New technologies from space to support mapping and monitoring of potential wetland areas

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Territorial Ecosystem Connectivity

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Aim

- **Mapping and Monitoring** of **water and wetness** dynamics using **Sentinel-2** multitemporal data for the whole BalkanMed translational territory (Bulgaria, Greece, FYROM, Albania and Cyprus)

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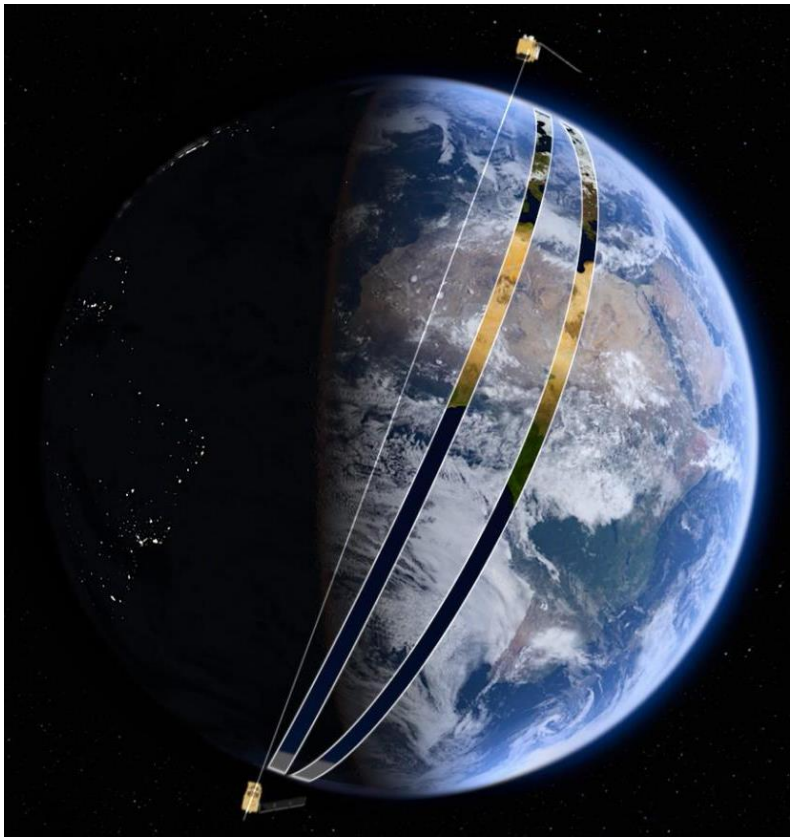
Sentinel-2A & -2B

- Operated by the **European Space Agency**.
- Part of EC's **Copernicus Programme**.
- Constellation of two **identical** polar-orbiting satellites
- Acquires new images every **5 days** at the Equator
- Acquires **multispectral** data



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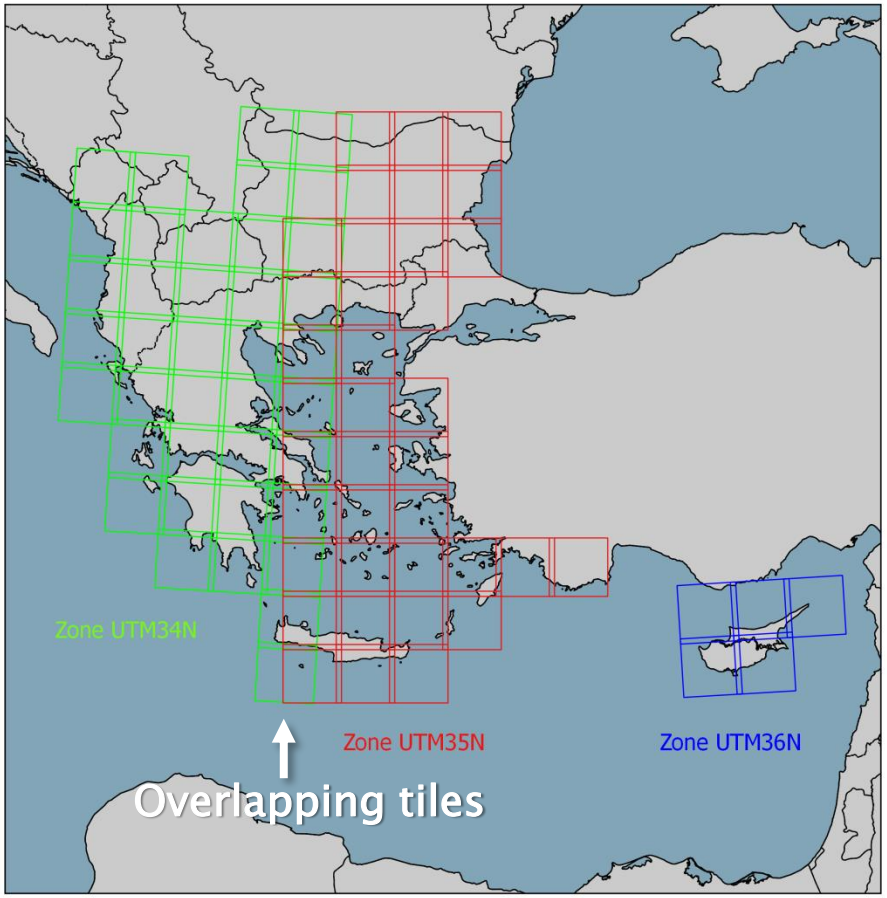
Spatial Coverage of the S2 tiles used in WetMainAreas

- **82 tiles** cover the five countries.
- UTM zones: **34N**, **35N** & **36N**

UTM zone	Tiles including only land	Tiles including land & sea
34N	12	27
35N	7	31
46N	0	5



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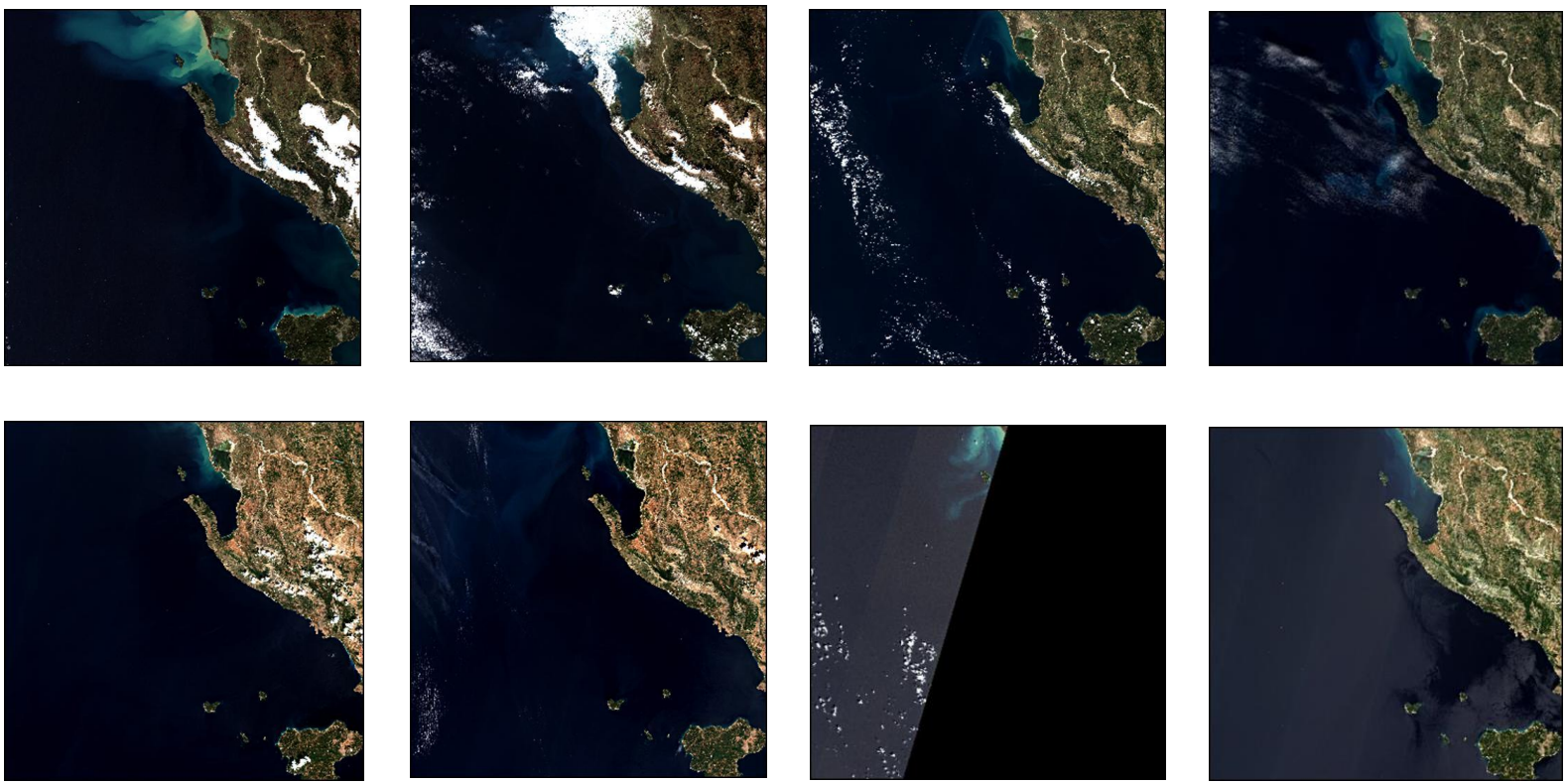
Temporal Coverage: 2017 & 2018

Tile: 34TCK



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Example of an incomplete tile

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Workflow Overview – Mapping

1. Retrieve the Sentinel-2 dataset.
2. Data pre-processing: mask the sea

$$MNDWI = \frac{\rho_{Green} - \rho_{SWIR}}{\rho_{Green} + \rho_{SWIR}}$$

[range: -1 to 1]

3. Estimate the MNDWI for each image of the S2 time-series
4. Retrieve the **Water and Wetness Mask** from the MNDWI time series
5. Export the Mask as GeoTiffs.

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Water & Wetness Masks

- For each tile, based on the MNDWI, Open water and Wetness **masks** are calculated:

if
MNDWI > 0.5
then
OPEN WATER

if
0.35 < MNDWI < 0.5
then
WETNESS

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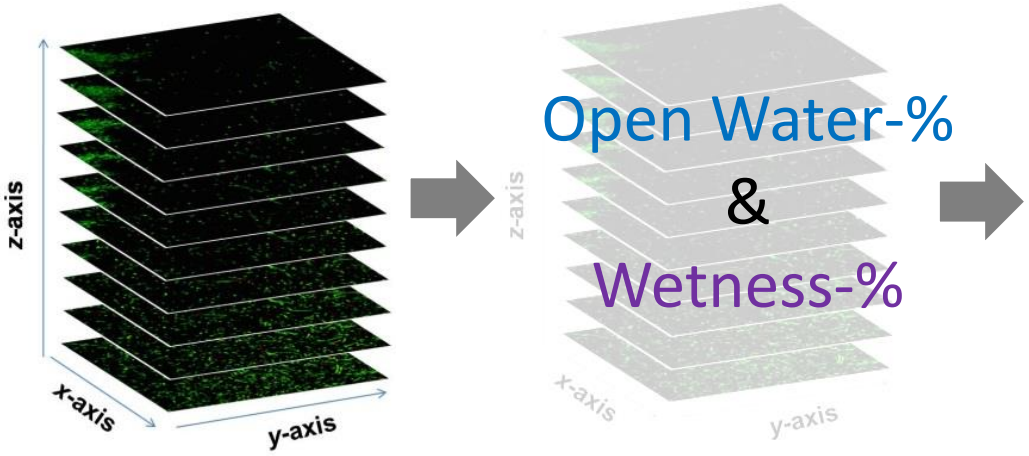
Water & Wetness Temporal Frequency

Step 1:

Data Stacking

Step 2:

Calculate the relative Frequency per pixel of



Step 3:

Apply Rules

OW: Open Water | W: Wetness

Rule	Description	
OW>85%	Permanent Water	1
50%<OW<85%	Seasonally Flooded Areas	2
25%<OW<50%	Intermittently Flooded Areas	3
W>75%	Permanently Wet Areas	4
25%<W<75%	Temporary Wet Areas	5

Source:
Fitoka, Eleni; Apostolakis, Antonis; Truckenbrodt, John; Tompoulidou, Maria. Mapping of water permanence and fluctuations for updating the Ramsar Information Sheets using optical and radar data: A case study for two Greek Ramsar Sites and their catchments. Mapping water bodies from space 2018, European Space Agency–ESRIN. POSTER. **DOI:10.13140/RG.2.2.36068.07042**

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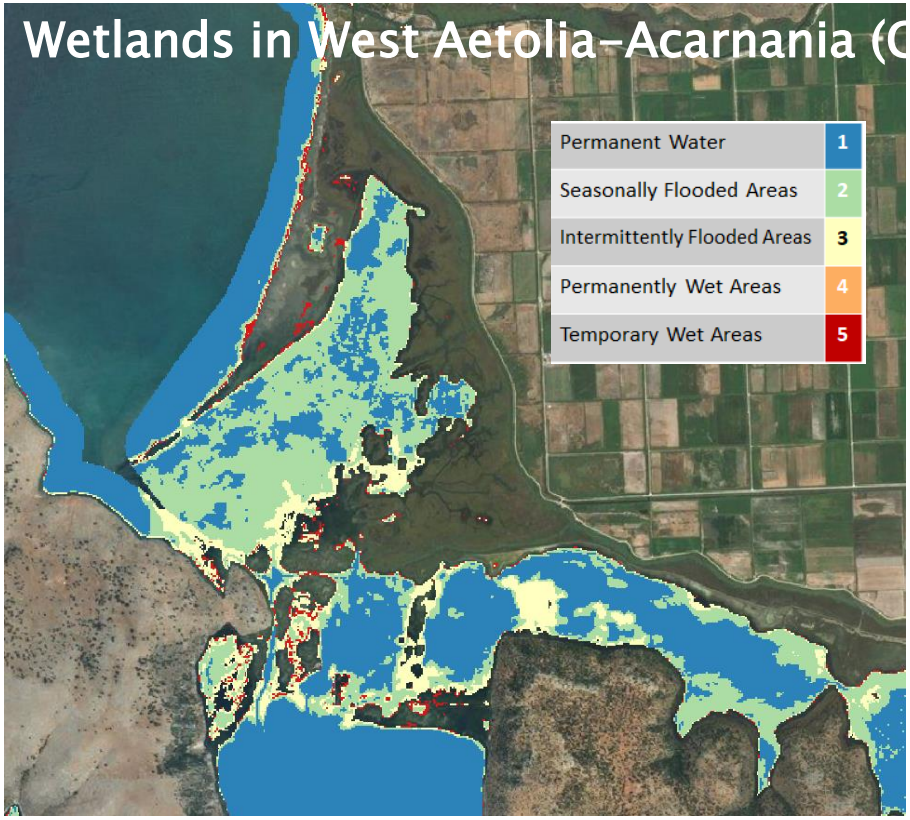
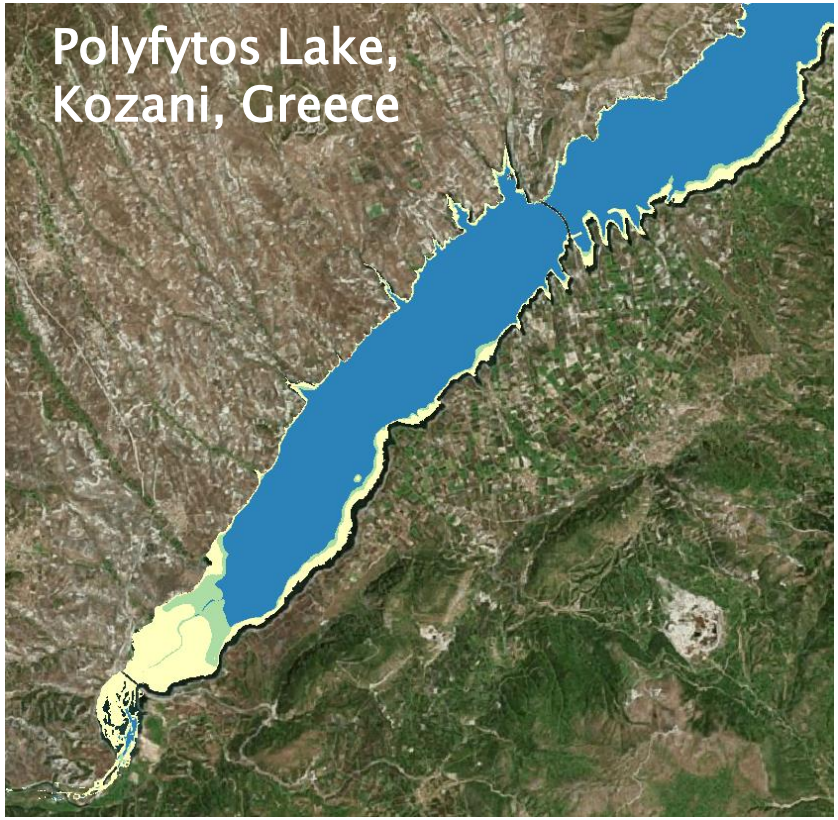
Output Water and Wetness





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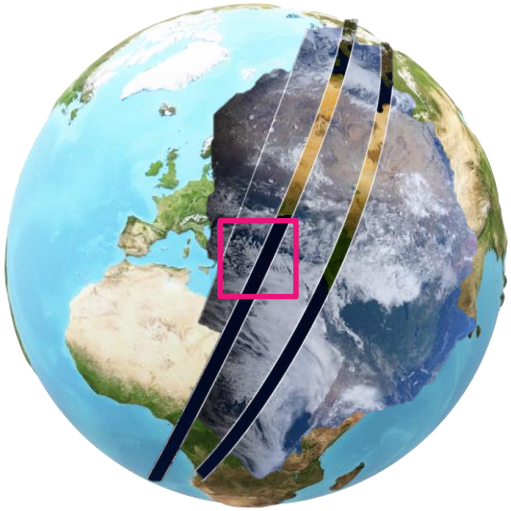
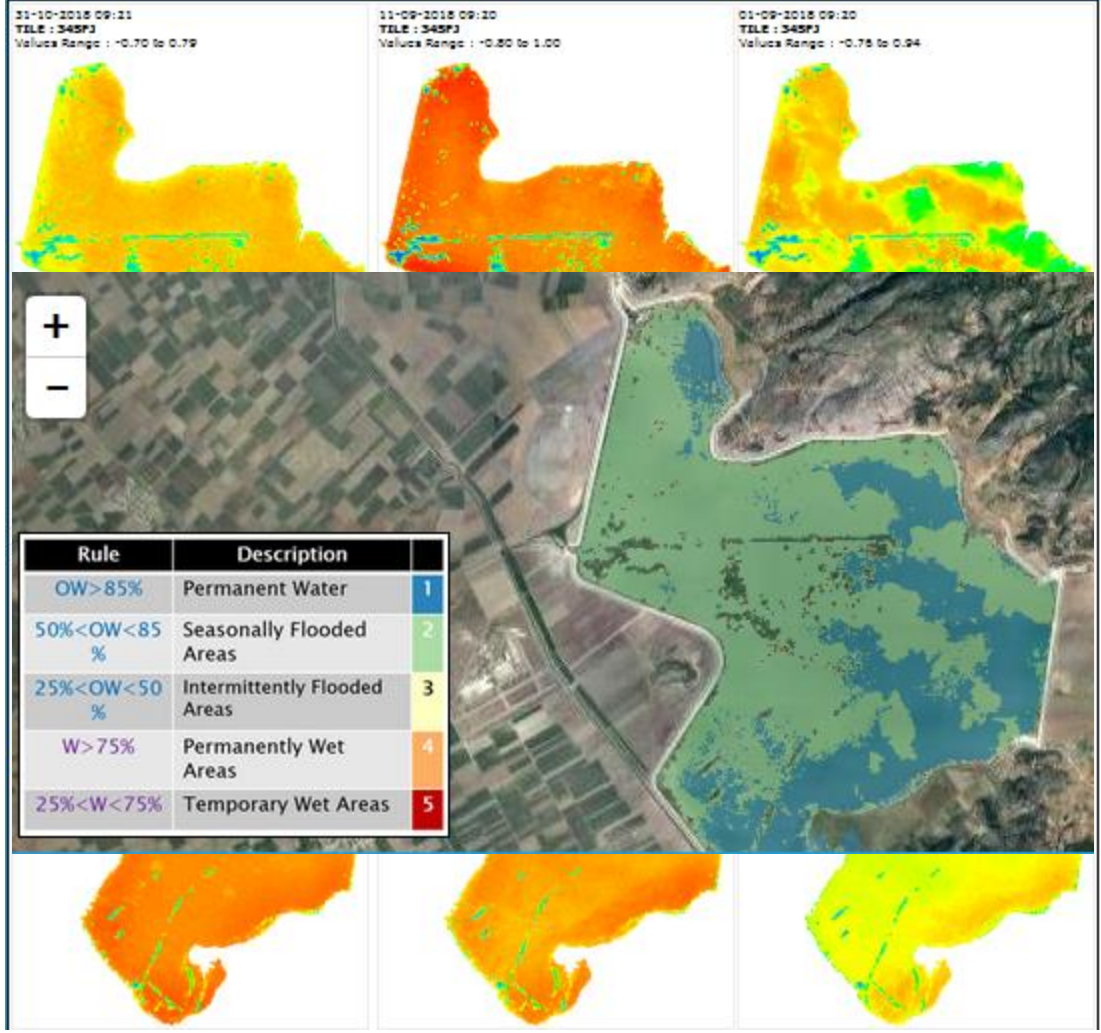
Monitoring





link

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