



Federal Agency for  
Cartography and Geodesy



# Delivering free, seamless, cloudless mosaic images of Europe to the world

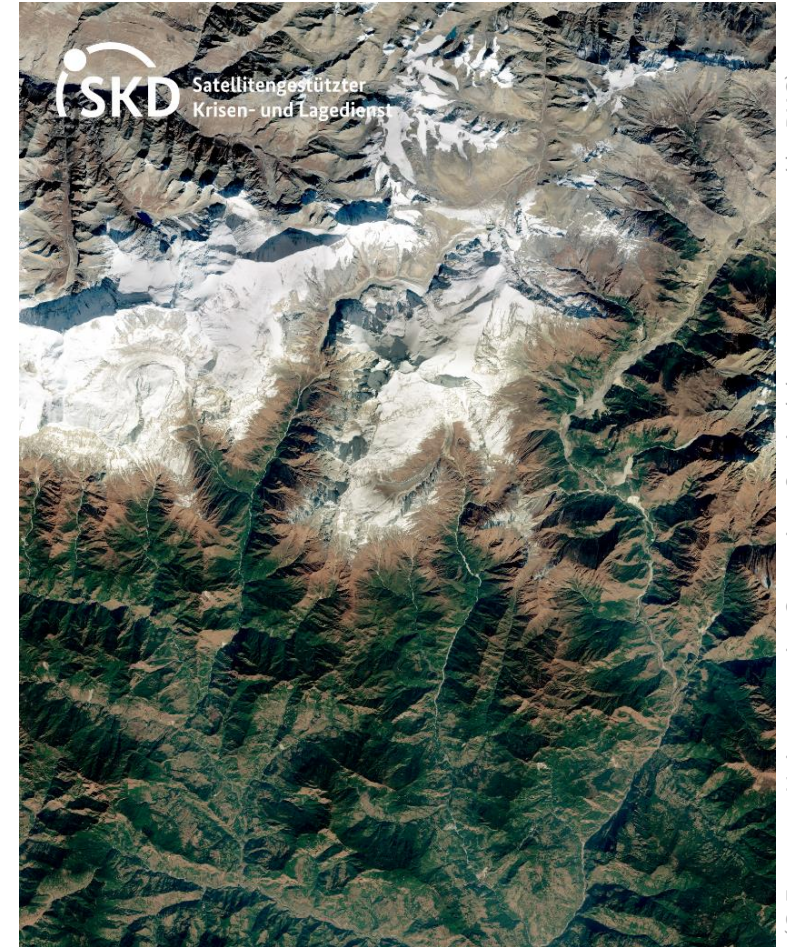
Thomas Wiatr

*EuroGeographics: Data Producer meeting (September 23, 2020)*



# What we want to tell you today is about:

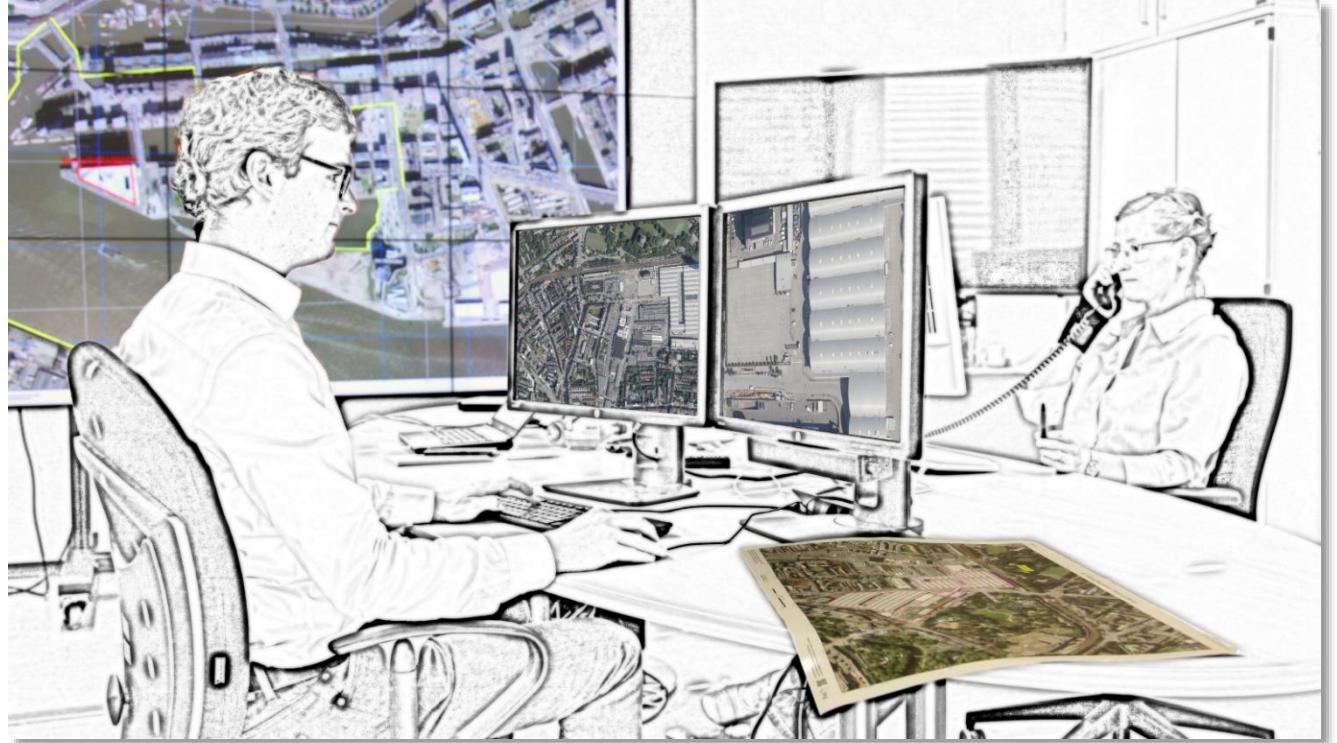
- The SKD remote sensing services
- Our motivation to produce mosaics
- Operational mosaic production
- Sen2Europe
- Insights into generation of Sen2Europe
- Future directions



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# Our unite at BKG: Satellite-Based Crisis and Spatial Information Service (SKD)

- We are **16 people** and the unite is dedicated to on-demand geospatial services for eligible users:
  - **Remote sensing**
  - **Mapping and map production**
- We have a **12 hours** and **7 day** standby availability
- All services are free of charge to Federal Agencies in Germany





# We use remote sensing data because ...

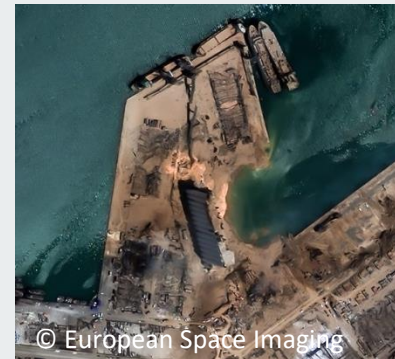
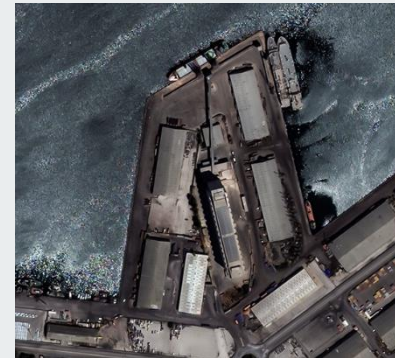
... can be used for various challenges.



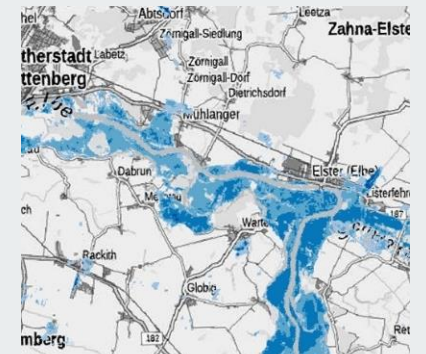
... the data can be available quickly.



... objective evaluation of critical situations is possible.

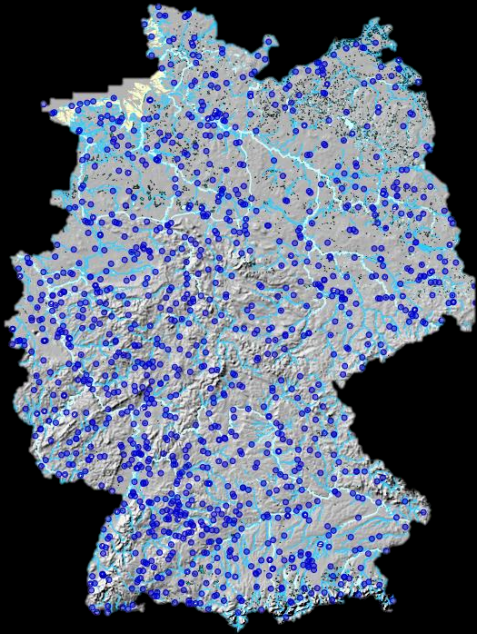


... can be used for further analysis



# We use Geospatial data – as an important basis

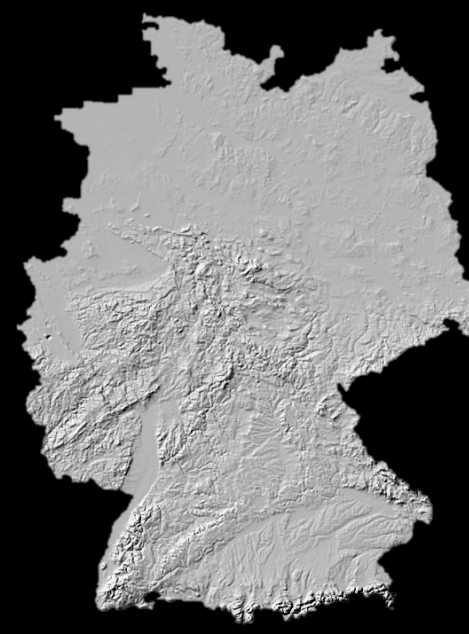
Infrastructure



Borders



Elevation model

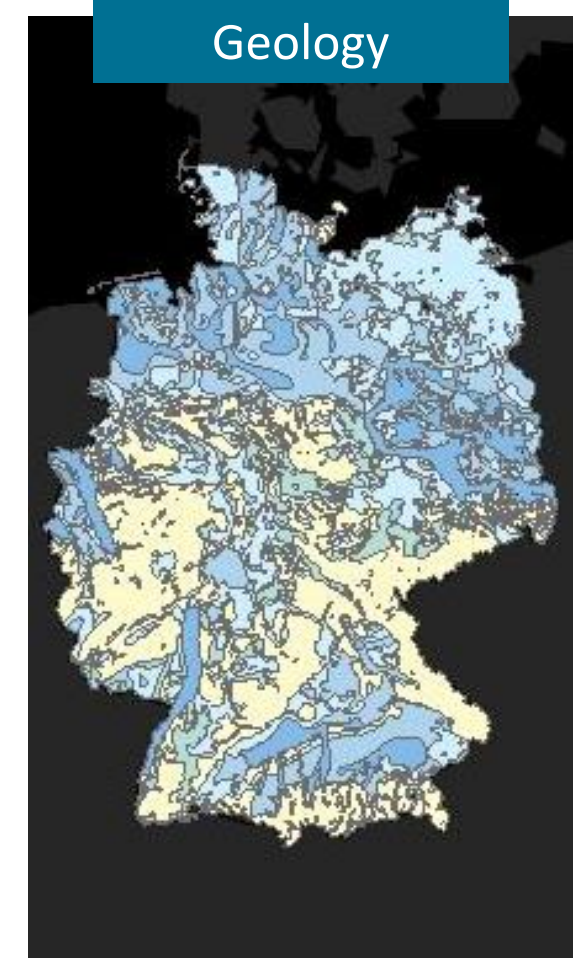
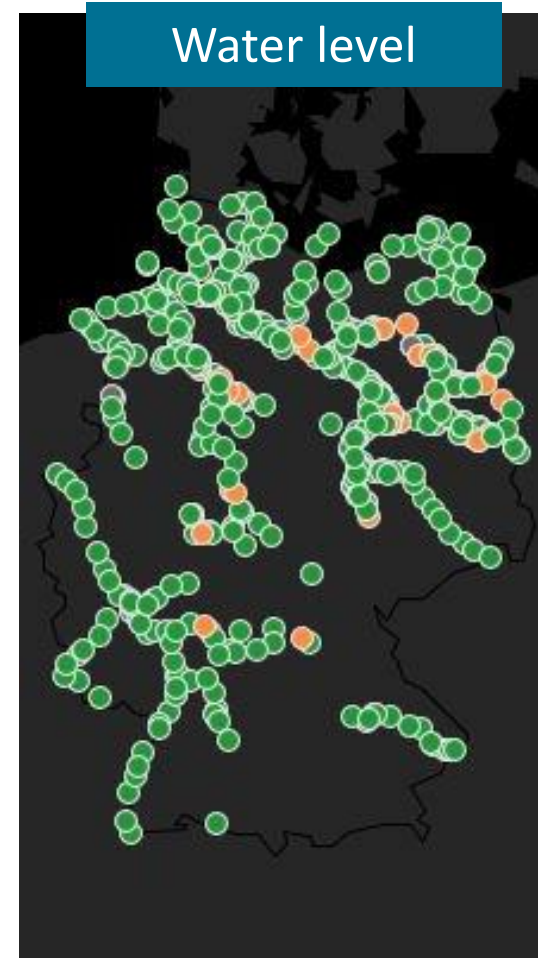
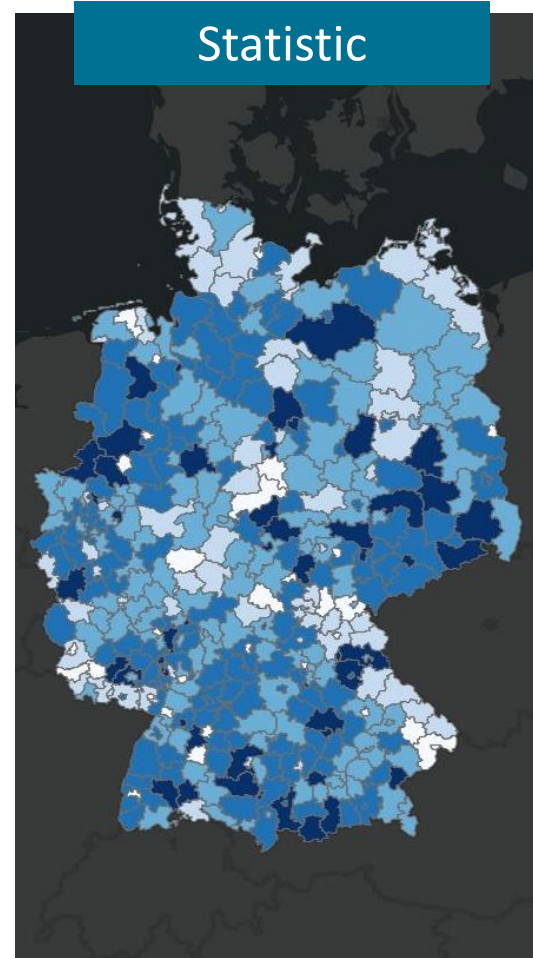
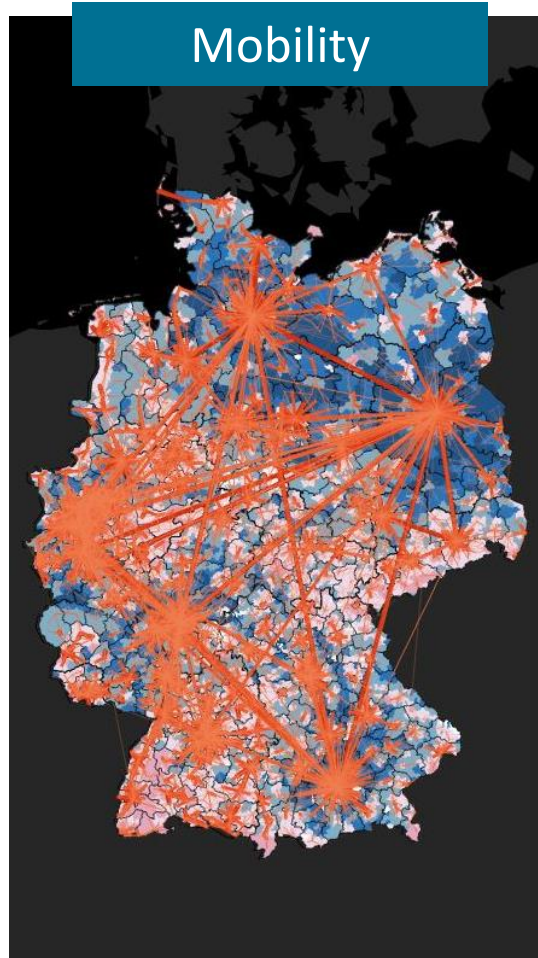


Aerial photos

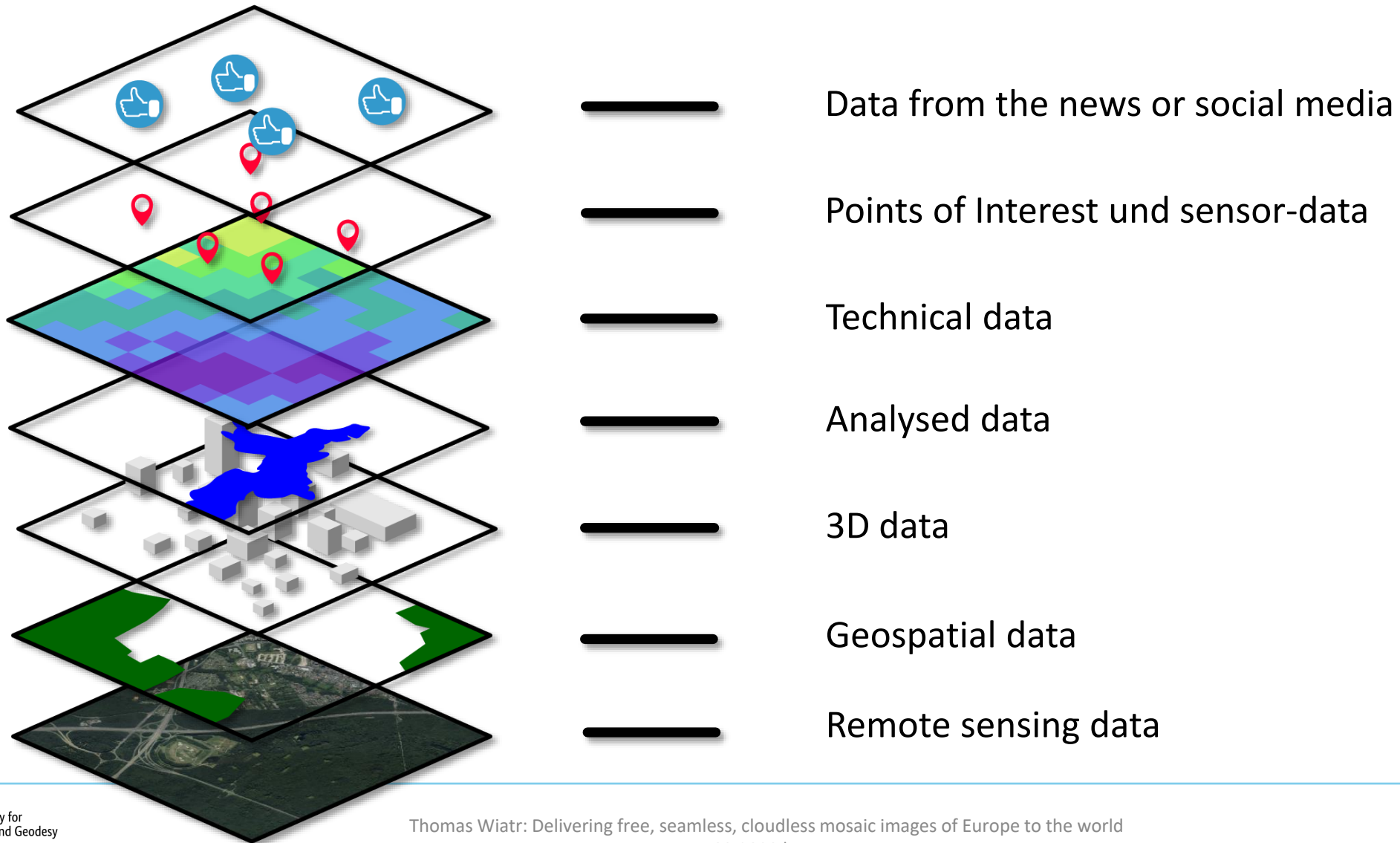




# We use technical data– as suitable addition



# Our philosophy of geo-intelligence is...



# A suite of remote sensing services

- The services of the **remote sensing part** includes:
- Rapid and responsive mapping system for individual on-demand products to special requirements, like **natural hazards, security** or **humanitarian health**
- **Creation of standard products** based on user requirements
- Trainings and knowledge transfer about **the potential of remote sensing**
- Consultation and user support for individual solutions

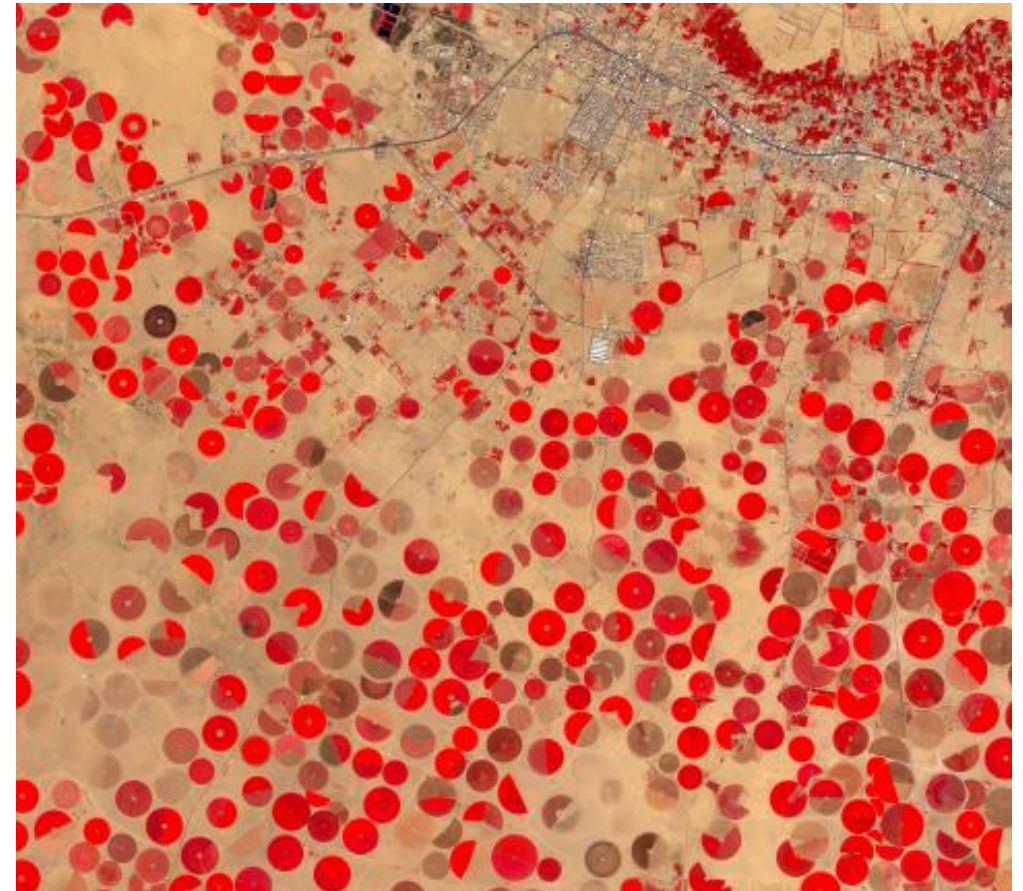
*Image processing is our **every-day's work**, because high-quality images are for us the basis for mapping and analysis products.*





# Our motivation: high-quality image deliverables and mosaics

- Copernicus data is **open** and **we want to use it**
- German (federal) **users demand high-quality** imagery and **mosaics**
- We **need showcases and best practice examples** of our mosaicking services
- High-quality mosaics as **uniform reference products** for mapping and visualization purposes

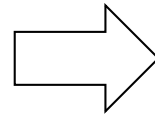


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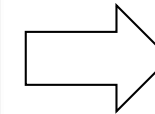


# Operational production of national mosaics at BKG

Sentinel2-DE 2018



Semi-automatic processing GUI



Sentinel2-DE 2019

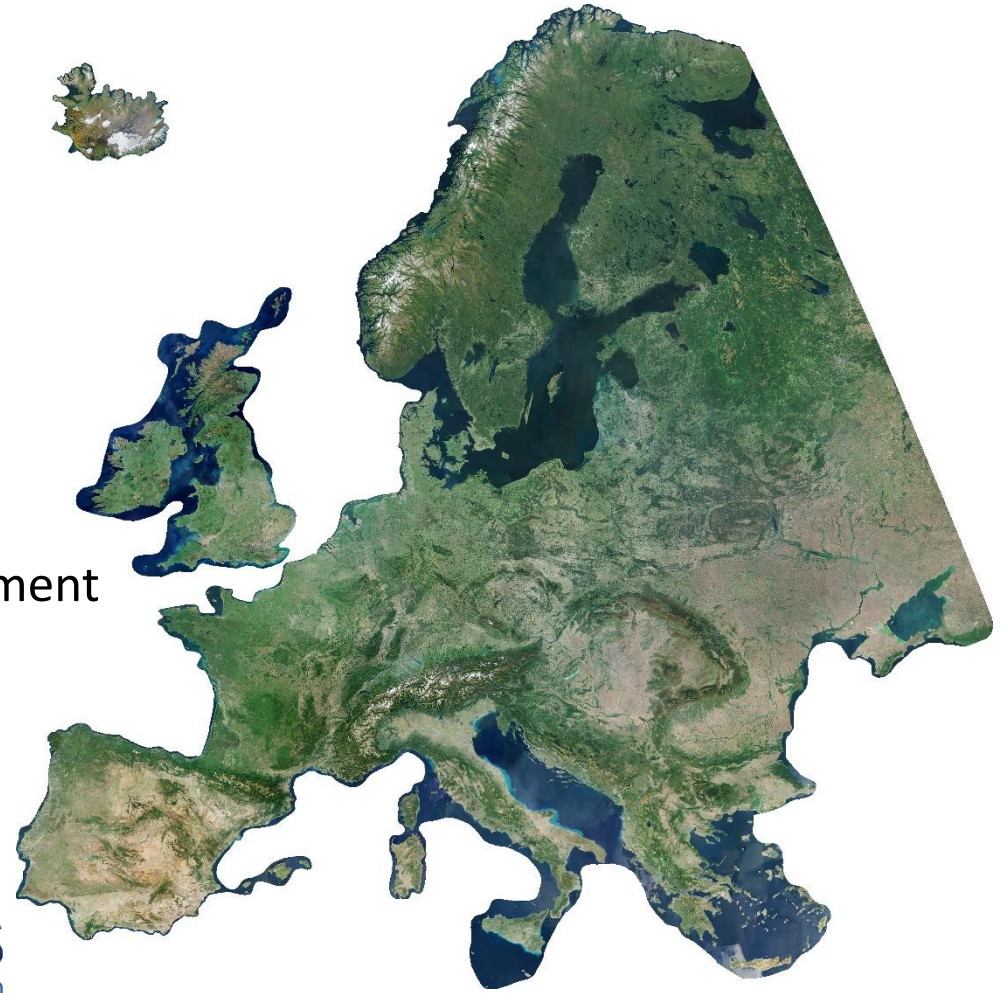


→ [https://sgx.geodatenzentrum.de/wms\\_sentinel2\\_de](https://sgx.geodatenzentrum.de/wms_sentinel2_de)



# Sen2Europe: a pan-European mosaic

- Harmonized **Sentinel-2** true-colour composite of **2018**
- **Mapping-/visualization ready** dataset
- *many objects and phenomena “do not stop” at country borders*
- **Open data** and **pan-European collaboration** as a commitment
- **Large-area processing**



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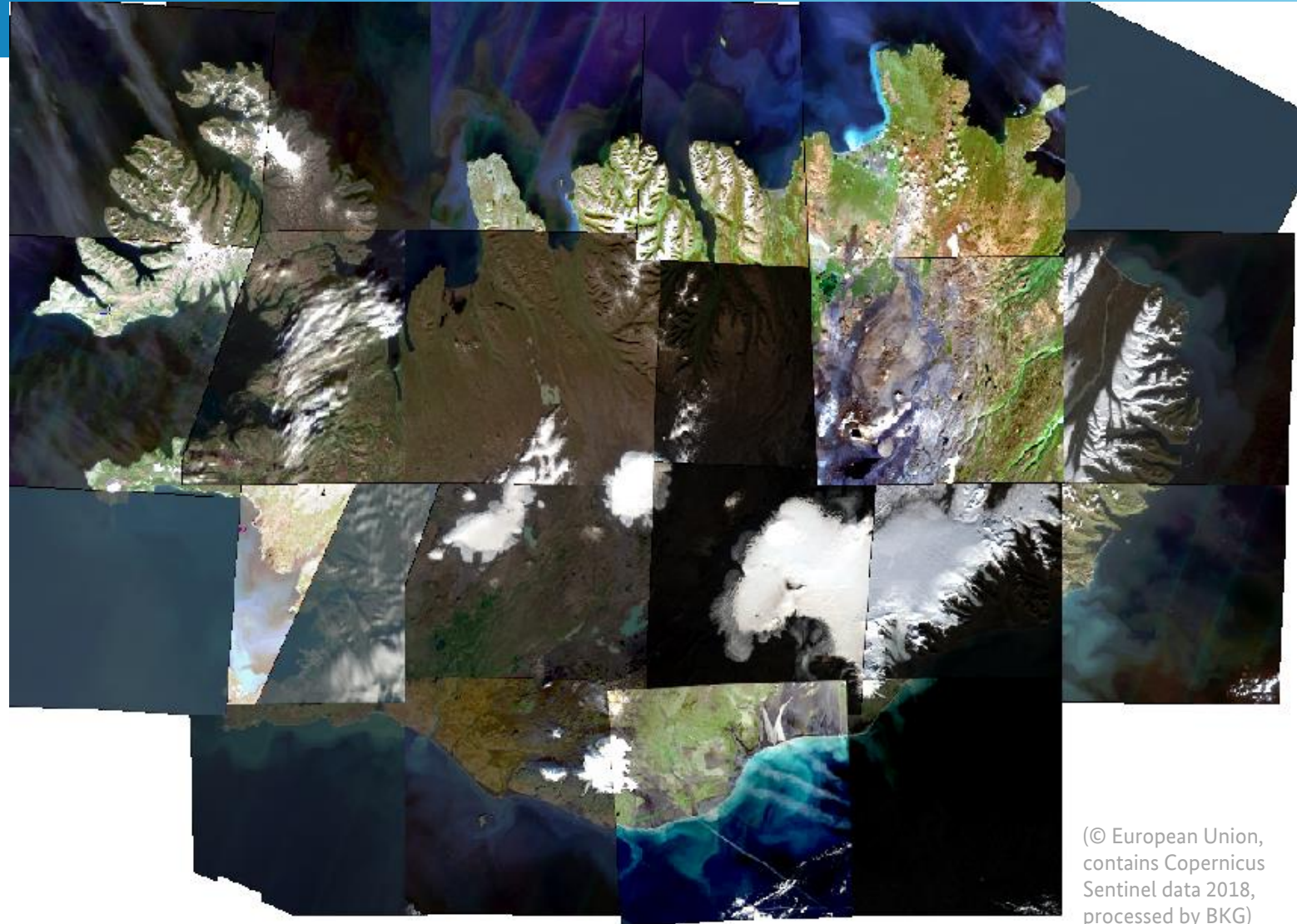


# Producing quality mosaics I

## Raw imagery (+ pre-processing)

e.g. Iceland:

- total area: 103000 km<sup>2</sup>
- (max. extent: 300 x 500 km)
- heterogeneous terrain
  
- 29 Sentinel-2 tiles:
  - 10m-resolution
  - full footprint: 100 x 100 km



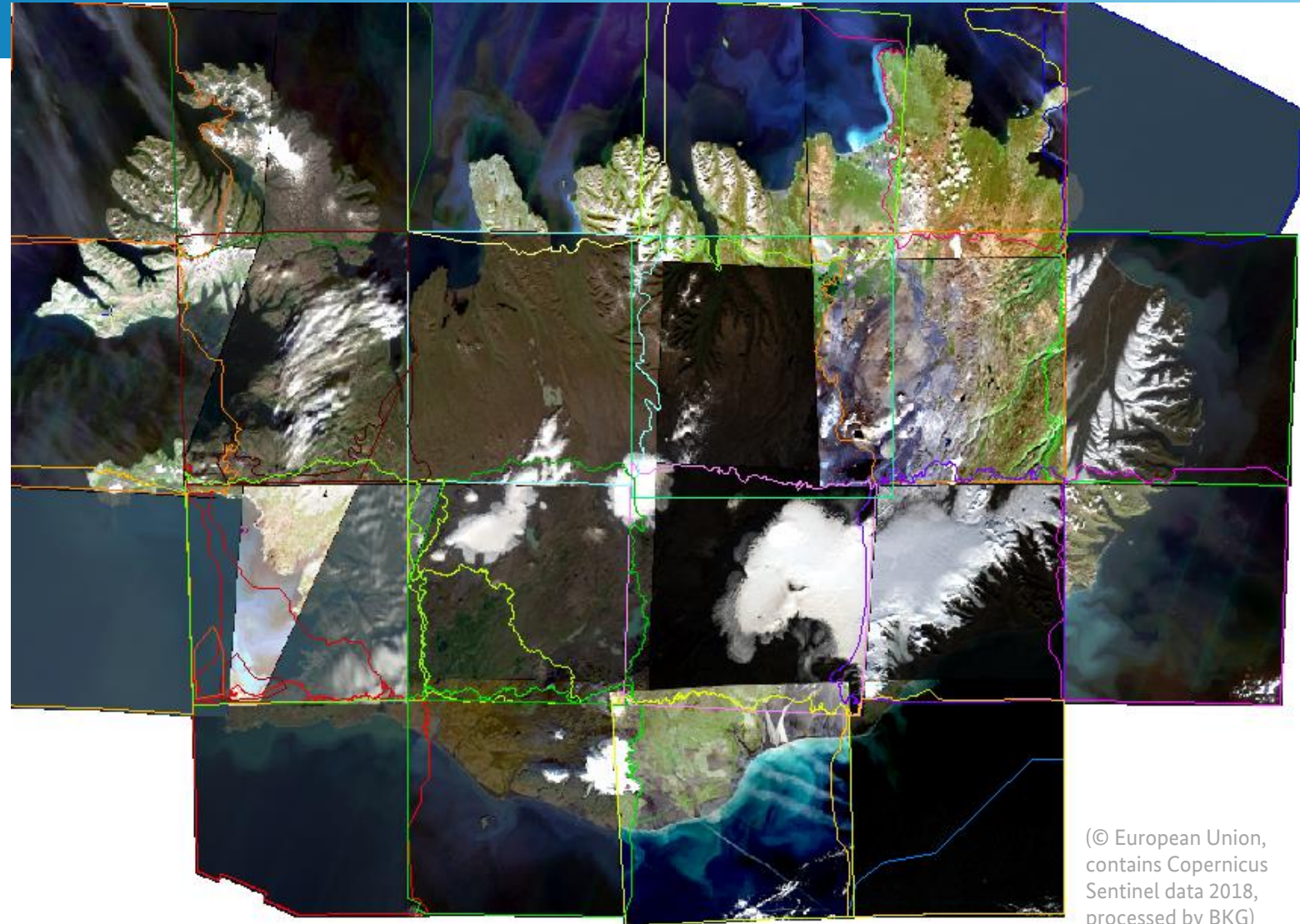
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# Producing quality mosaics II

## Cutline generation (automated and manual)

- Segment boundaries as input for in-depth image adjustment and harmonization

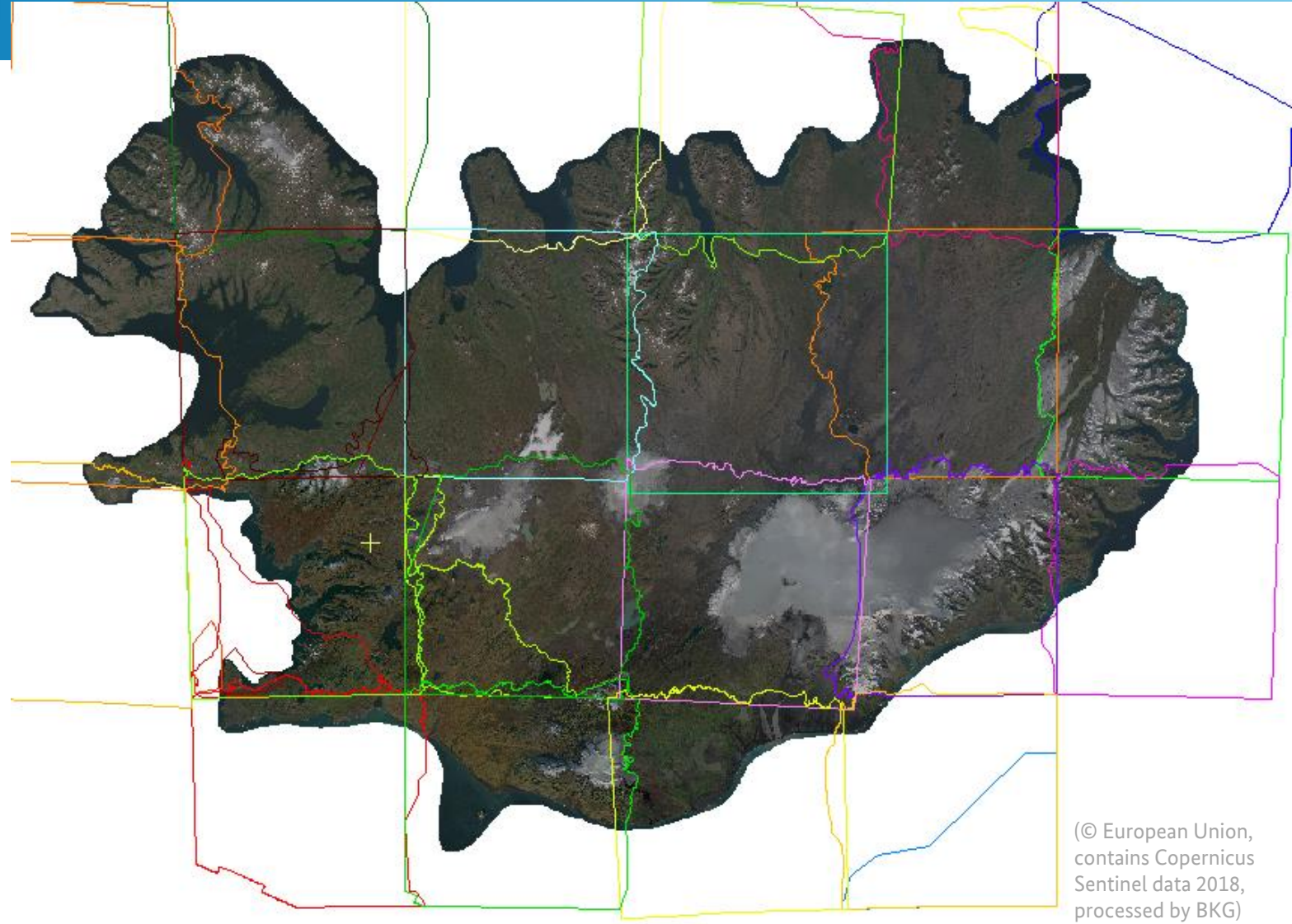


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# Producing quality mosaics III

## Radiometric harmonization

- Adjustment based on local compensation functions
- Accounts for radiometric variation between acquisitions
- „uniform appearance“

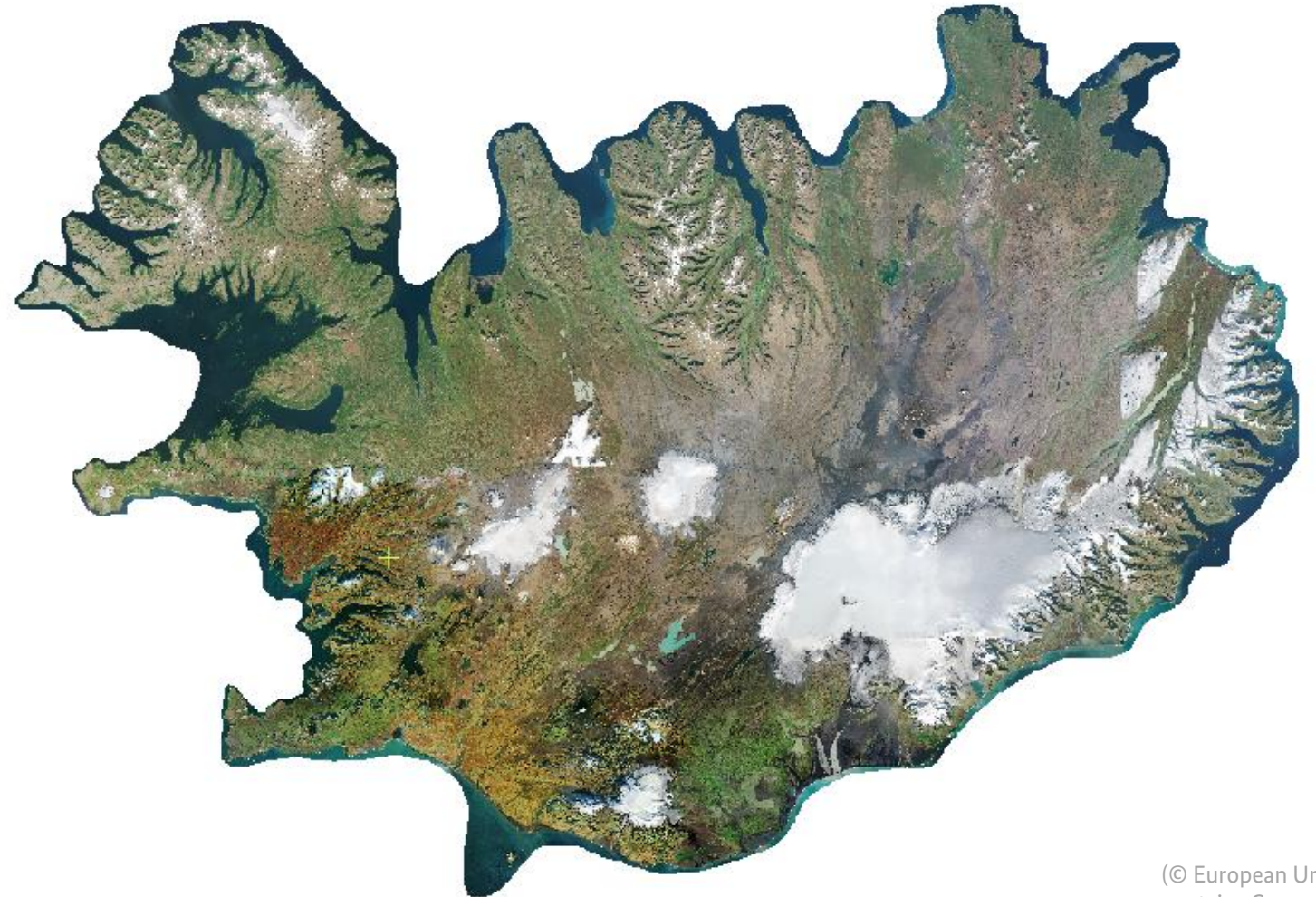


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## Global scaling

- Scale global histogram to local tiles (transformation to 8-bit)
- Manual quality checks
- Flexible tiling



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# Facts on BKG mosaics

>1 Mill.  
accesses  
within one year  
(Sentinel2-DE)

4  
libraries  
used within BKG  
mosaic software

1338  
input tiles  
(Sen2Europe)

0.9  
terabyte  
input data volume  
(Sen2Europe)

2 – 4  
weeks  
for production  
(Sentinel2-DE)

3 – 5  
band  
composite  
selectable

2  
persons  
developing and  
producing mosaics

8.3 Mill.  
sq. km<sup>2</sup>  
coverage area  
(Sen2Europe)

440,756  
km  
length of cutlines  
(Sen2Europe)



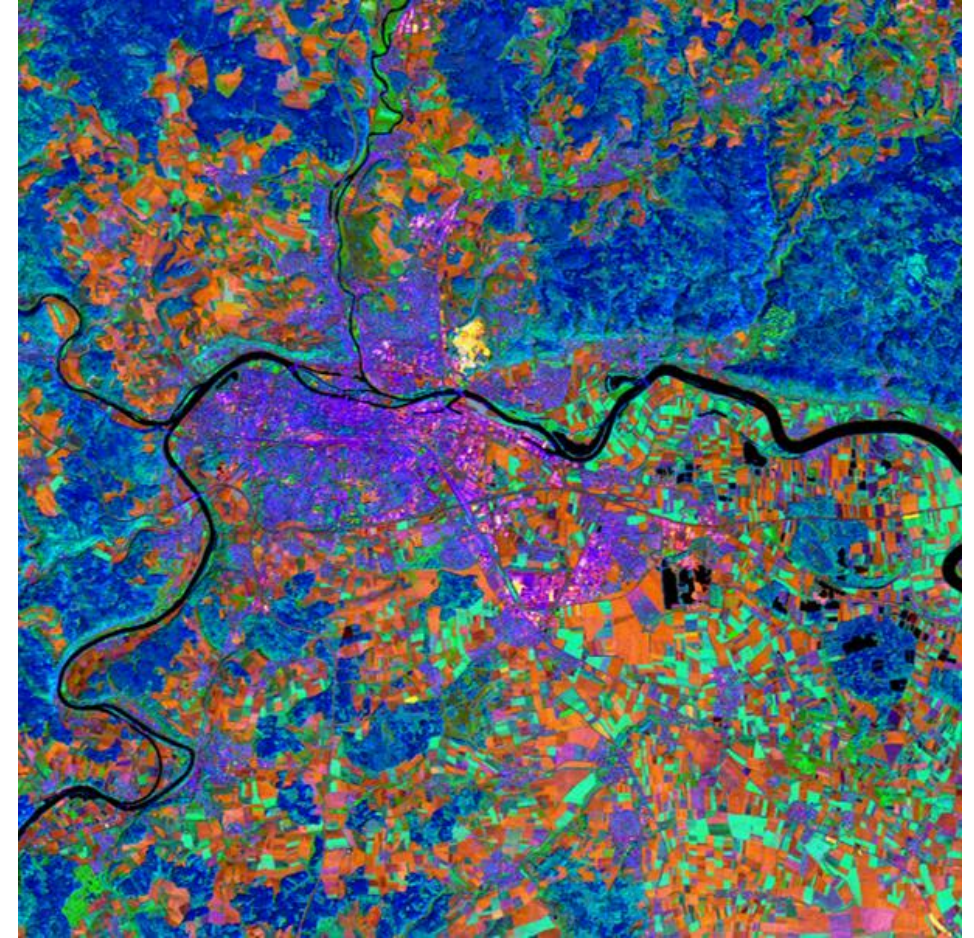
# Coming up

## Production

- **Sen2Europe 2018** production is finished (**publication** as open data WMS: **Autumn 2020**)
- Open data → Open products
- Kick-off of next annual mosaic production for Germany and for Europe we are in the considering process

## Development

- Evaluation of demand for **VHR** (Very-High-Resolution) mosaics of Germany (data and processing volume!)
- **Multi-sensor mosaics + multi-temporal composites**



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**We believe that pan-European open data products keep up the European idea - especially during these times**

**Thank you for your kind attention!**

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