



The research center for agricultural remote sensing (FLF)

a data source for agricultural information based
on Sentinel satellite data

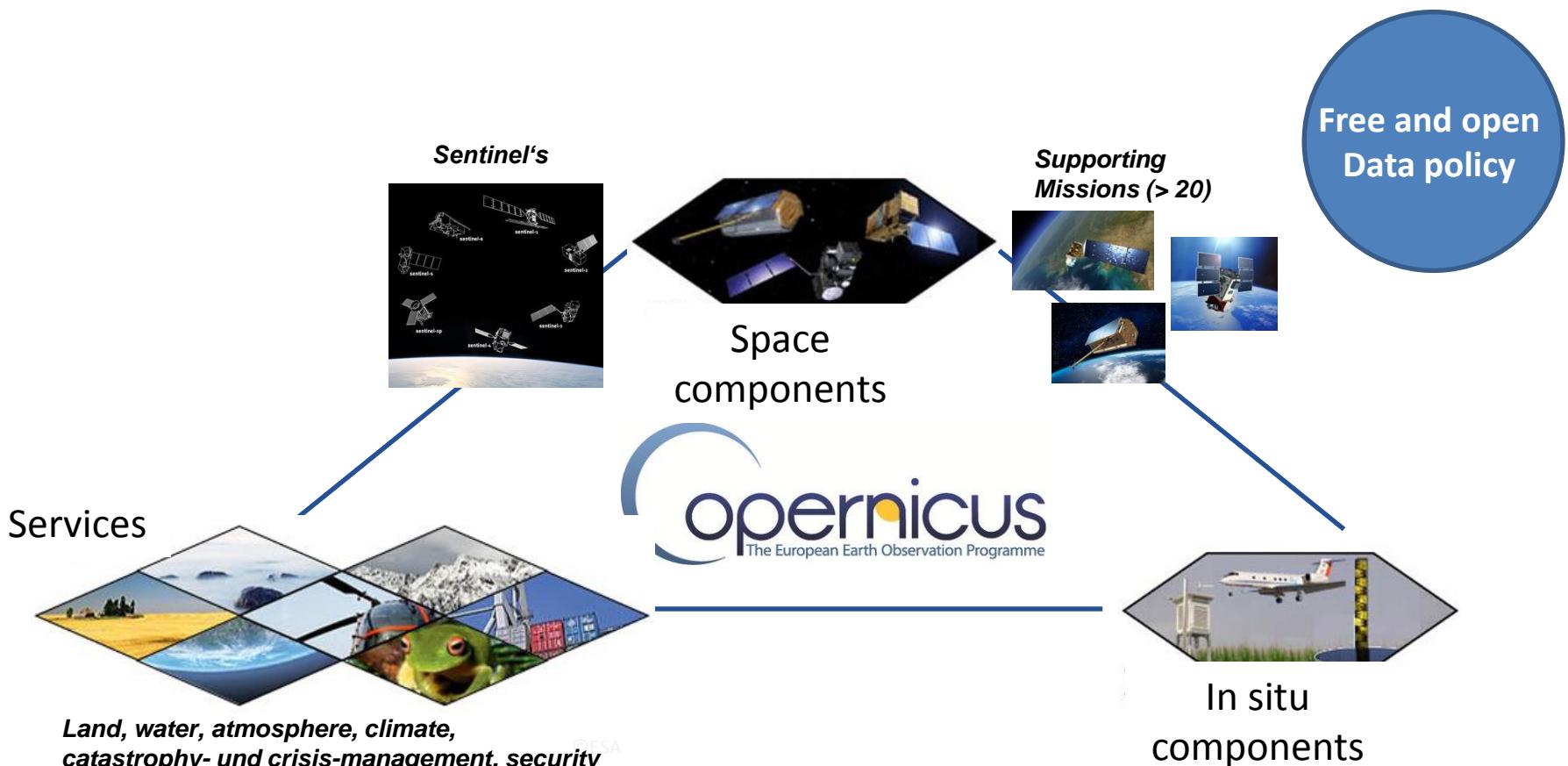
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Research Center for agricultural remote sensing

(Forschungszentrum für landwirtschaftliche Fernerkundung (FLF) am JKI)

Copernicus Programme



Land, water, atmosphere, climate,
catastrophe- und crisis-management, security

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Sentinel Satellites

S1A/B: Radar Mission (C-Band)

(SAR, Interferometry und Polarimetry.)



3. April 2014/
25. April 2016

S2A/B: High resolution optical Mission

(Land, Vegetation, Water)



23. Juni 2015/
6. März 2017

S3A/B: Mid resolution optical Mission and Altimetry

(Land and Oceans)



16. Februar 2016/
End 2017

S4A/B: Payload on geostationary Meteosat Third Generation (MTG)

(Monitoring of trace gases in atmosphere)

2021/2027

S5P: Precursor LEO Mission

(Atmosphere)

Sept. 2017

S5A/B/C: LEO Mission on MetOp Second Generation

(Chemical composition of Atmosphere)

2021/2027

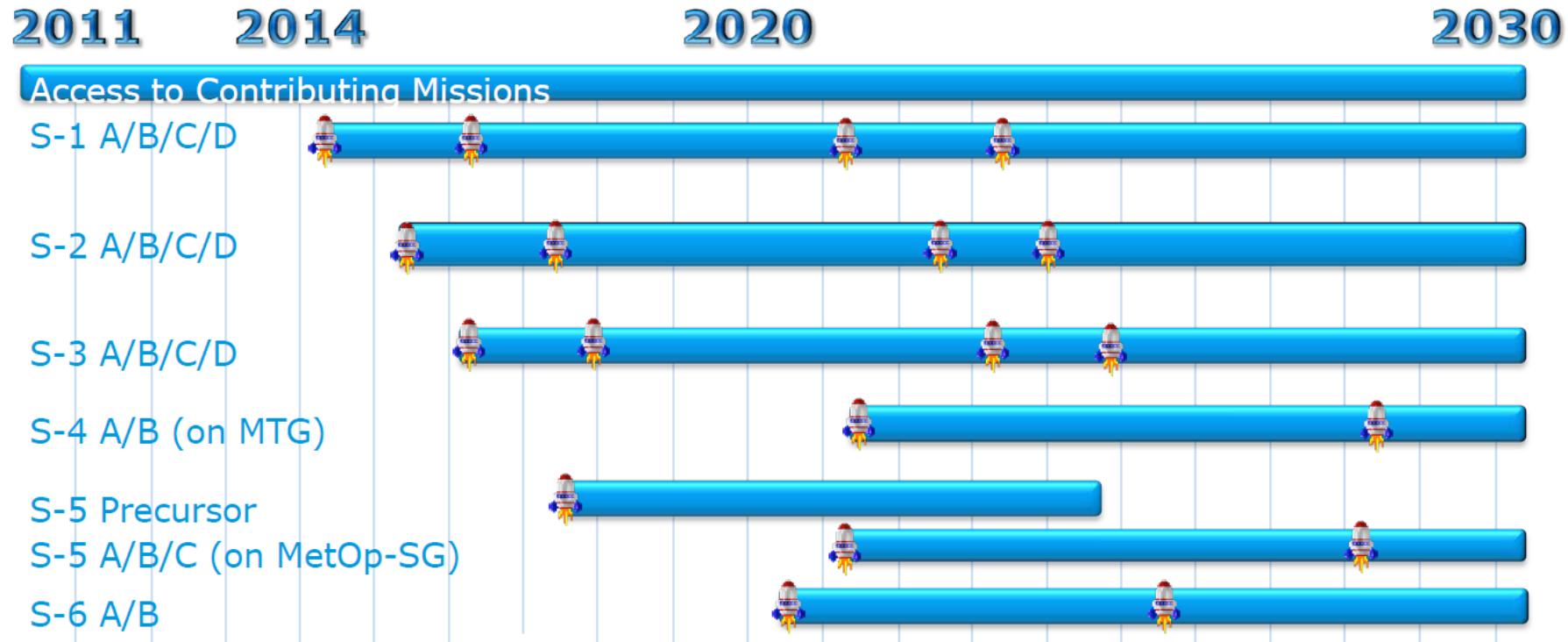
S6A/B: Altimetry Mission

2020/2025

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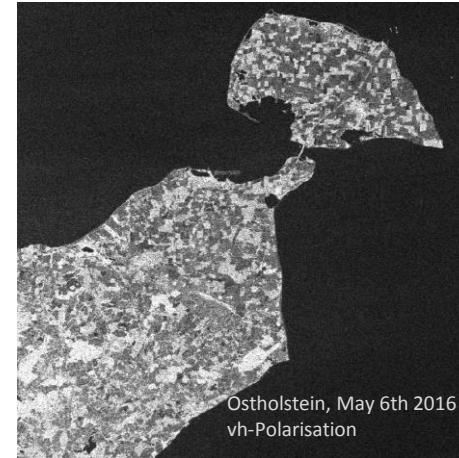
Sentinel Satellites



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Sentinel-1 A/B



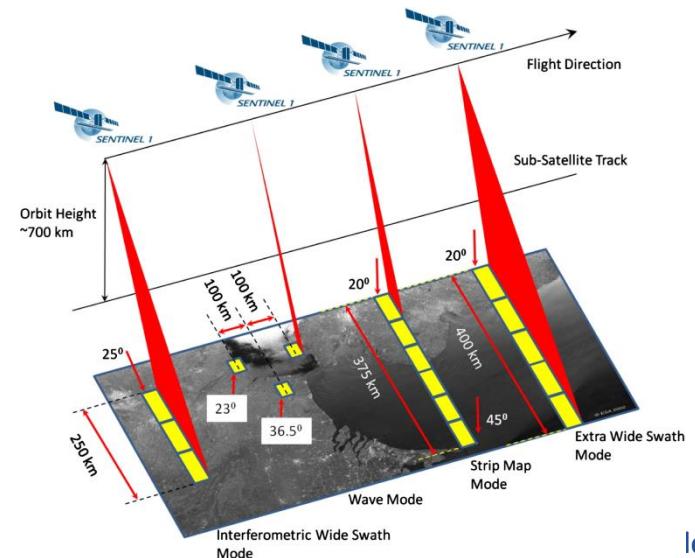
Active Radarsystem: C-Band SAR (5cm, 5.4GHz)

Measured variable: Backscatter

Polarisation: 2 Modi (VV+VH, HH+HV)

Record mode: *Interferometric Wide Swath* (IW)

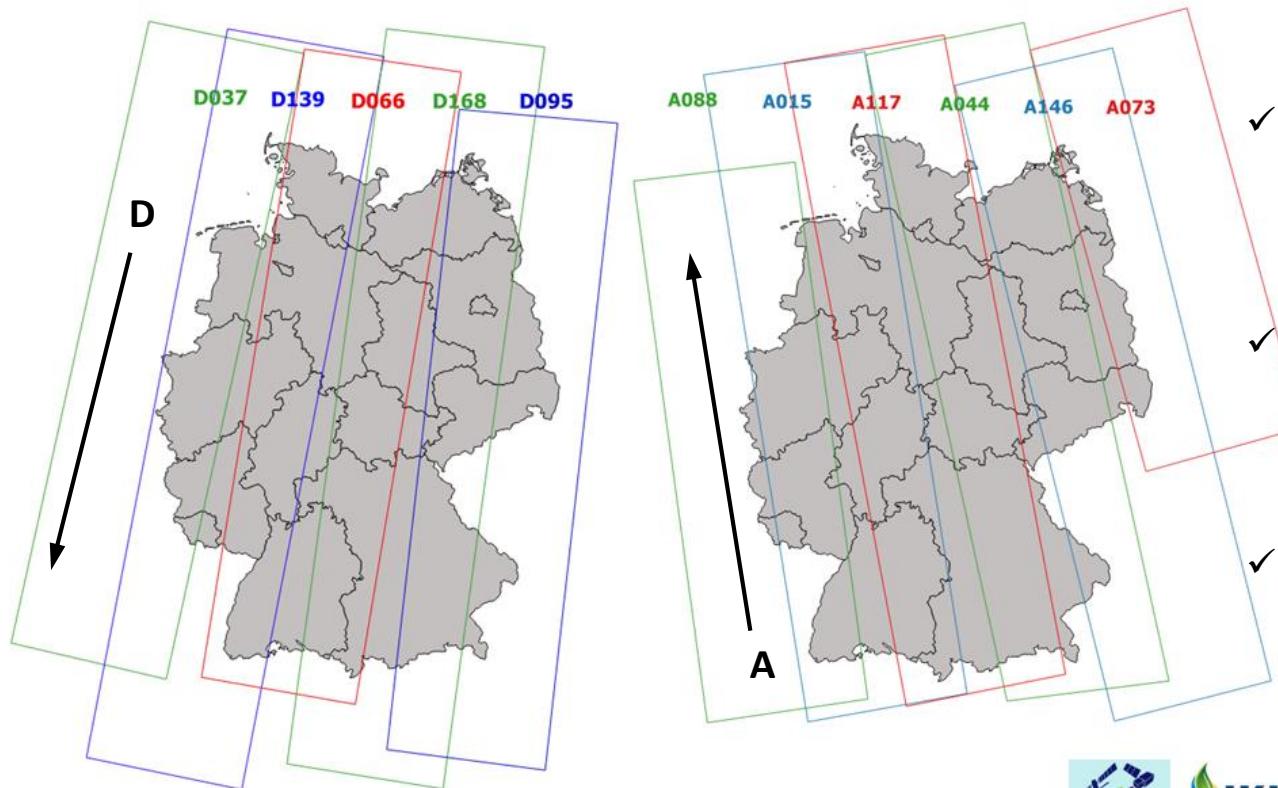
- ✓ **Swathwidth: 250km**
- ✓ **Spatial Resolution: 5x20m (10m)**
- ✓ **Repetitionrate (A/B): 6 Days (at equator)**



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Sentinel 1A/B – Tracks covering Germany (overlapping!)



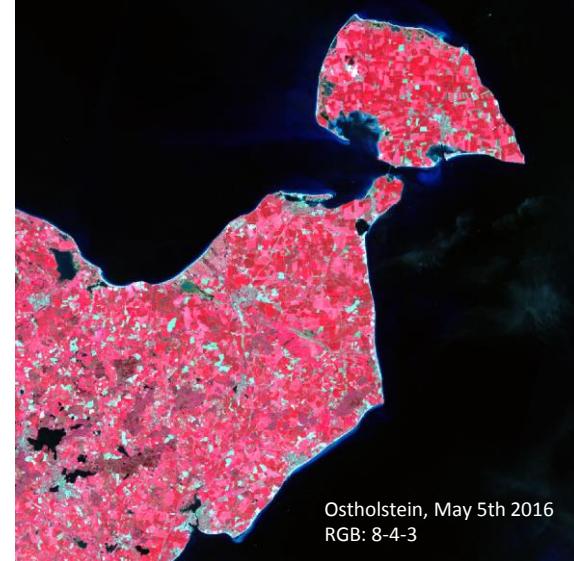
- ✓ Independent on illumination, “Ascending” (A) und “Descending” (D) Modus
- ✓ Almost independent on weather (cloud and rain up to 5 mm), security of data availability
- ✓ Germany coverage ca. 45GB (one date!)

	D 037	D139	D066	D168	D095		A 088	A015	A117	A044	A146	A073
	$t_0; t_0 + 6$	$t_0 + 1$	$t_0 + 2$	$t_0 + 3$	$t_0 + 4$		$t_0 + 3$	$t_0 + 4$	$t_0 + 5$	$t_0; t_0 + 6$	$t_0 + 1$	$t_0 + 2$
GB*	6,6	8,25	9,9	9,9	9,9		4,95	8,25	9,9	9,9	5,28	4,95

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Sentinel-2 A/B



Passive optical System: Sun = Illumination

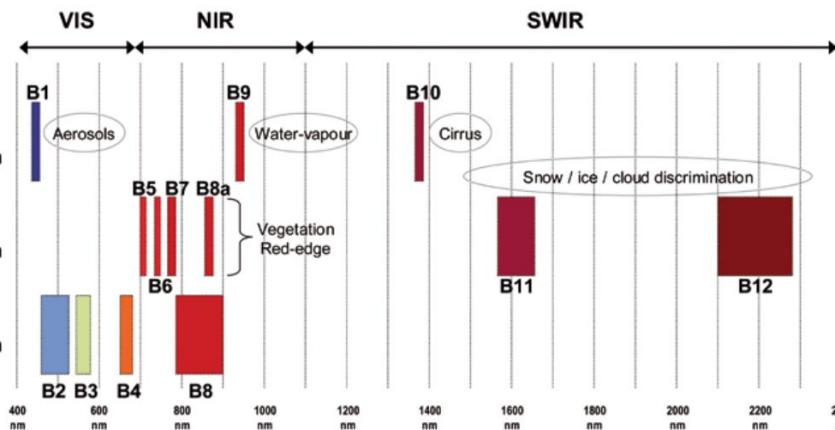
Measured variable: Reflexion

Swathwidth: 290km

Spectral Resolution: 490-2190nm, 13 (10) Bänder

Spatial Resolution: 10m (4), 20m (6), 60m (3)

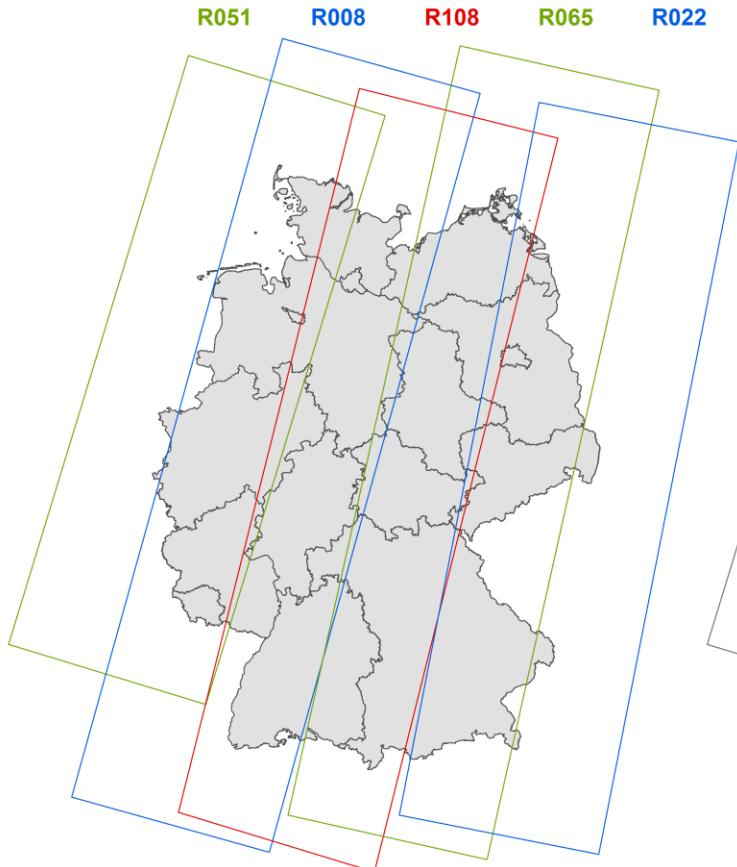
Repetitionrate (A/B): 5 days (at equator)



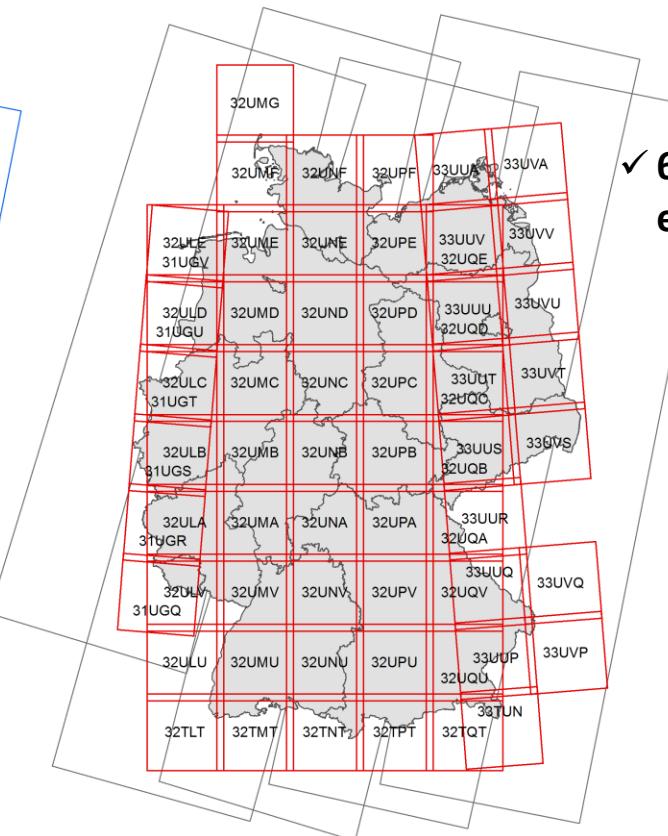
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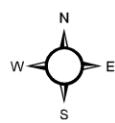
Sentinel 2A/B - Tracks covering Germany (overlapping!)



R051	R008	R108	R065	R022
$t_0; t_0 + 5$	$t_0 + 2, t_0 + 7$	$t_0 + 4, t_0 + 9$	$t_0 + 1, t_0 + 6$	$t_0 + 3, t_0 + 8$



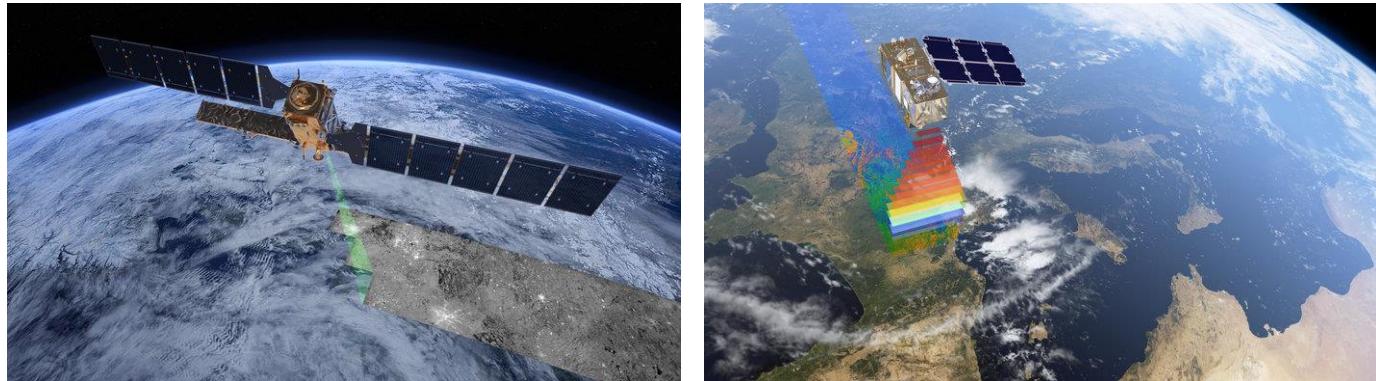
✓ 67 tiles cover Germany,
each ca. 2.5GB



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Background

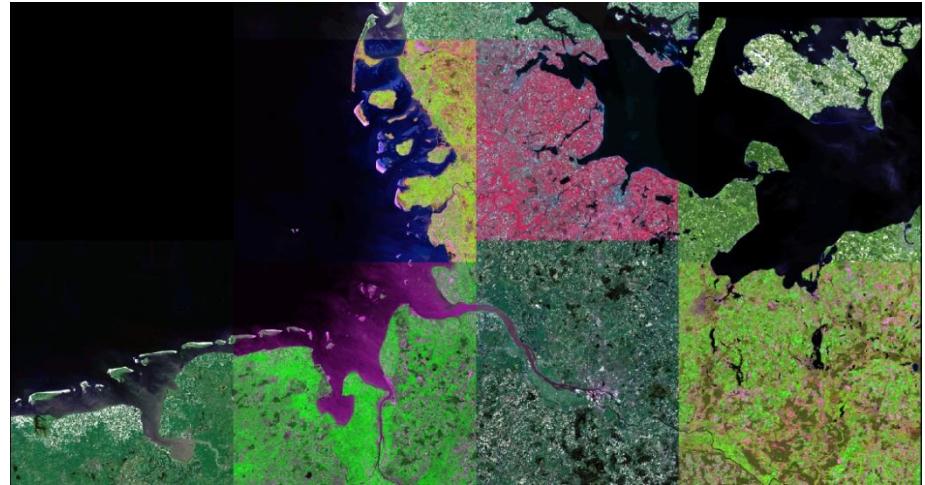


- EU Copernicus Programme provides satellite imagery with high spatial and temporal resolution
- Long-term financing and planning security (successors for 2037 already in planning phase)
- "Open data policy" - raw data and software tools available free of charge
- Germany is recorded every 1-2 days by imaging radar and every 2-3 days by optical satellites
- Emerging raw data volumes for Germany several TB per year

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Challenges



- After preprocessing, analyses and interpretation, the data are of considerable added value for a multitude of research questions of the Julius Kühn Institute, the Department institutes of the ministry of agriculture and federal state authorities

but:

- No budget for skilled personnel for data interpretation is neither available in several authorities, nor the technical infrastructure to process the data.
- The federal structure of Germany requires a central interpretation and analyses of the data so that the results remain standardized and comparable between the federal states.
- The governmental and federal authorities need information, not raw data!

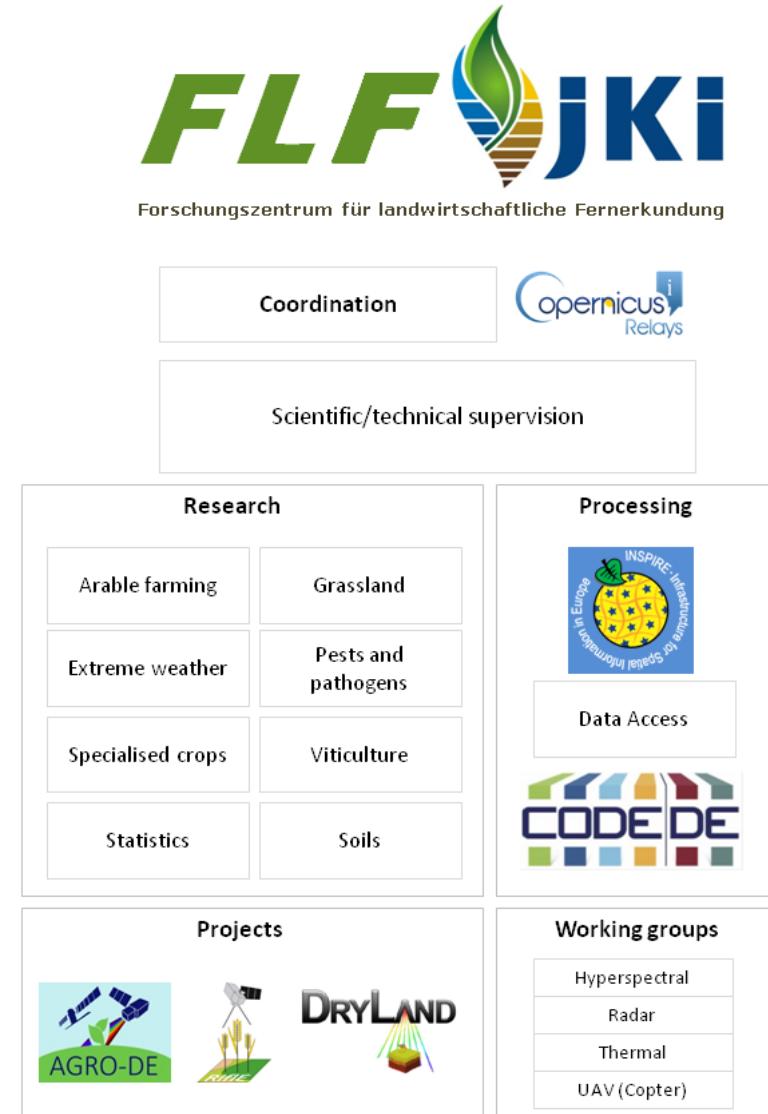
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Tasks

- The FLF is the competence center for remote sensing within the JKI and contact point for their specialized institutes as well as other research institutions and authorities.
- Creation of up-to-date agricultural geo-information for the research questions of the JKI institutes as well as for advice and reporting to BMEL.
- Operationalise of results and methods from third-party funding projects (e.g. DryLand, RifLE, AGRO-DE, Sattgrün, TimeStamp...).
- Participation in working groups and panel boards (e.g. Copernicus Relay, Inspire, COST Action).

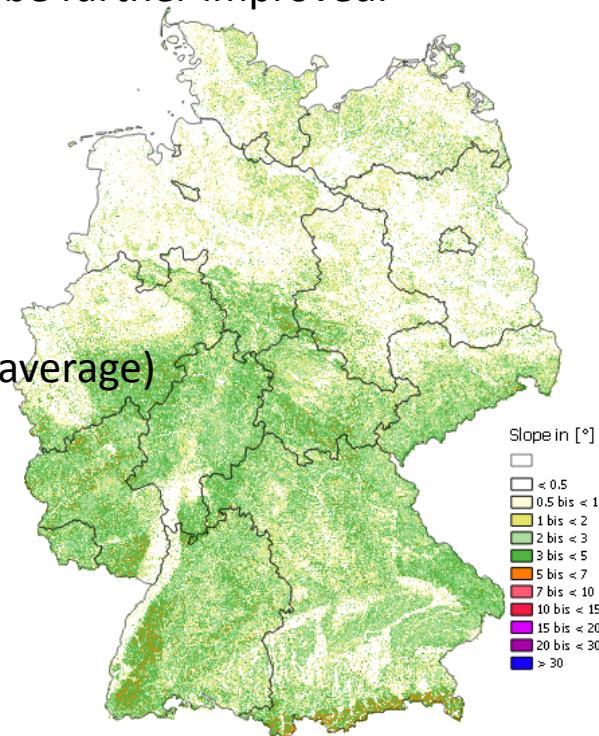
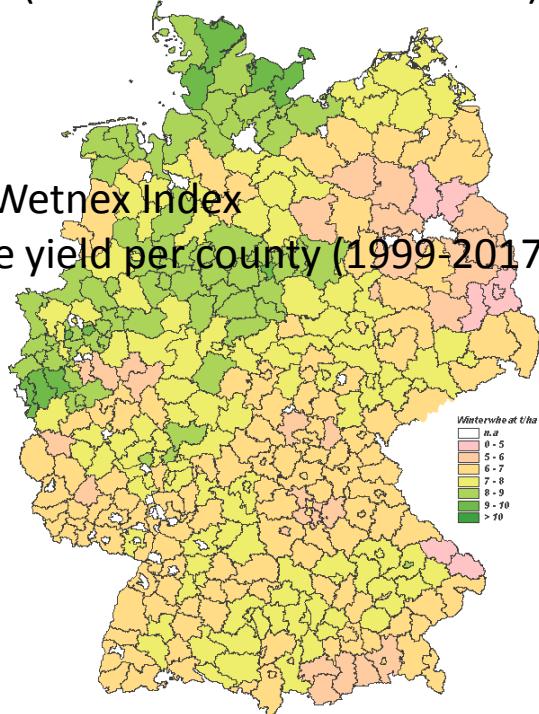


Products

- The FLF is **not** a provider for raw data or processed Level-2 data (research institutes excluded)!
- A variety of data products is in development and will be further improved.

Statistical base data (not based on Sentinel data):

- Slope
- Aspect
- Insolation
- Topographic Wetness Index
- Mean average yield per county (1999-2017, 3 year average)



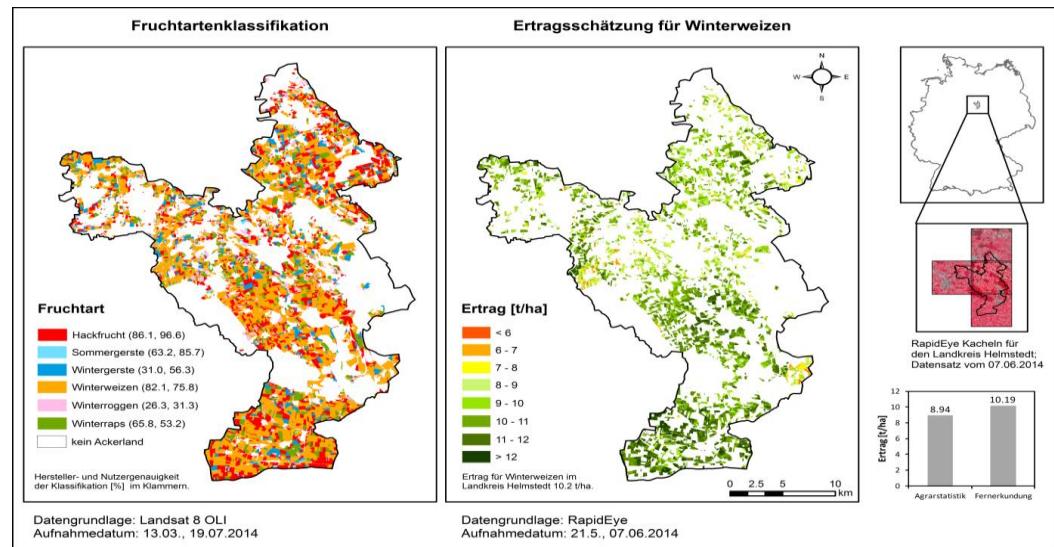
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Products

Current data (based on Sentinel data):

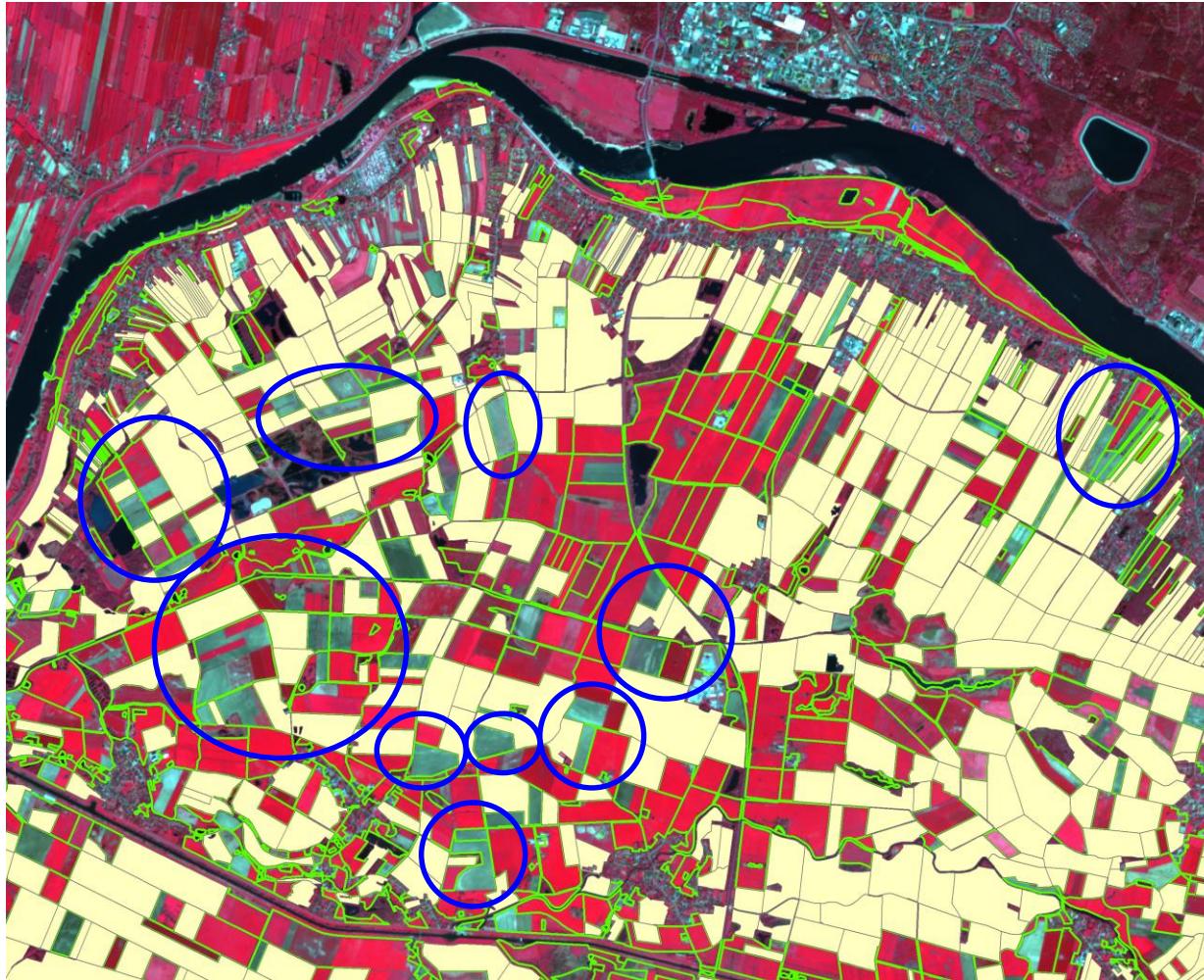
- a) Crop type classification
- b) Crop rotation
- c) Grassland monitoring
- d) Erosion modelling



Dynamic data (based on Sentinel data):

- a) Yield potential estimation
- b) Vegetation parameters (biomass, leaf area index, Chlorophyll content)
- c) Phenology (Growing degree days)

Conversion of grassland



Sentinel-2 from 5.5.-8.5.2016; CIR RGB 8-4-3



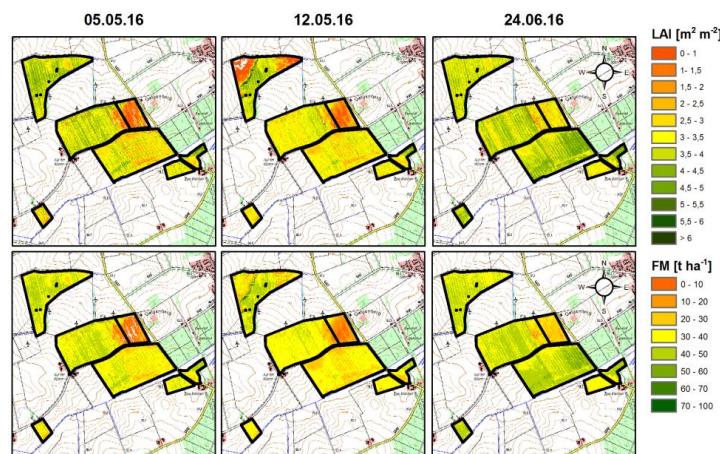
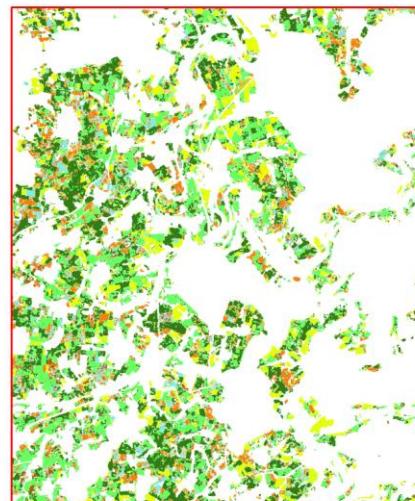
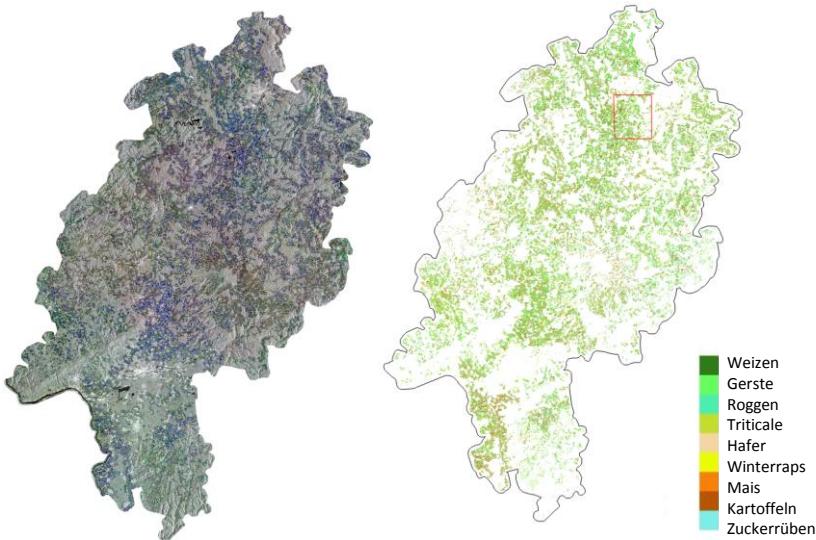
Cropland
Grassland

Vegetation : „red“
Bare soil: „blue-grey“

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Crop type classification



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Data access

- The FLF is will distribute the geodata via the JKI geoportal

<http://geoportal.julius-kuehn.de/>

and via WebMap Services (WMS, WFS...). Official launch for the prototype will be at



Internationale Grüne Woche Berlin
19.-28. Januar 2018

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Thank you for your attention
Questions?

Contact:

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