

An automatic oil spill detection and early warning system in the Southeastern Mediterranean Sea

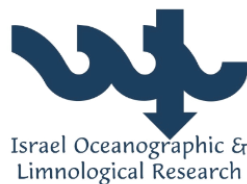
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❖ *This study is part of DARTIS project, funded by the Federal Ministry of Education and Research (BMBF), Germany and the Ministry of Innovation, Science and Technology, Israel.*



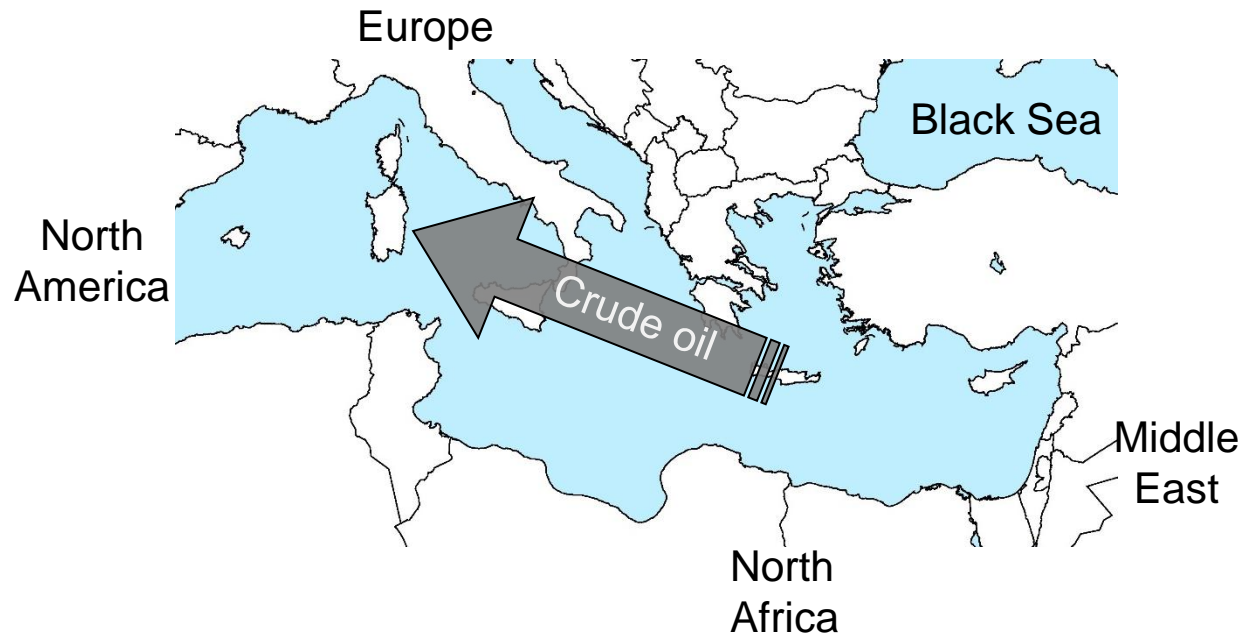
Knowledge for Tomorrow



Southeastern Mediterranean Sea

High Marine Traffic

- Shortest shipping route from Asia to Europe
- Oil transit center



Discoveries of large gas fields in 2010

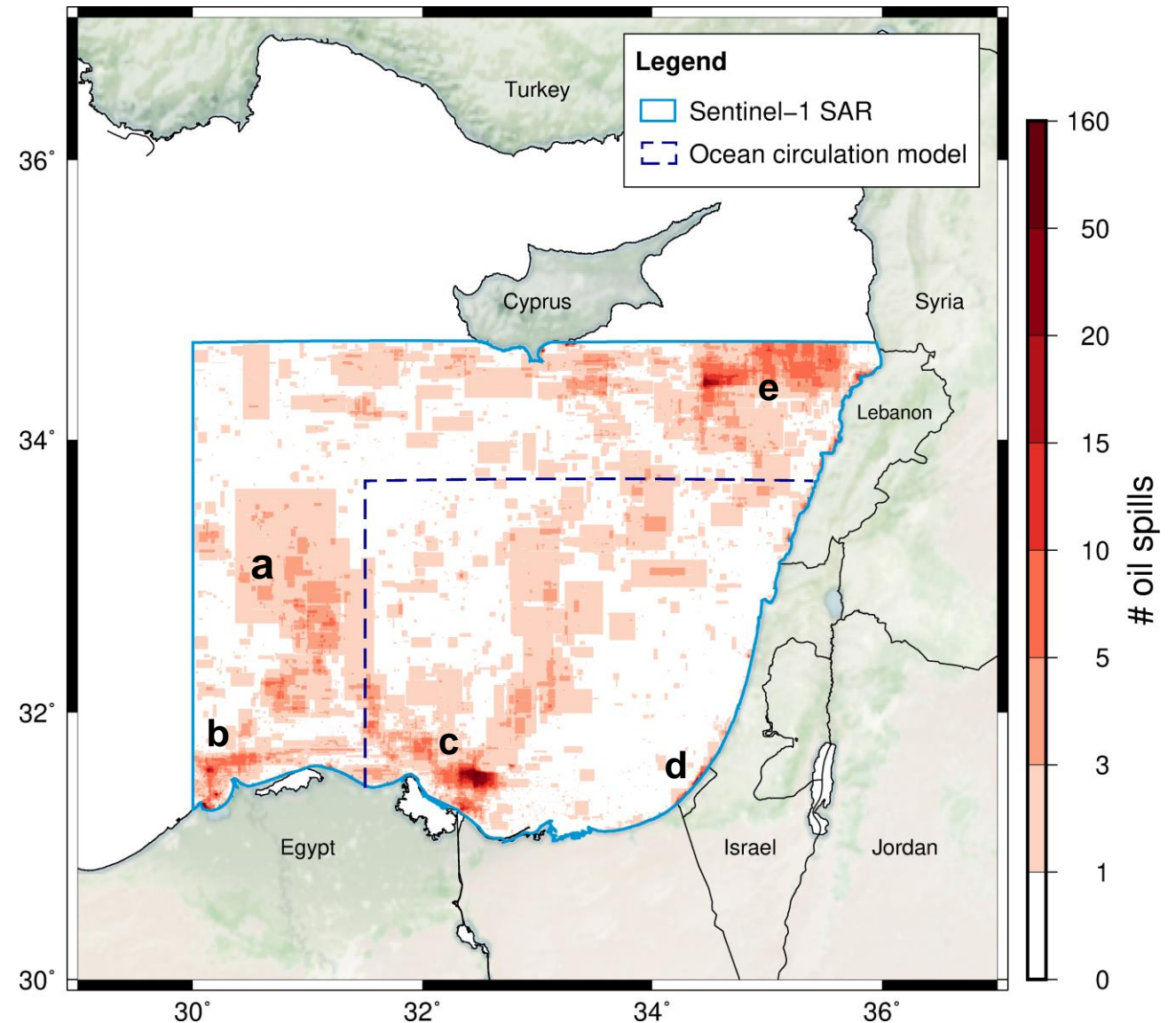
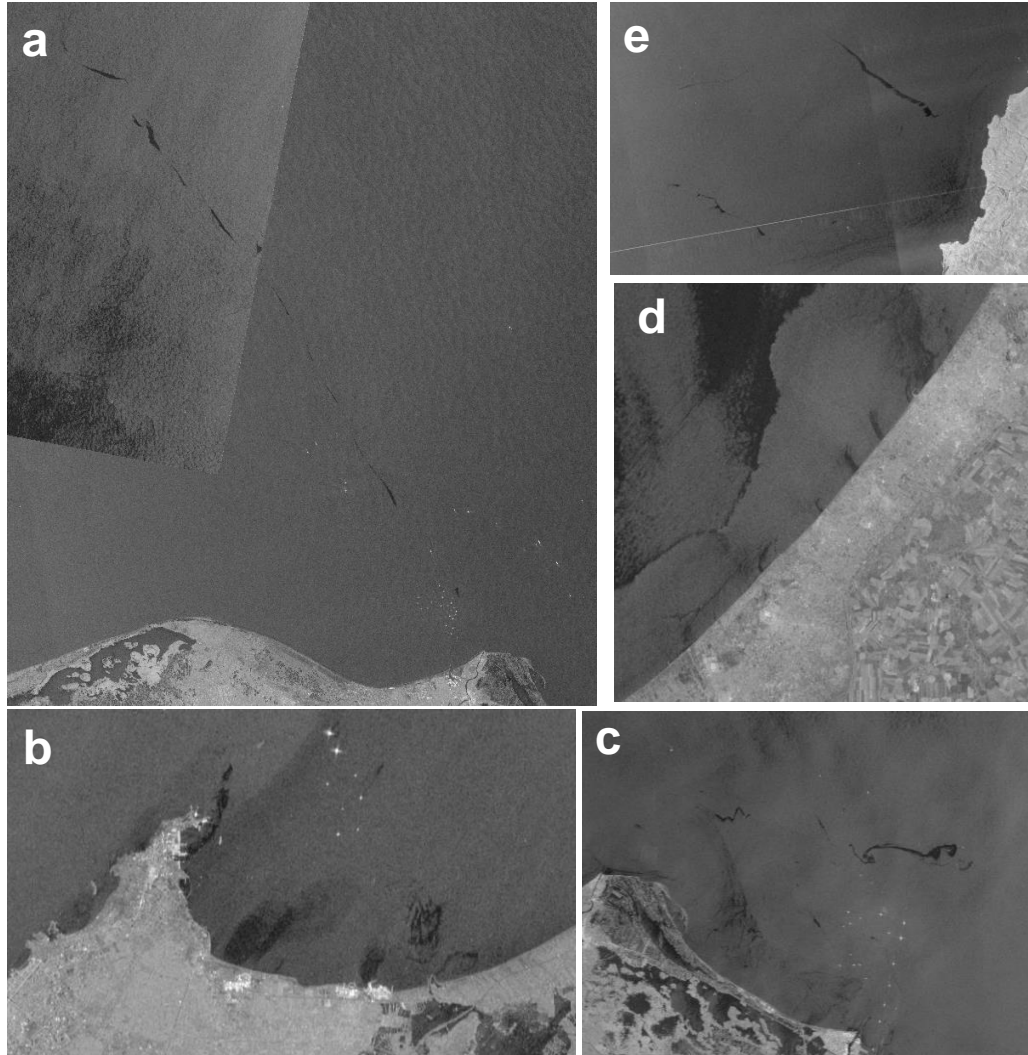
- Increasing number of offshore oil and gas exploration and exploitation activities



(European Parliamentary Research Service, 2019)



Study Area

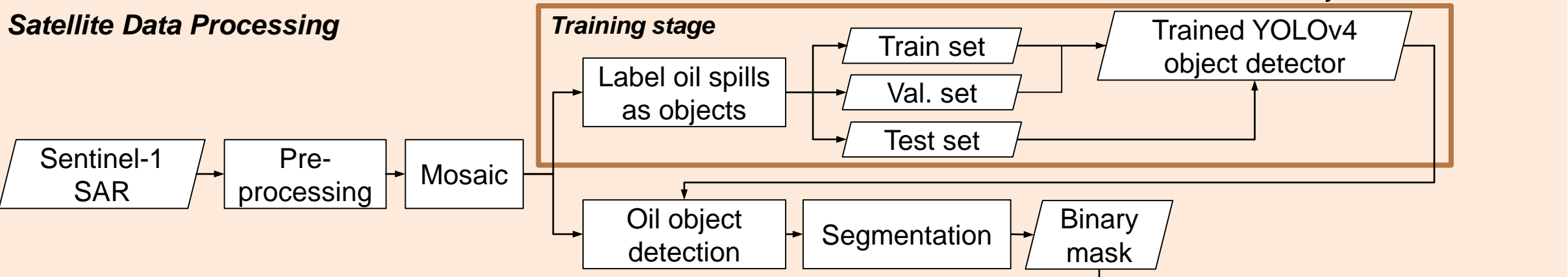


- The amount of oil spills collected in the study area from 2015–2018 with a total of 9768 oil spills from 5930 Sentinel-1 scenes.

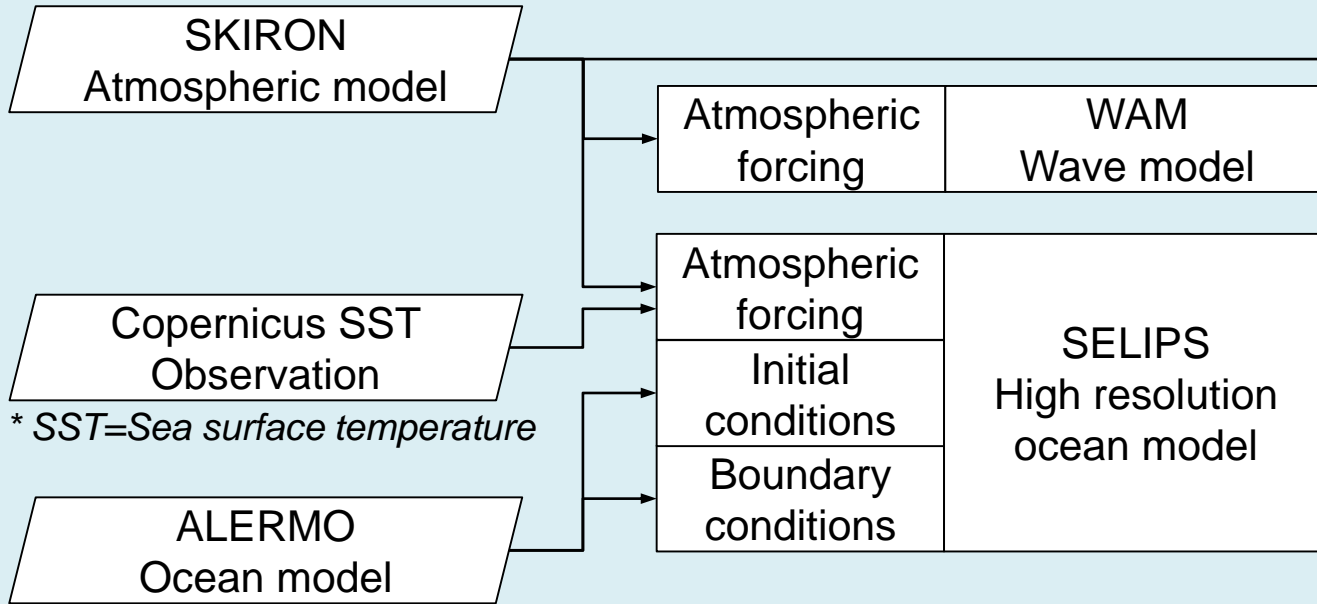
Oil Spill Detection and Early Warning System

* YOLOv4=You Only Look Once version 4

Satellite Data Processing

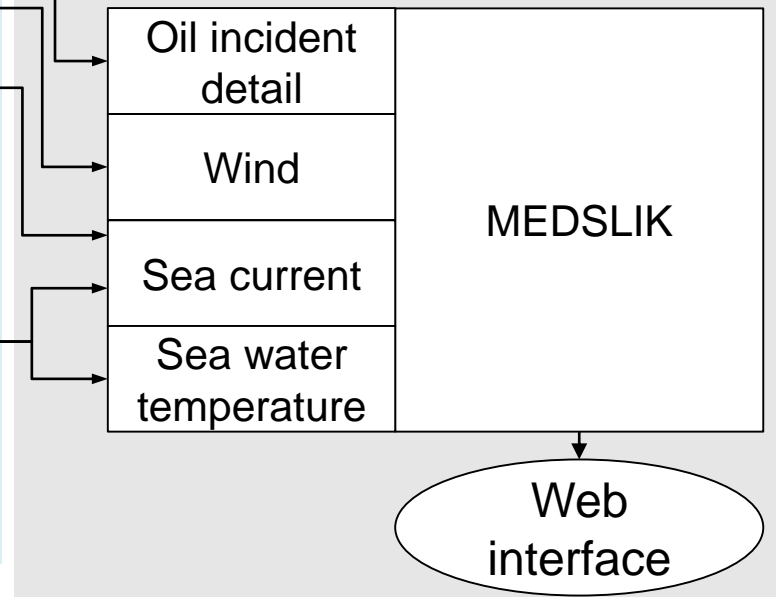


Forecast of synoptic conditions



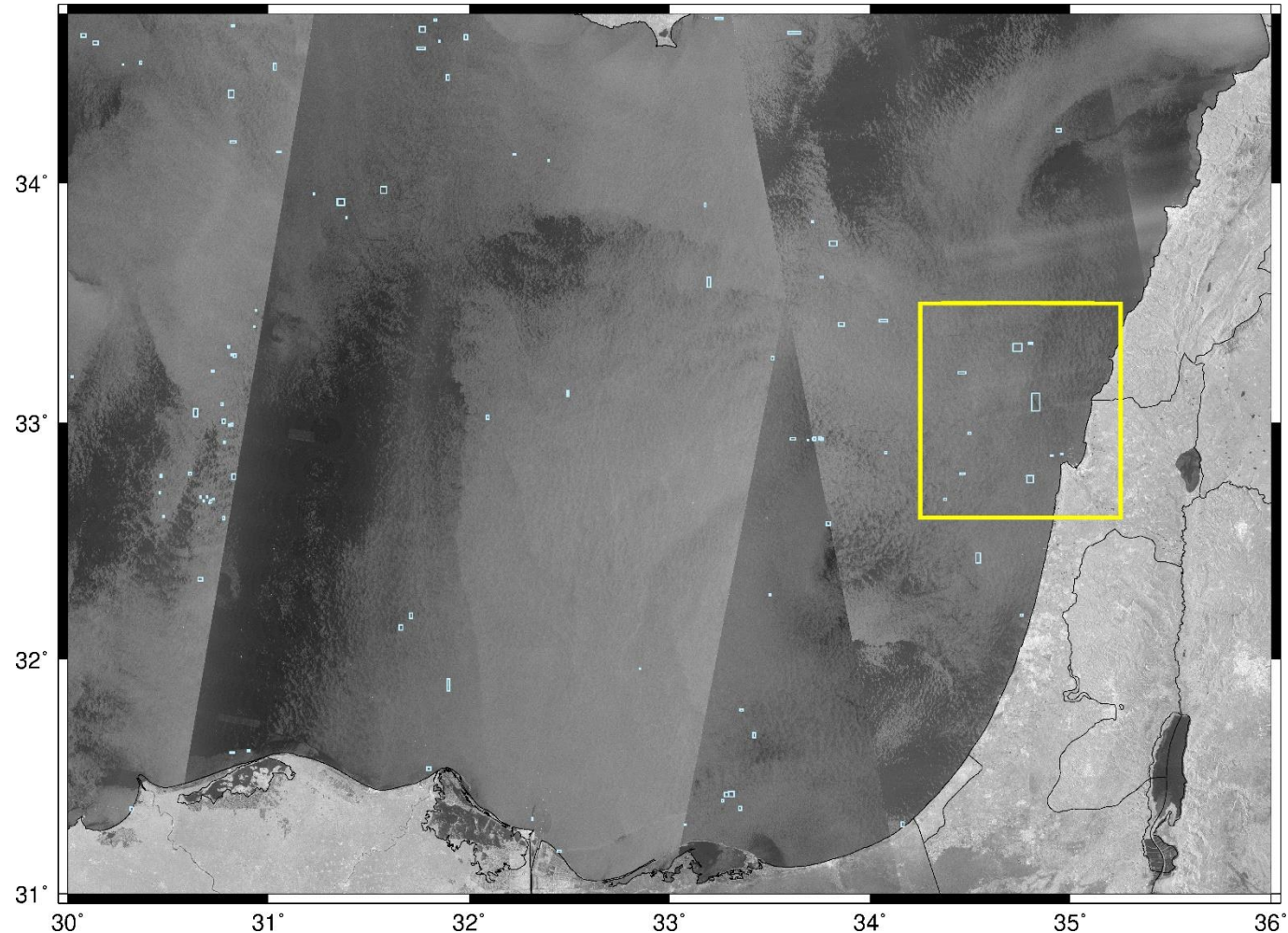
* SST=Sea surface temperature

Oil Trajectory Simulation

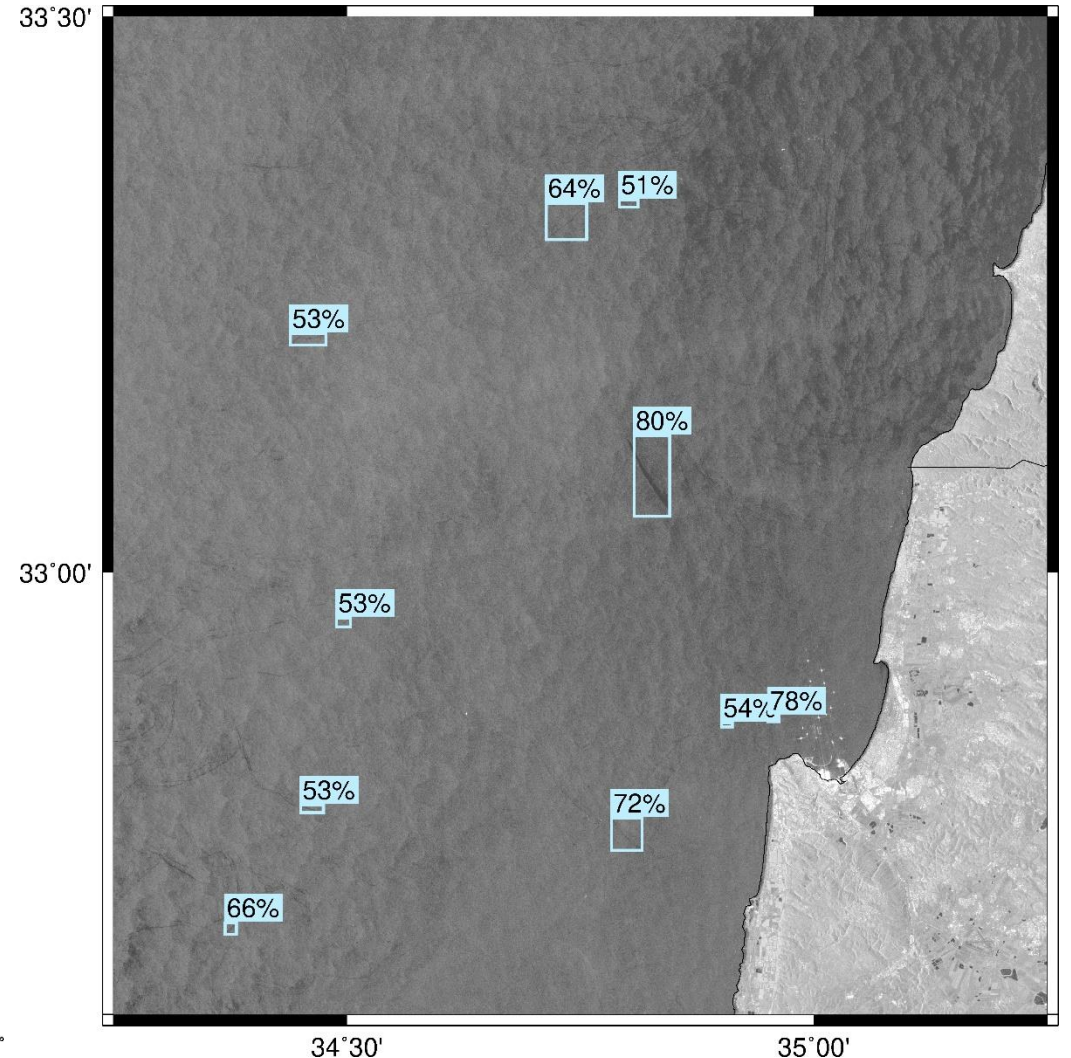


Oil spill detection by trained YOLOv4 object detector

2021/01/19 18:00:00–2021/01/25 18:00:00

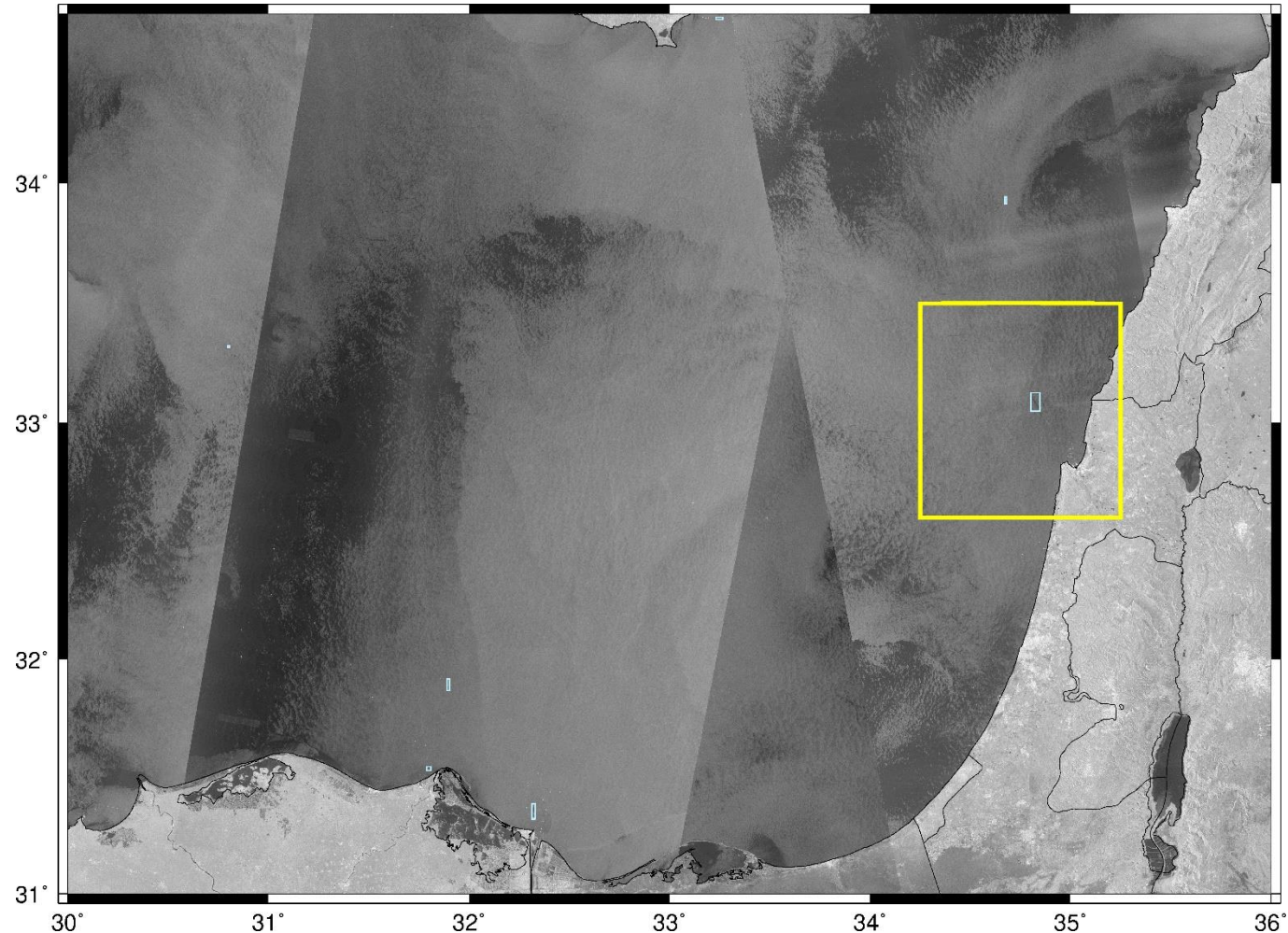


2021/01/25 15:39:54



Oil spill detection by implemented detector

2021/01/19 18:00:00–2021/01/25 18:00:00

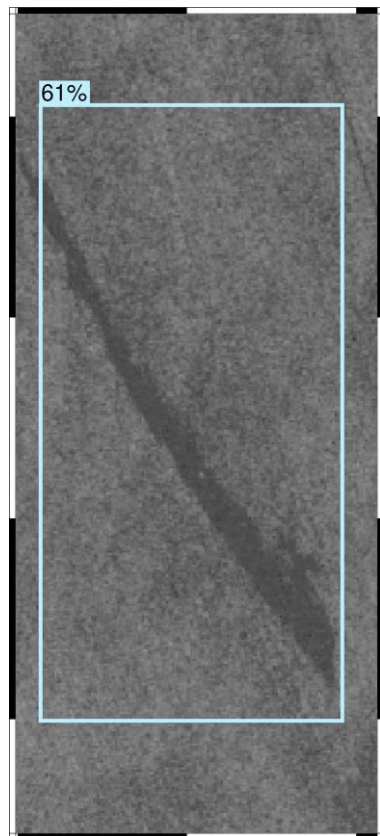


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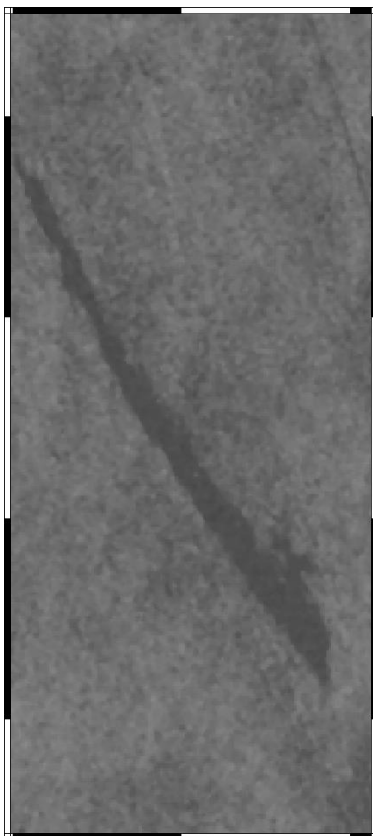


Segmentation

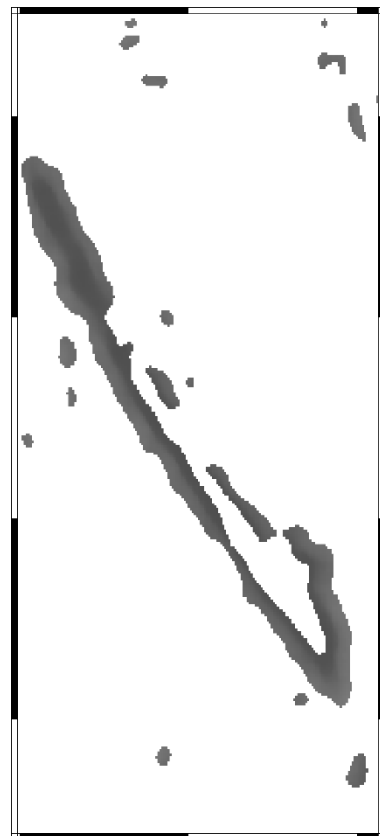
Load image



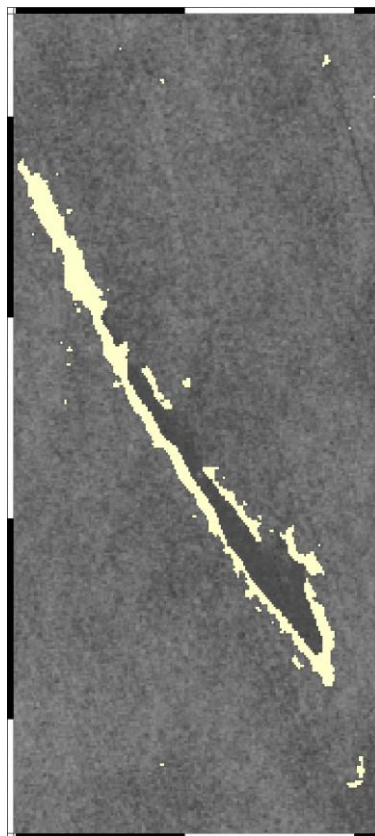
Median blur



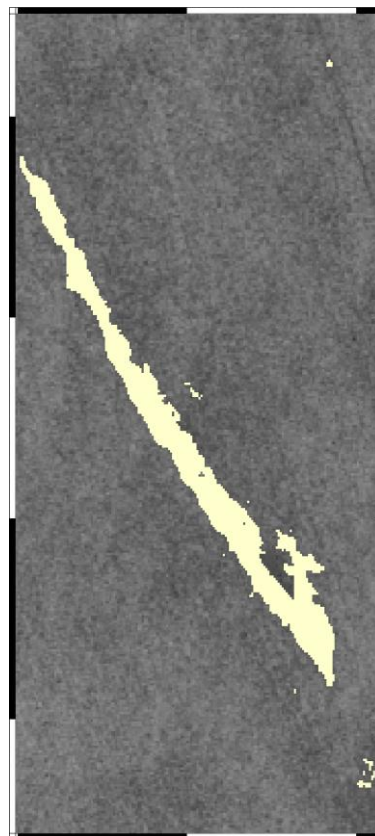
Data at/near edge



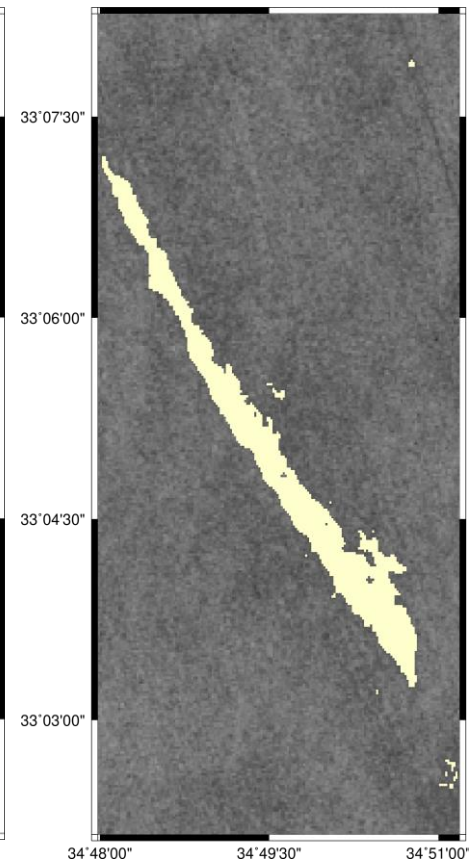
Seed points



Region growing

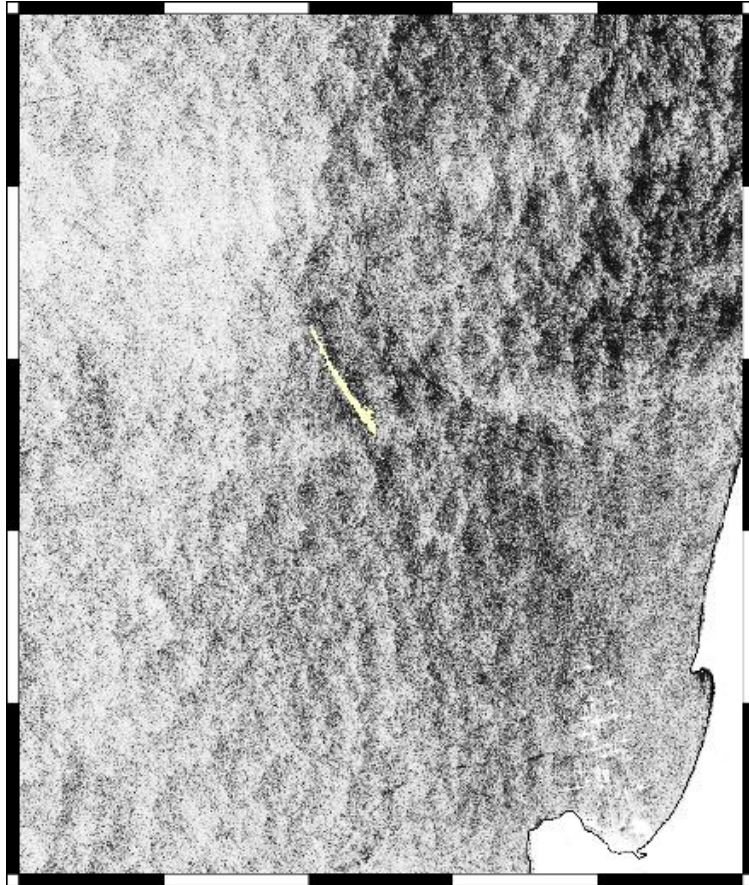


Oil binary mask

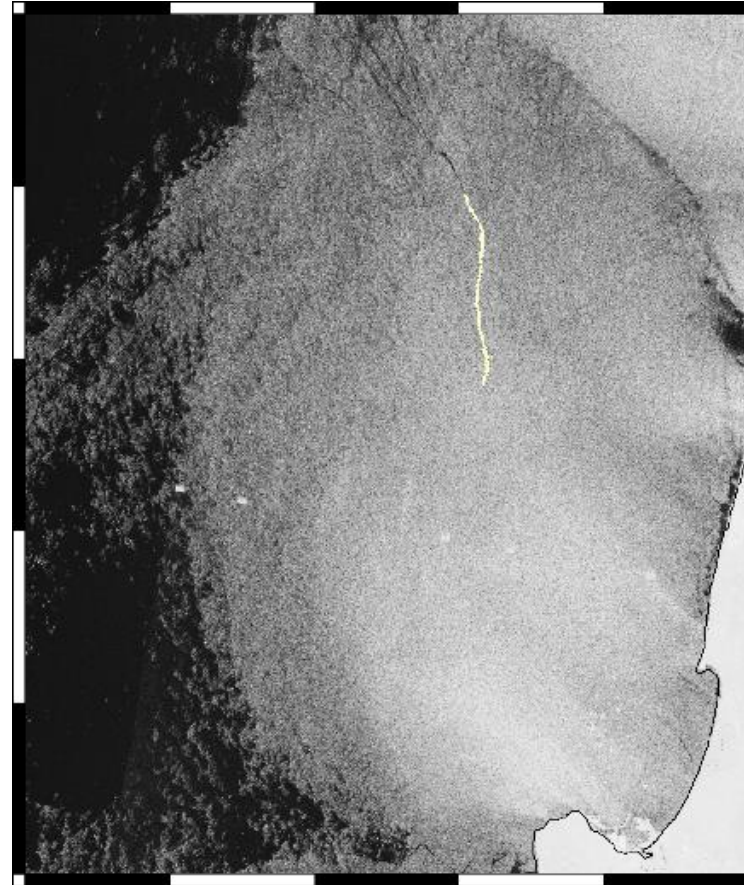


SAR observations and simulation of oil slick trajectory by MEDSLIK

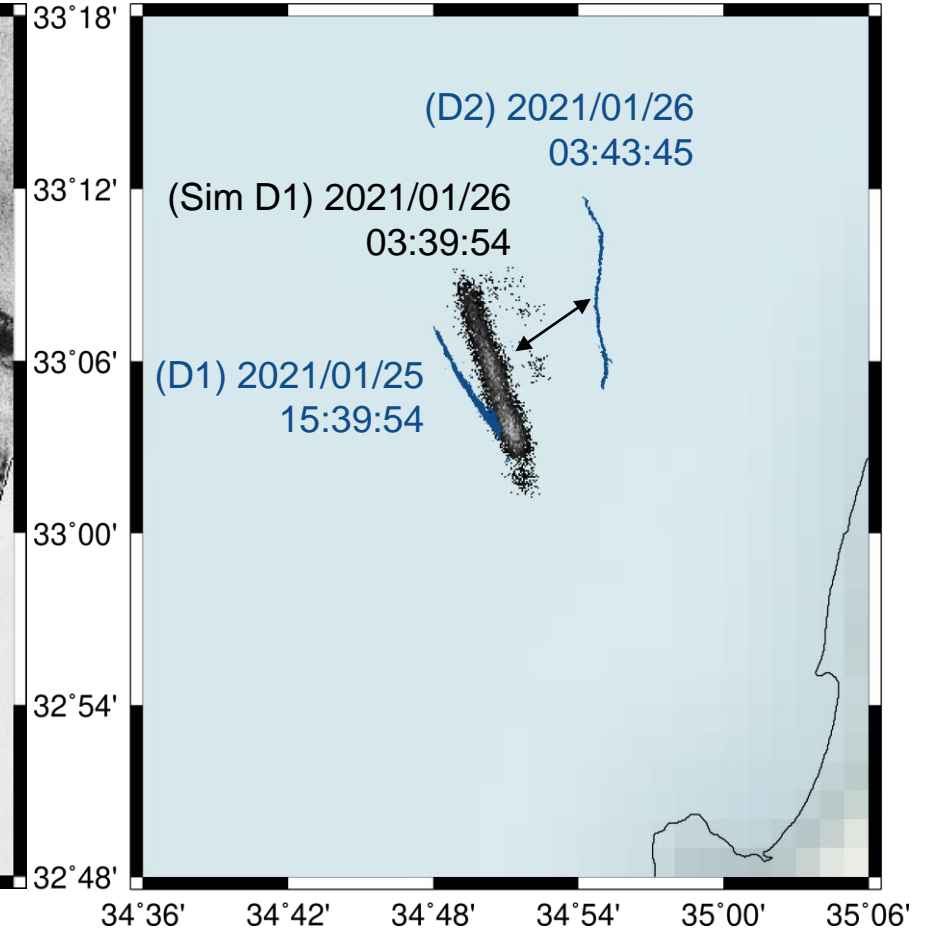
D1: 2021/01/25 15:39:54



D2: 2021/01/26 03:43:45



Simulation from D1



Web Interface

SPILLS [1]

SPILL TIME

SPILL AMOUNT

0.0 bbls

SPILL RATE

SPILL DURATION

0.0 h

LONGITUDE & LATITUDE

00° 00.00' E 00° 00.00' N

OBSERVATIONS [0]

OBSERVATION TIME

26/Jan/2021 03:43:00

OBSERVATION POSITION

00° 00.00' E 00° 00.00' N

LOAD EXISTING OBSERVATION

Select one ...

BOOMS [0]

REMOVAL ACTIVITIES [0]

SIMULATION SETTINGS

2021/01/25 15:39:54

Base map: 2021/01/26 03:43:45

33° 08.01' N 34° 55.25' E

1000 units/m²

100 units/m

SPILLS

2021-01-25T15:39:54Z[UTC]

OBSERVATIONS

No records found.

BOOMS

No records found.

REMOVAL ACTIVITIES

No records found.

ADDITIONAL LAYERS


S1_IW_20210119T180000_20210125T180000_


☒

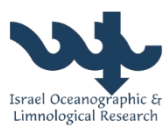
S1_IW_20210120T180000_20210126T180000_

☐

User defined polygon

 DLR

 TUM

 Israel Oceanographic & Limnological Research

Summary

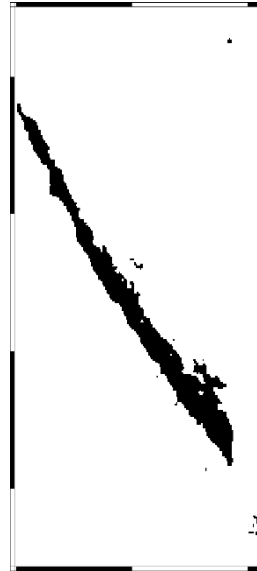
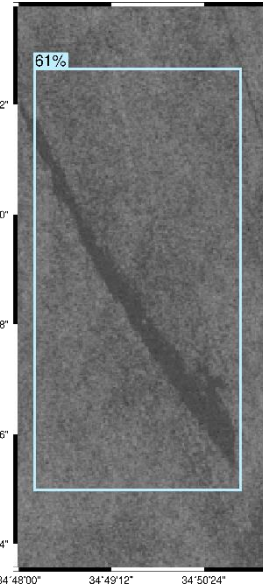
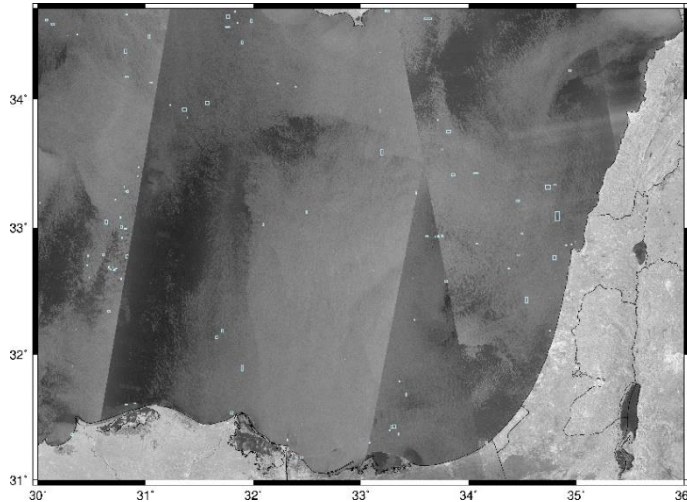
Mosaic

Oil object detection

Segmentation

MEDSLIK

Web interface



SPILLS
2021-01-25T15:39:54Z[UTC]
OBSERVATIONS
No records found.
BOOMS
No records found.
REMOVAL ACTIVITIES
No records found.
ADDITIONAL LAYERS
<input type="checkbox"/> S1_IW_20210119T180000_20210125T180000_VV_latest_R20m
<input checked="" type="checkbox"/> S1_IW_20210120T180000_20210126T180000_VV_latest_R20m
INFO
Click on spills for concentrations

Ongoing work

- Further improve object detector by refining training dataset w.r.t. look-alikes
- Test the whole system on a daily basis to adjust the detection strategy and find the best segmentation method
- Calculate the false alarm and false negative rates of the detection system

Contact

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