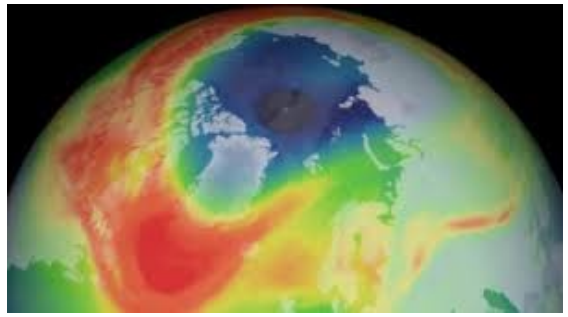
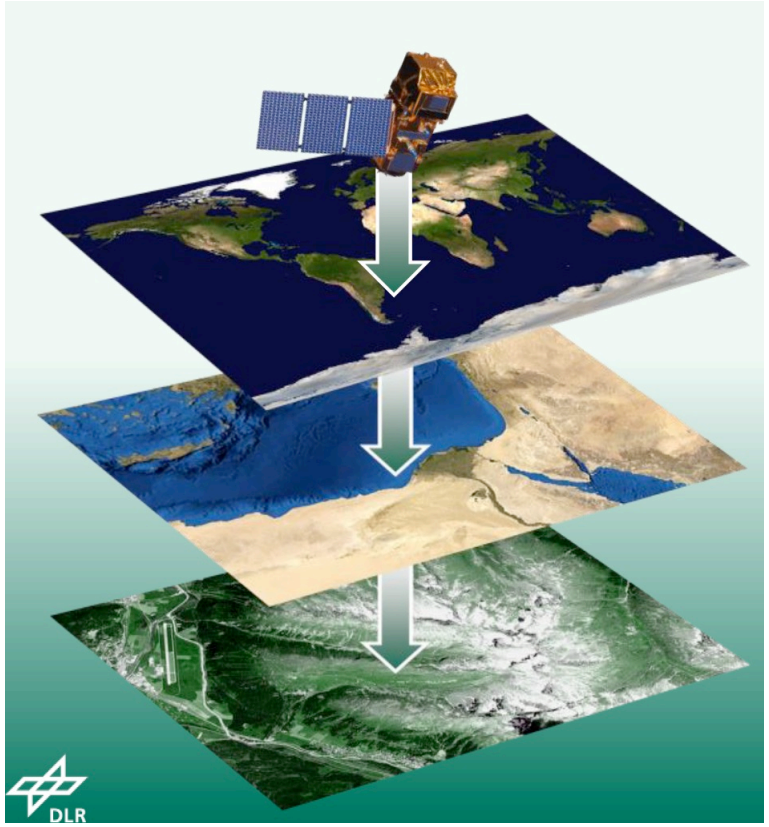


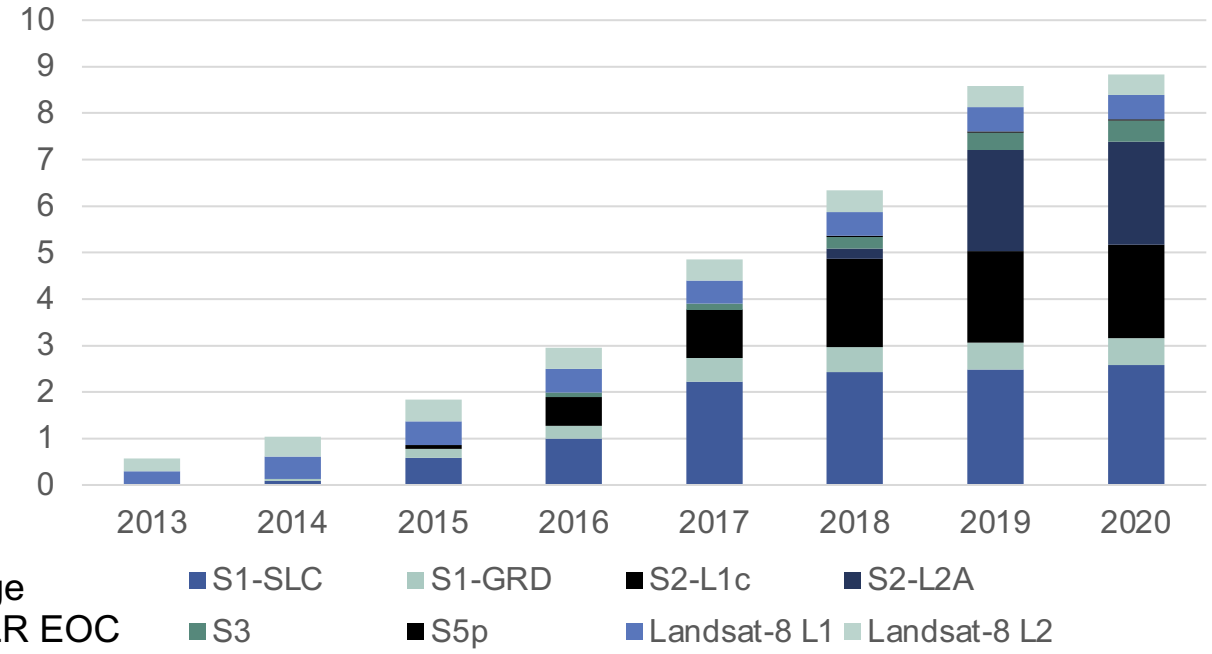
Image Sources: DLR EOC

Earth Observation Today

Continuous monitoring and quantification of global environmental change at all scales

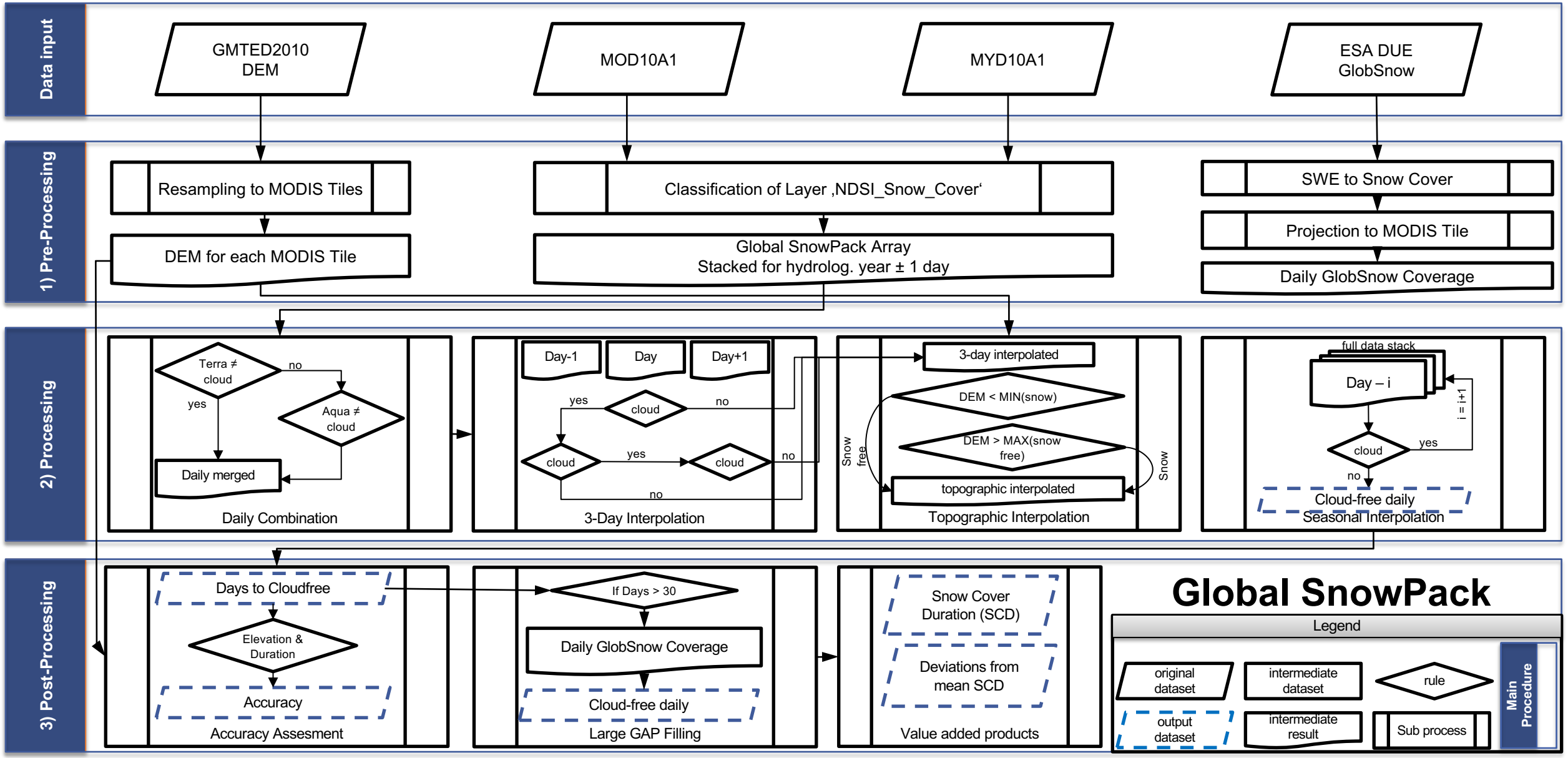


New EO data per year in Petabyte

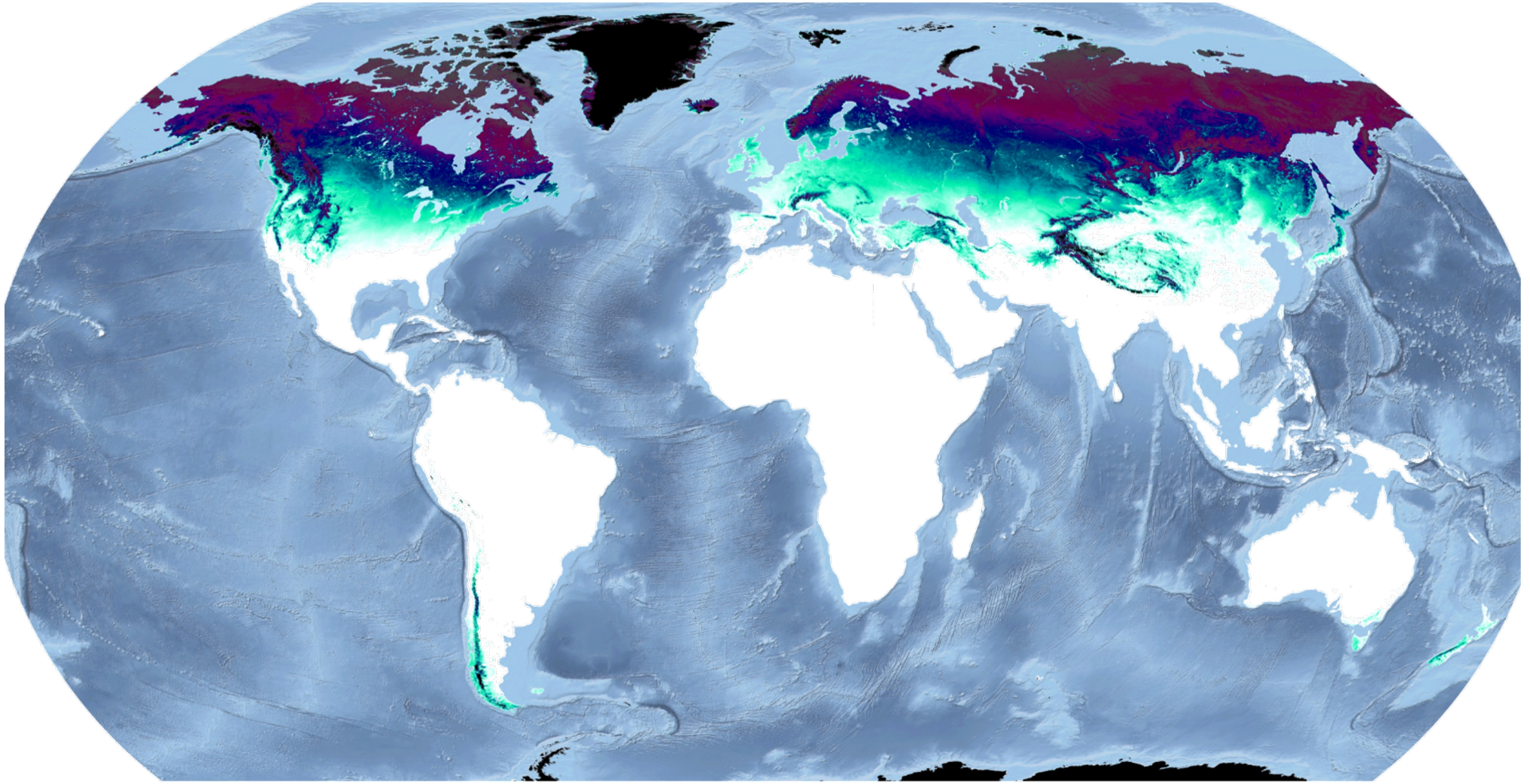


Data & Image Sources: DLR EOC

Example: DLR Global SnowPack Proc. Workflow



Example Result: DLR Global SnowPack



HPDA terrabyte project @ DLR

DLR Earth Observation Center

Leibniz-Rechenzentrum der Bayerischen Akademie der Wissenschaften

terrabyte

openEO actinia GRASS GIS kubernetes

- Pilot project -
World Settlement Footprint WSF

```python
import openeo

# First, we connect to the back-end and authenticate ourselves via Basic authentication.
con = openeo.connect("https://earthengine.openeo.org")
con.authenticate_basic("group11", "test123")

# Now that we are connected, we can initialize our datacube object with the area around Vienna
# and the time range of interest using Sentinel 1 data.
datacube = con.load_collection("COPERNICUS/S1_GRD",
                               spatial_extent={"west": 16.06, "south": 48.06, "east": 16.65, "n
                               temporal_extent=["2017-03-01", "2017-06-01"],
                               bands=["VV"])

# Since we are creating a monthly RGB composite, we need three (R, G and B) separated time rang
# Therefore, we split the datacube into three datacubes by filtering temporal for March, April
march = datacube.filter_temporal("2017-03-01", "2017-04-01")
april = datacube.filter_temporal("2017-04-01", "2017-05-01")
may = datacube.filter_temporal("2017-05-01", "2017-06-01")

# Now that we split it into the correct time range, we have to aggregate the timeseries values
# Therefore, we make [illegible] Client function "mean time", which reduces the time dime

# With the last process we have finished the datacube definition and can create and start the j

job = datacube.send_job()
job.start_and_wait().download_results()
```

Data & Image Sources: DLR EOC

Fragen?

http://se.informatik.uni-wuerzburg.de

http://descartes.tools