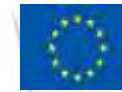




SWOS

Satellite-based Wetland
Observation Service



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 642088

SWOS - Satellite-based Wetland Observation Service

SWOS at Ecop. Brussels, 10 Jan. 2018

Kathrin Weise, Jena-Optronik GmbH



Wetlands
INTERNATIONAL



Jenaoptronik

TerraSphere

BROCKMANN GEOMATICS
SWEDEN AB



SWOS project team partners - 6 user organisations / NGOs, 3 universities and 4 companies.



SWOS is a service



Wetland Ecosystem services

Wetlands are the most fragile and threatened ecosystems

64% of wetlands lost since 1900

76% of freshwater plants and animals disappeared in the last 40 years

(WWF Living Planet report)

Wetlands give us ecosystem services for free !

- *Water supply & purification*
- *Erosion control*
- *Flood and drought risk reduction*
- *Food supply*
- *Recreation areas*
- *Climate change mitigation / Carbon sequestration*

The Millennium Ecosystem Assessment gave **wetlands a value of US\$15 trillion in 1997**

http://wwf.panda.org/about_our_earth/about_freshwater/intro/value



SWOS is a service



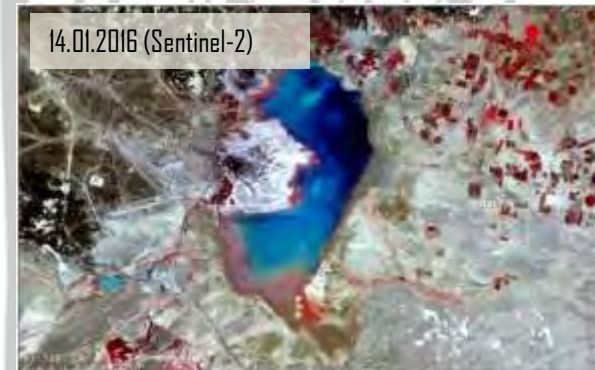
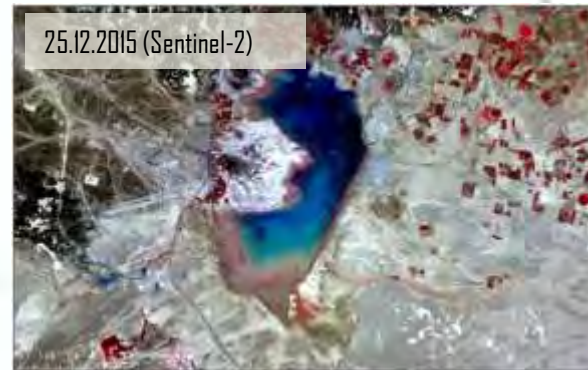
Satellite data for wetland mapping:

1. World wide available
2. Long term programs
3. Historical data from 70ies
4. Weather independent (Radar data)
5. For free

Landsat and S2 for wetland monitoring



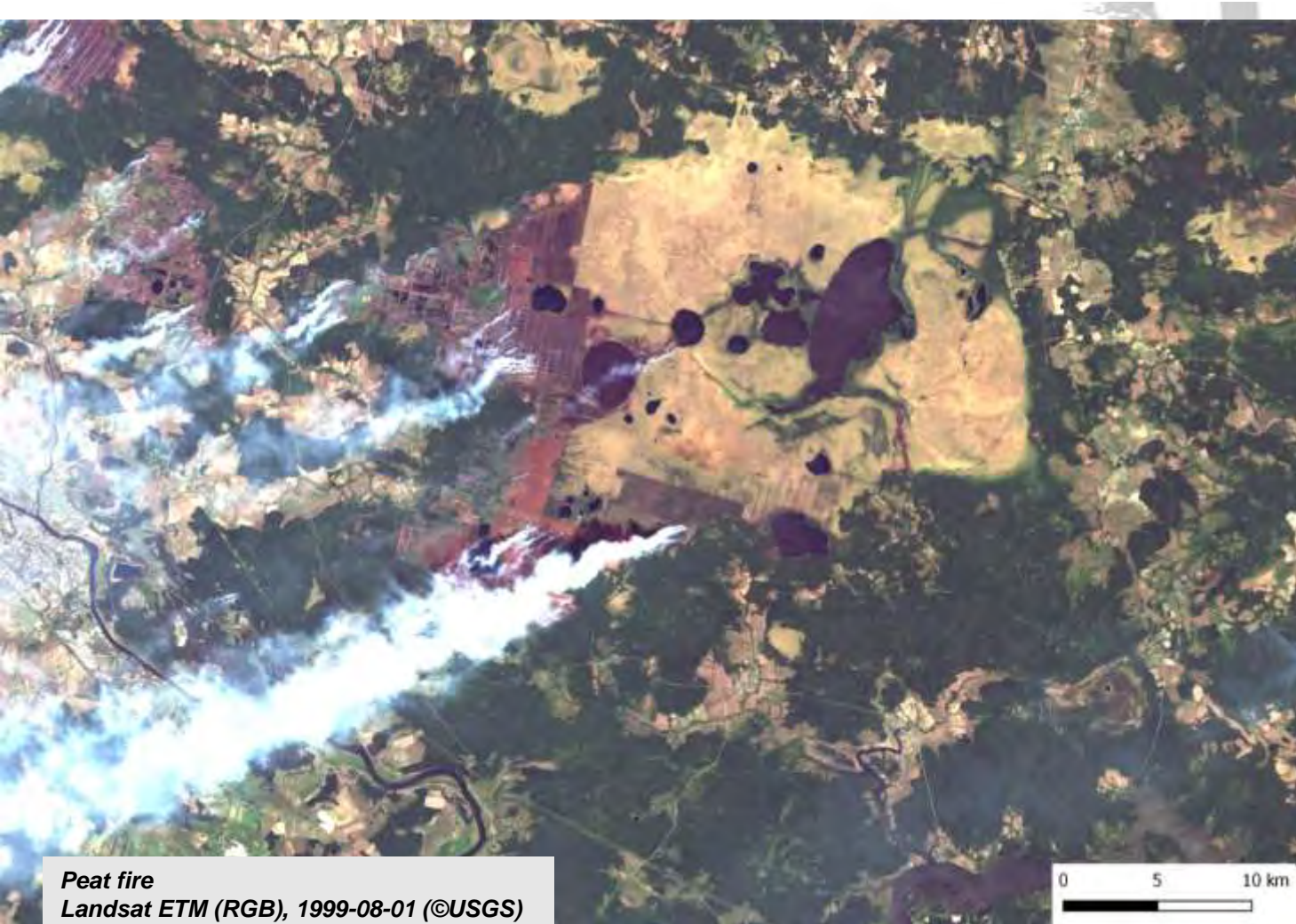
The temporal scale: **Monitoring of long term changes** / decreasing water table (Dead Sea, Jordan/Israel)



The temporal scale: **Monitoring of short term changes** / wetland characteristics (Azraq Oasis, Jordan)

Peatland Fires in Russia, Tver

After extensive peat and forest fires in 2010, affecting especially Moscow region, Russia has rewetted 65,000 ha of drained peatlands in the Moscow region (involving 100million Euro) to prevent further fires.



Peat fire
Landsat ETM (RGB), 1999-08-01 (©USGS)



Russia, Tundra, Nenets Autonomous Okrug

The Nenets Autonomous Okrug (NAO) and the Komi Republic contains the main part of frozen or permafrost peatlands in north-east Russia, these areas are considered to be the key carbon pool of the globe



***Melting Process, R: 27-05-2017, G:
08-06-2017, B: 20-06-2017, VV
polarization, descending orbit
(©Contains modified Copernicus
Sentinel - data 2017)***

0 10 20 km





Sentinel -2
RGB = 4,3,2
Acquisition date:
12. Mai 2016

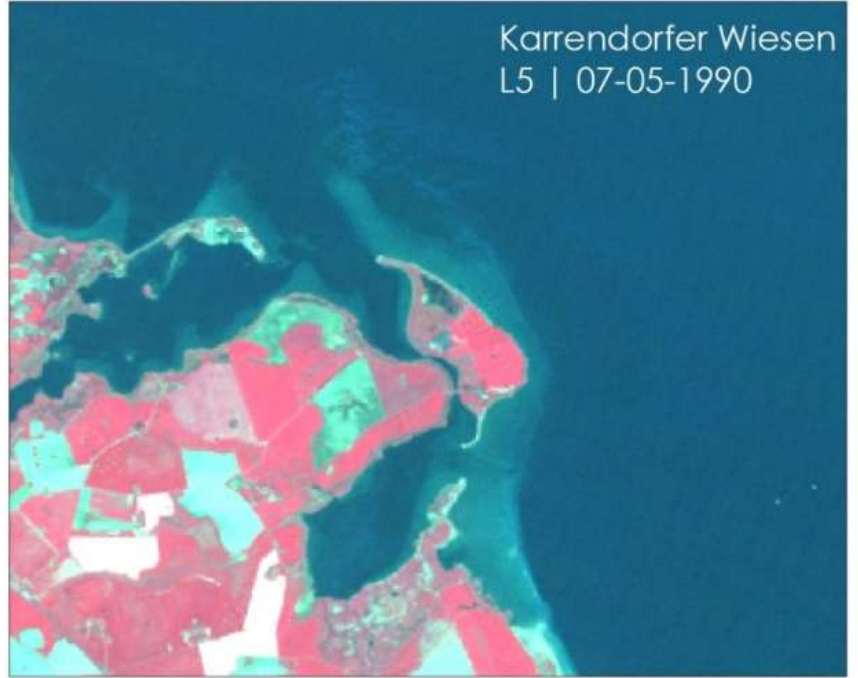
Koos

Karrendorf

Karrenderfer Wiesen
L1 | 29-05-1973



Karrenderfer Wiesen
L5 | 07-05-1990



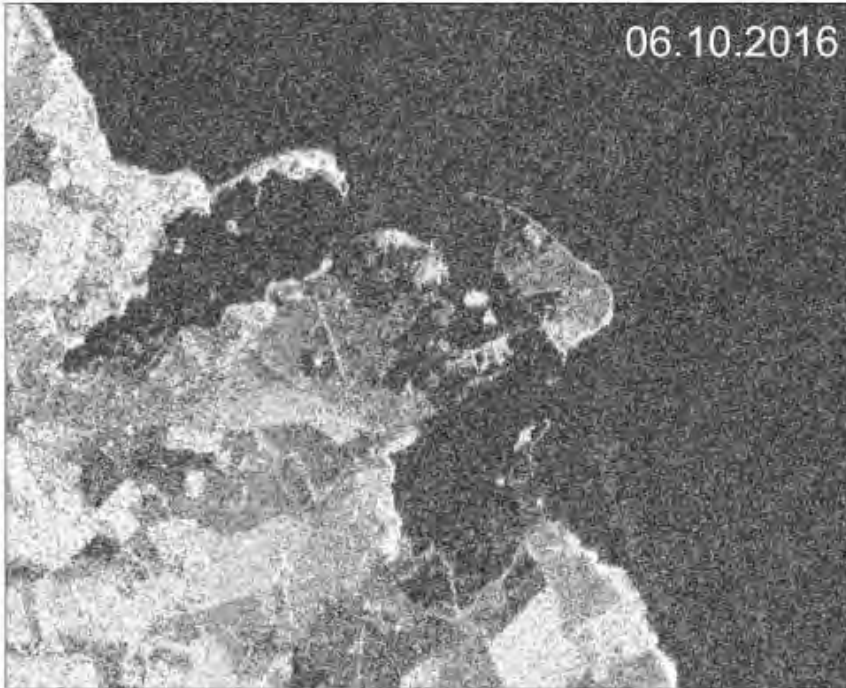
Karrenderfer Wiesen
L5 | 02-05-2009



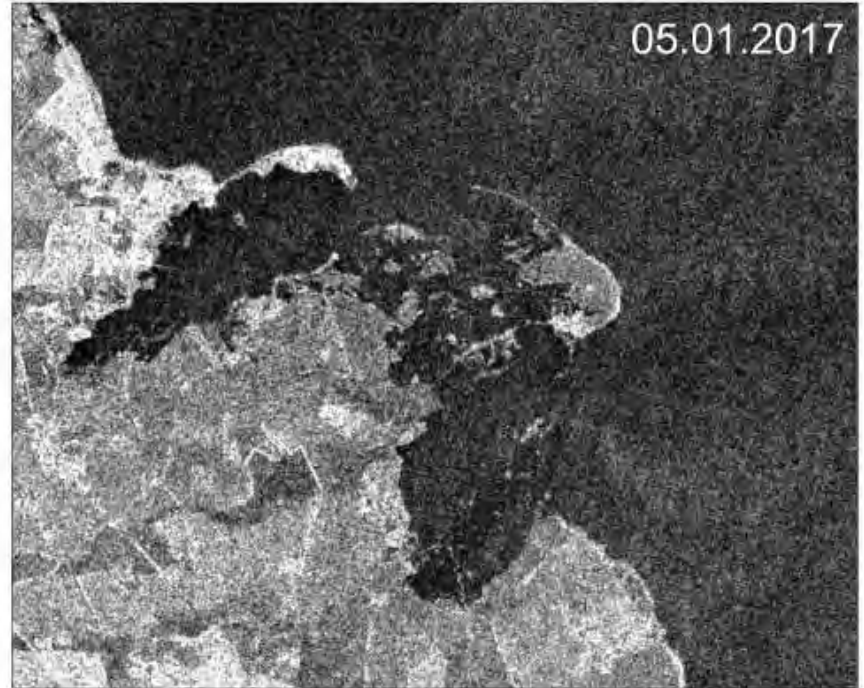
Karrenderfer Wiesen
S2 | 12-05-2016



06.10.2016



05.01.2017



04.04.2017



Overview Karrendorfer Wiesen - Radar

Grid

Projection: UTM 33N
Spheroid: WGS84
Datum: WGS84

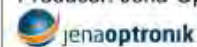
Satellite

Satellite: Sentinel 1A
Pixel size: 10m
Acquisition dates: 2016-10-06, 2017-01-05,
2017-04-04

Data source: Sentinel-1 © ESA

Copyrights

Creation: 2017-06-27
Producer: Jena-Optronik GmbH

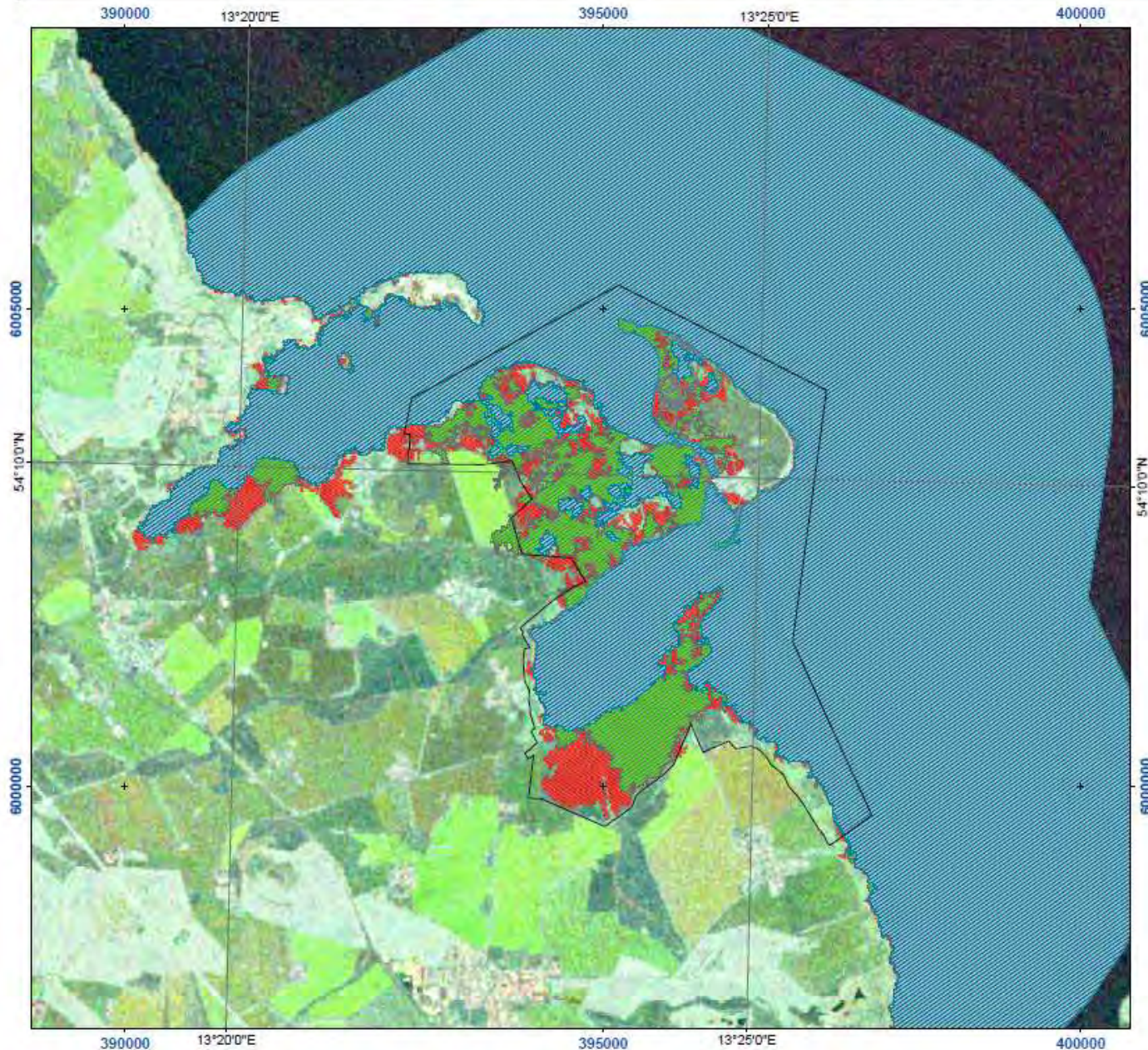


0 750 1.500 3.000
Meters



SWOS
Satellite-based Wetland
Observation Service

Maximum water extent Karrendorfer Wiesen



Legend

- Nature reserve border
- Water extent 04.04.2017
- Flooded area 05.01.2017
- Flooded area 06.10.2016

Background information

This map depicts the maximum water extent at two given dates and is produced using Sentinel-1 satellite images.

Grid

Projection: UTM 33N
Spheroid: WGS84
Datum: WGS84

Satellite

Satellite: Sentinel 1A
Pixel size: 10m
Acquisition dates: 2017-01-05, 2017-04-04
Background image: max-mean-min

Data source: Sentinel-1 © ESA

Copyrights

Creation: 2017-06-27
Producer: Jena-Optronik GmbH



0 500 1.000 2.000 Meters



SWOS test sites



SWOS is a service



- Integrated Risk and Water Resource Management
- From local to global incl Transboundary Wetland monitoring management, management policy and restoration
- Habitats Directive Article 17 reporting
- Peatland monitoring
- Ramsar Convention on Wetlands local and national reporting
- SDG 6.1.1 local to national reporting
- MAES wetland ecosystem and ecosystem service mapping

SWOS Training WS in Munich next week (16-18 Jan. 2018) with 50 participants from 23 countries

Maps and indicators production

Software delivery

Training/Capacity Building

Portal (Middleware/Data broker/Clients)

Service components

Service demonstration via Multilevel Service cases

From Satellite images to maps

Landsat / S2 for wetland monitoring:

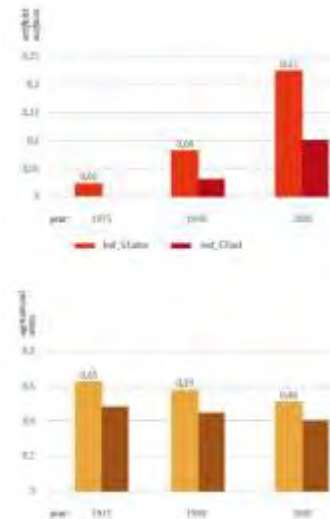
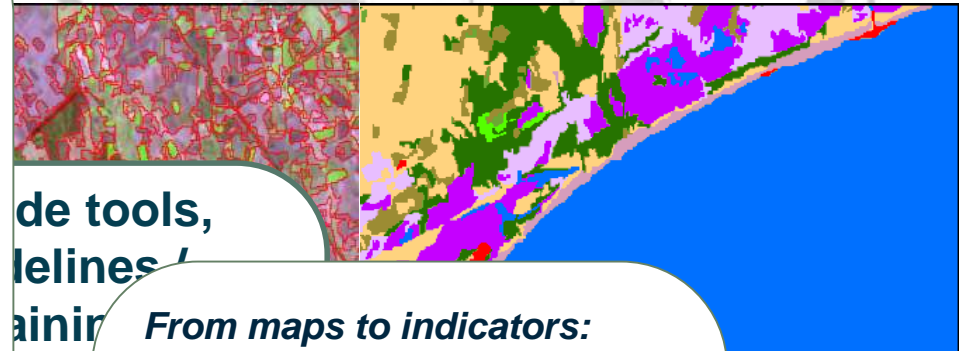
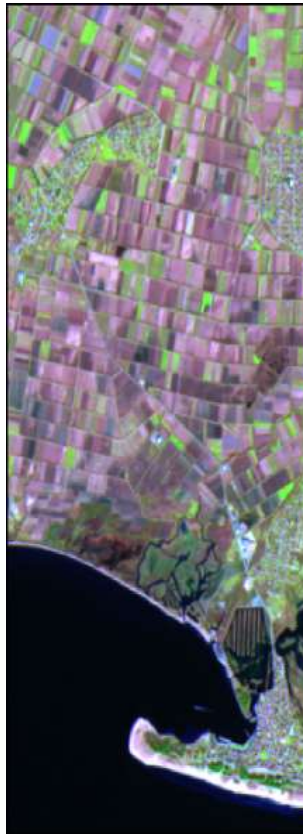
1. Land Use Land Cover
2. Land Use Land Cover Change
3. Water Cycle Regime
4. Inventory and delineation
5. Surface temperature
6. Water quality
7. ...

Radar data / S1 for wetland mapping:

1. Surface water dynamics
2. Inventory and delineation
3. Soil Moisture
4. ...

From maps to indicators:

1. Total wetlands extent
2. Change in wetland area
3. Change to Agriculture & Urbanization
4. Wetlands artificialization and degradation
5. Status of Wetland Threats
6. Extent of Open Water
7. Status and Trend of Water Quality
8. Ecosystem Fragmentation
9. Wetland Ecosystem Services



Functions

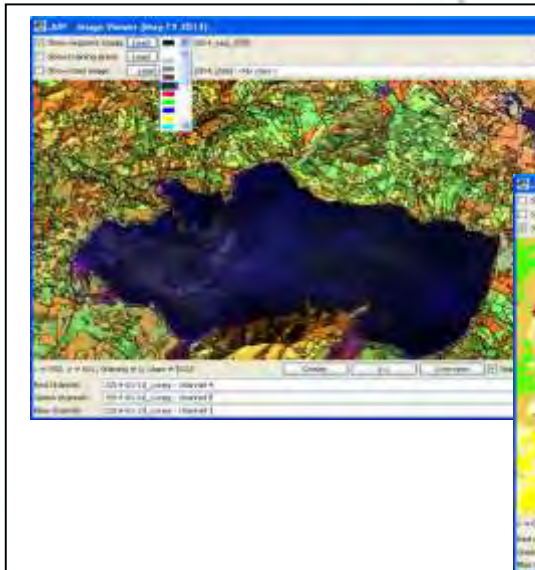
- EO data processing (Optical + SAR)
- Map product generation
- Indicator calculation

Easy integration of

- Local knowledge for supervised classification and interpretation
- Standardized nomenclatures

Available as

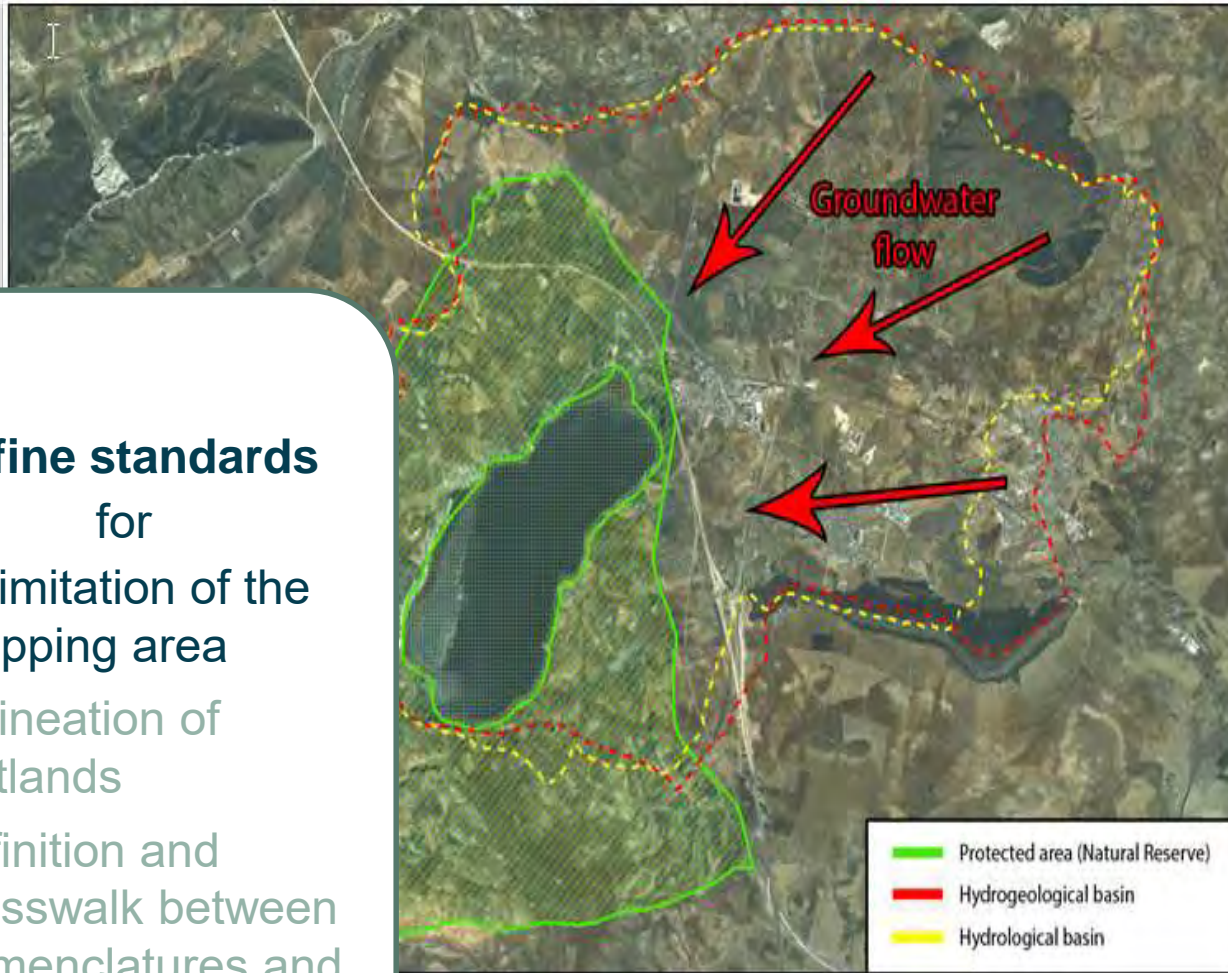
- Standalone version (GUI & command line)
- Integrated in external software e.g. ArcGIS, Interaction of external tools
- *GEOclassifier* Cloud processing



Deliver the infrastructure to

- locate and connect wetland information (SWOS GEOportal)
- derive wetland maps and indicators (SWOS software toolbox and GEOportal)

Delimitation of the mapping area



Define standards for

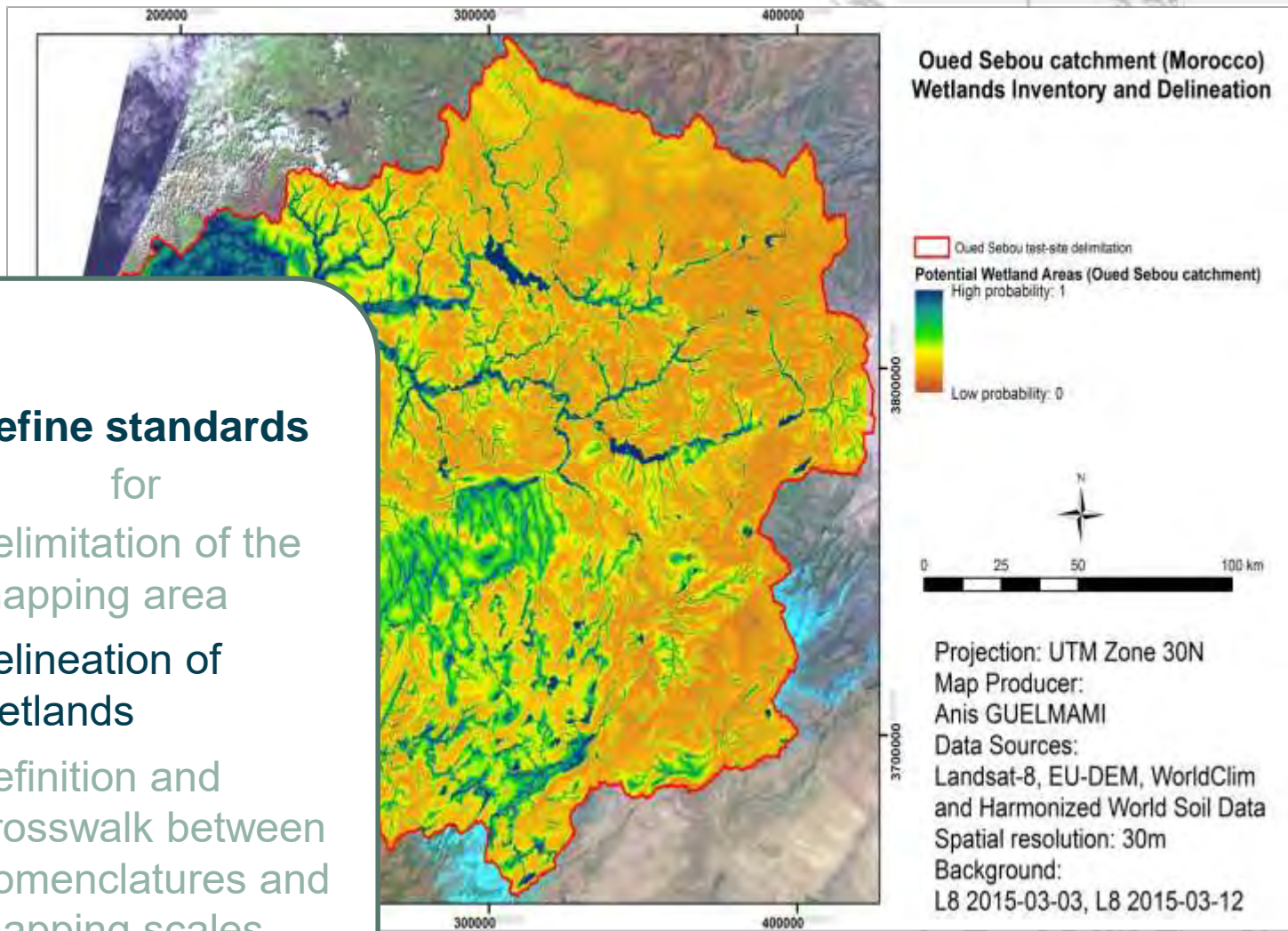
- delimitation of the mapping area
- delineation of wetlands
- definition and crosswalk between nomenclatures and mapping scales

the natural reserve vs the area of hydrological cycle.

Delineation of Wetlands

Define standards
for

- delimitation of the mapping area
- delineation of wetlands
- definition and crosswalk between nomenclatures and mapping scales



*Wetland Inventory and Delineation /
SDG6.6.1 reporting, Qued Sebou catchment (Morocco)*

Crosswalk between nomenclatures

| | | | |
|---------|--|---------------------------|--|
| 6.2 | Bare soil, rock, perennial snow & ice | feasible | |
| 6.2.1 | Beaches, dunes, sands | feasible | |
| 6.2.1.1 | Beaches | contextual class | A common case is that a beach is adjacent to a dune. Differentiation/delineation not possible at required high level of certainty |
| 6.2.1.2 | Dunes | contextual class | A common case is that a beach is adjacent to a dune. Differentiation/delineation not possible at required high level of certainty |
| 6.2.1.3 | River banks | feasible | |
| 6.2.1.4 | Littoral zone of water bodies | contextual class | this class is covered by other classes, since the littoral zone can be covered by either grassland, sparsely vegetated, or bare soil |
| 6.2.2 | Bare rocks, burnt areas, glaciers and perpetual snow | contextual/temporal class | |
| 6.2.2.1 | Bare rocks | feasible | |
| 6.2.2.2 | Burnt areas | temporal class | Burned areas can be mapped, but this is rather an additional product. It's a temporal class that depends on the availability of ancillary data |
| 6.2.2.3 | Glacier | ancillary data required | e.g. glaciers can be covered by substrate, dust or ashes |
| 7 | Inland non-forest wetlands | feasible | The delineation product can assist here |
| 7.1 | Inland non-forest wetlands | feasible | |
| 7.1.1 | Inland non-forest wetlands | ancillary data required | Differentiation between 5 ha and 10 ha is not possible at required high level of certainty |
| 7.1.1.1 | Inland non-forest wetlands | ancillary data required | Differentiation between 5 ha and 10 ha is not possible at required high level of certainty |
| 7.1.1.2 | Inland non-forest wetlands | ancillary data required | Differentiation between 5 ha and 10 ha is not possible at required high level of certainty |
| 7.1.2 | Inland non-forest wetlands | ancillary data required | Differentiation between 5 ha and 10 ha is not possible at required high level of certainty |
| 7.1.2.1 | Inland non-forest wetlands | ancillary data required | Differentiation between 5 ha and 10 ha is not possible at required high level of certainty |
| 7.1.2.2 | Inland non-forest wetlands | ancillary data required | Differentiation between 5 ha and 10 ha is not possible at required high level of certainty |
| 7.2 | Paludiculture | ancillary data required | Case dependent if the product is intended for mapping or for monitoring |
| 7.2.1 | Paludiculture | ancillary data required | Case dependent if the product is intended for mapping or for monitoring |
| 7.2.1.1 | Paludiculture | contextual/temporal class | |
| 7.2.1.2 | Paludiculture | contextual/temporal class | |
| 8 | Coastal wetlands | feasible | |
| 8.1 | Coastal wetlands | ancillary data required | Confusion with 82 (coastal waters) likely when flooded |
| 8.1.1 | Coastal wetlands | ancillary data required | |
| 8.1.1.1 | Coastal wetlands | ancillary data required | |
| 8.1.1.2 | Coastal wetlands | ancillary data required | |
| 8.1.2 | Coastal wetlands | functional class | Salines are not always squared features and thus not possible to identify (e.g. Salines in Azraq) |
| 8.1.3 | Coastal wetlands | contextual class | Too detailed since the tidal range must be incorporated |
| 8.2 | Coastal wetlands | feasible | Confusion with 10 (marine other) likely |
| 8.2.1 | Coastal wetlands | feasible | Confusion with 10 (marine other) likely |
| 8.2.2 | Coastal wetlands | feasible | Confusion with 10 (marine other) likely |
| 9 | Wetlands of inland waters | feasible | |
| 9.1 | Wetlands of inland waters | feasible | |
| 9.1.1 | Wetlands of inland waters | contextual class | Interconnection cannot be fully assessed by remote sensing (e.g. gallery forests that cover parts of a river) |
| 9.1.1.1 | Wetlands of inland waters | contextual class | Interconnection cannot be fully assessed by remote sensing (e.g. gallery forests that cover parts of a river) |
| 9.1.1.2 | Wetlands of inland waters | contextual class | Interconnection cannot be fully assessed by remote sensing (e.g. gallery forests that cover parts of a river) |
| 9.1.1.3 | Wetlands of inland waters | contextual class | Interconnection cannot be fully assessed by remote sensing (e.g. gallery forests that cover parts of a river) |

For nomenclatures like

Define standards for

- delimitation of the mapping area
- delineation of wetlands
- definition and crosswalk between nomenclatures and mapping scales

feasible

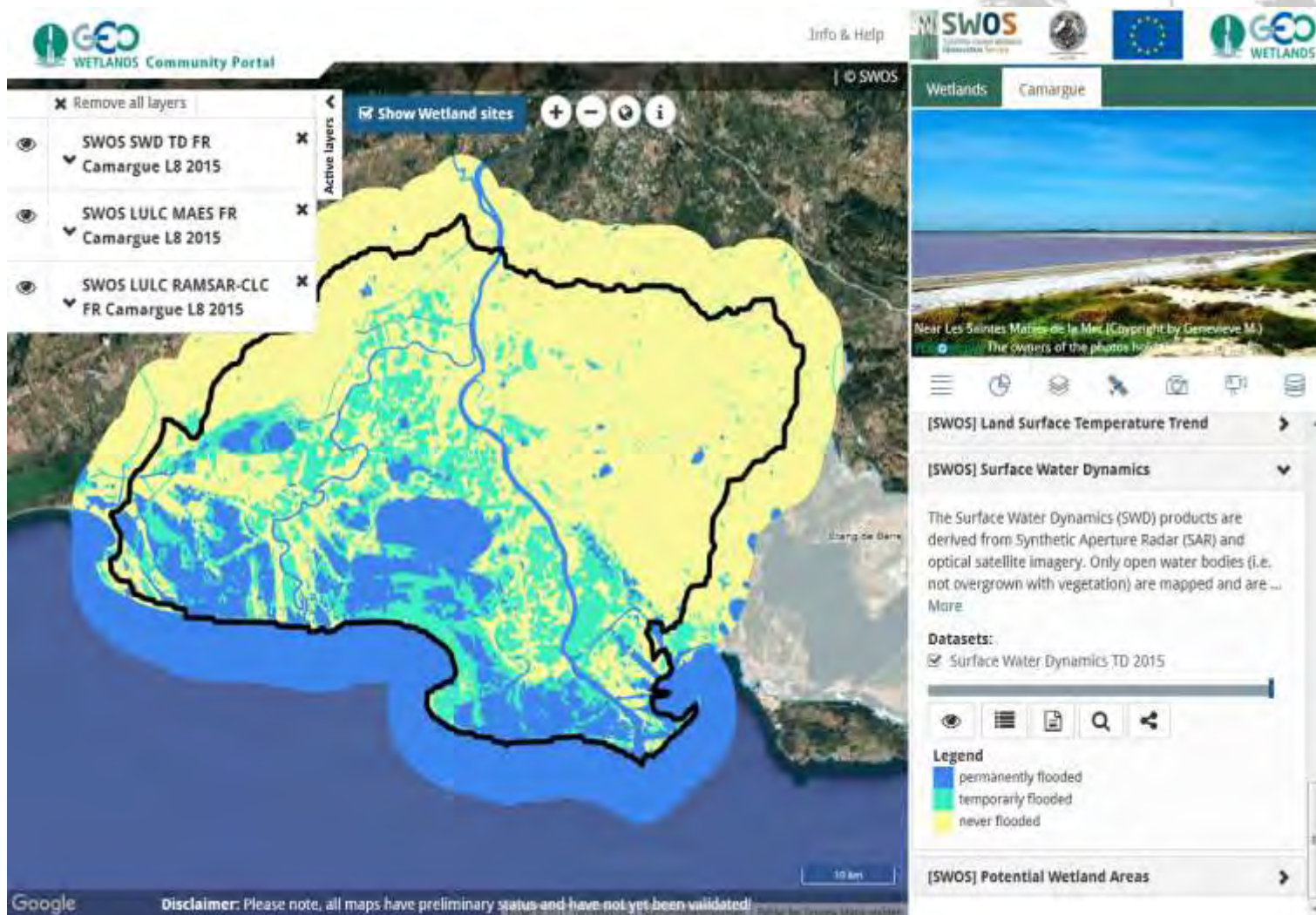
feasible with ancillary data

not feasible

WOS

es

<http://swos-service.eu/swos-portal/>



The screenshot displays the SWOS Portal interface. At the top, there are logos for GEO WETLANDS Community Portal, SWOS, and the European Union. The main map area shows a satellite view of the Camargue region with overlaid wetland data. A legend on the right side of the map indicates three categories: permanently flooded (blue), temporarily flooded (green), and never flooded (yellow). The map is framed by a black outline. On the left, a layer control panel lists several active layers, including SWOS SWD TD FR, SWOS LULC MAES FR, and SWOS LULC RAMSAR-CLC. A sidebar on the right contains a search bar, a list of datasets (e.g., Land Surface Temperature Trend, Surface Water Dynamics), and a legend. The bottom of the map area includes a Google logo and a disclaimer: "Please note, all maps have preliminary status and have not yet been validated".

SWOS Portal =
GEOwetlands
Community
Portal

Access to

- SWOS products
- global and European wetland related data sources
- Analysis functions

SWOS is a service

The H2020 project “Satellite based Wetland Observation Service (SWOS)” developed a service and free available tools for

- local to global satellite based monitoring of
 - the ecological character of wetlands
 - threats
 - degradation
 - restoring measures
- wetland inventory and delineation as it can be applied e.g. for
 - SDG 6.6.1 or Ramsar reporting
 - Negotiation with stakeholders and decision makers
 - Planning of restoring measures
- Close cooperation with Ramsar (UNFCCC, UNCBD)
- GEOwetland leadership





The value of Wetlands



Wetlands give us ecosystem services for free !

SWOS delivers infrastructure for monitoring and provides a basis for decision making and actions!

For more information, contact
<http://swos-service.eu>



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phone +49 (0)3641 200160

