

# La Pampilla Oil Spill

## GEOBIA Oil Spill Detection and Mapping Using Sentinel 2 Imagery

### The accident

The oil spill began the morning of Saturday the 15th, January 2022 from the oil tanker Mare Doricum, which was refilling at the refinery.

The cause was identified as waves as a result of a volcanic eruption in Tonga, about 10.300 km east in the Pacific Ocean. The company, Repsol, was charged with criminal negligence. Although recent, it is already considered the greatest ecological disaster in the history of Perú



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### Methodology

The methodology implemented here follows the workflow designed by Kolokoussis and Karathanassi (2018) on oil spill detection using Sentinel 2 data. All the processes were done in QGIS (whereas eCognition was the software used in the paper referenced above).

#### Data acquisition

Sentinel 2 2A Multispectral imagery  
Visible: 02, 03, 04  
Near InfraRed: 08  
Short Wave InfraRed: 11

Pre-spill: 15th January  
Post-spill: 4th February

#### Image Compound

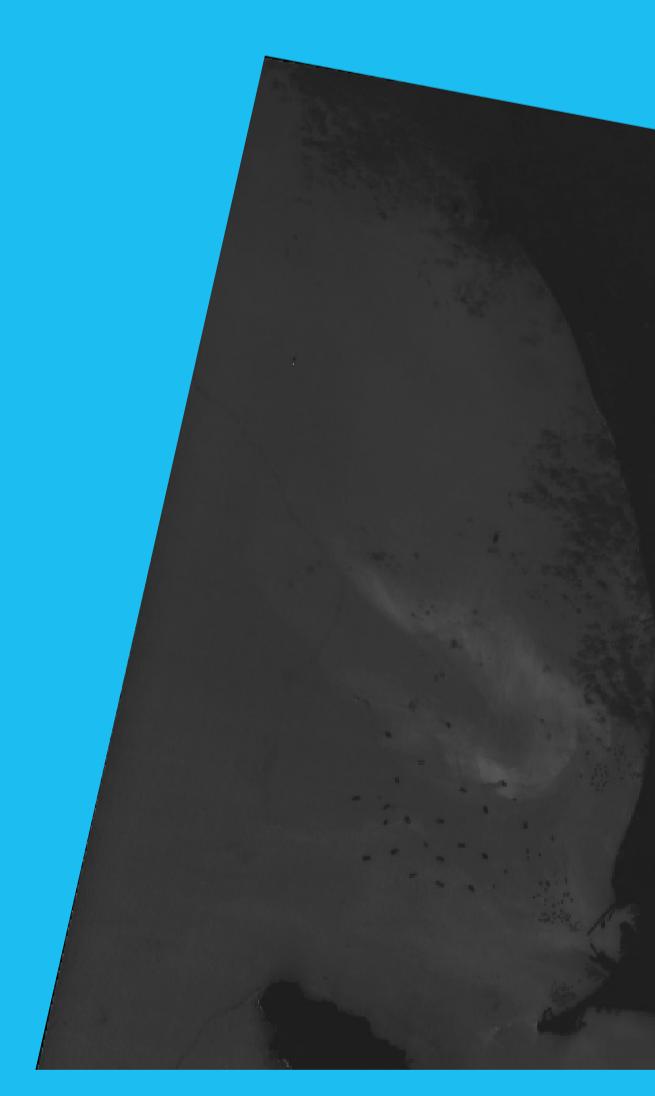
Build Virtual Raster tool  
Combine the 10m resolution bands

#### Multiresolution Segmentation

Segment	Scale	Color	Compactness
SMALL	10	0.8	0.5
LARGE	80	0.1	1



NDWI



B2 mean difference



B2/B11



StdDev(B2)\*B2/B11

#### Water identification

NDWI Composite:  $(B2-B11) / (B2+B11)$  > 0.4

#### Oil spill

B2 avg. segment - B2 avg. supersegment - PRE > 11

B2 avg. segment - B2 avg. supersegment - POST < 11

StDev(B2) \* B2 / B11 - PRE < 135

StDev(B2) \* B2 / B11 - POST > 135

B2 / B11 > 13

Area (in pixels) > 20

#### Possibly dissolved oil spill

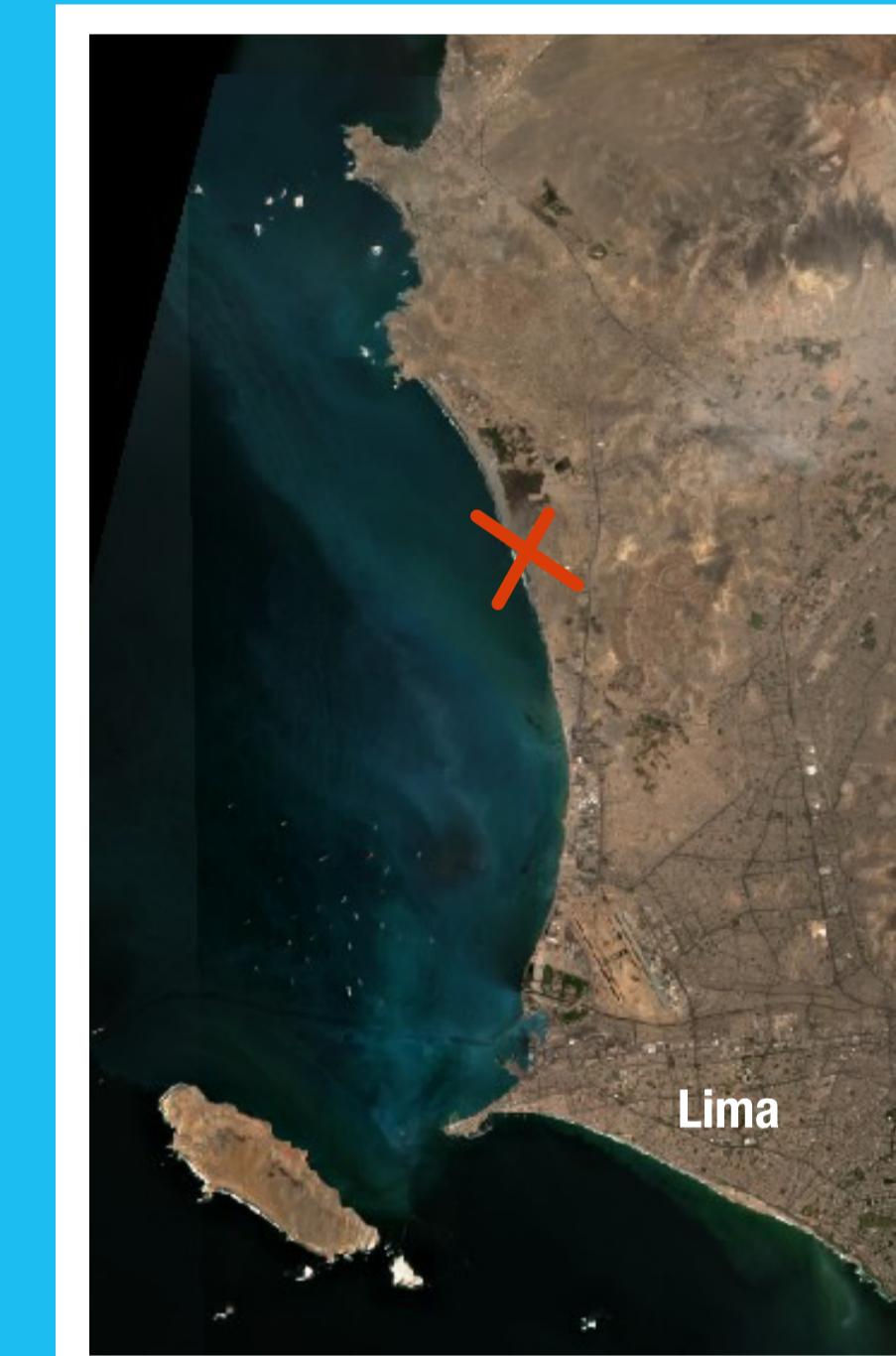
Distance to oil spill (in meters) > 275

StDev(B2) \* B2 / B11 - PRE > 125

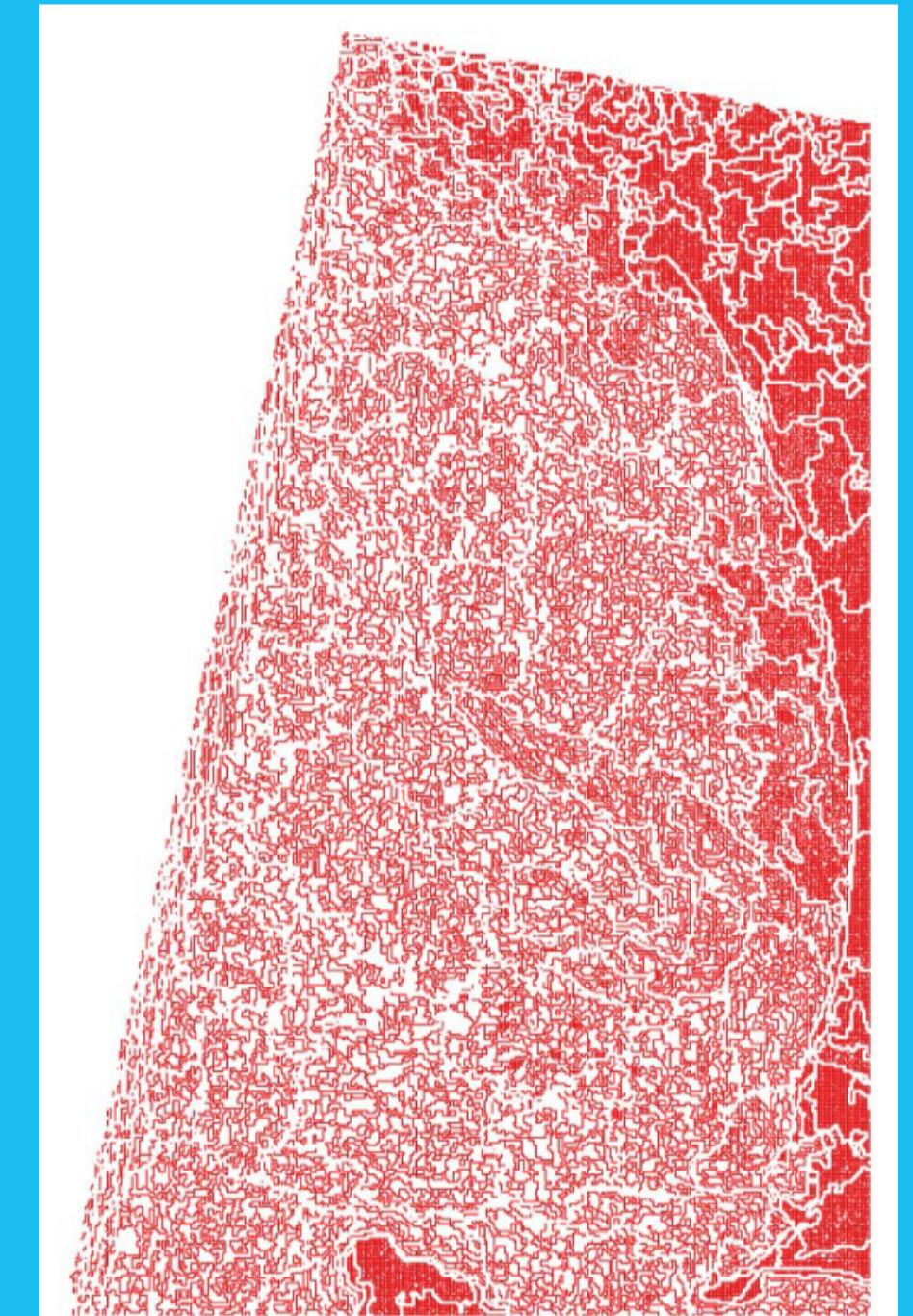
StDev(B2) \* B2 / B11 - POST < 135

### Location

The accident occurred at the La Pampilla crude oil refinery just north of Lima, Peru located in the province of Callao. The refinery is positioned on a gulf between the San Lorenzo island to the south and Punta Salinas, a cape to the north.



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Pre-spill segmentation

### Results

Oil Spill  
No Oil Spill  
Land

### References

Kolokoussis, P., & Karathanassi, V. (2018). Oil spill detection and mapping using sentinel 2 imagery. *Journal of Marine Science and Engineering*, 6(1), 4.

Unprecedented oil spill catches researchers in Peru off guard. (2022, February 22). *Nature*. [https://www.nature.com/articles/d41586-022-00333-x?error=cookies\\_not\\_supported&code=4875a51f-9eba-4fc8-be41-809b966f6fba](https://www.nature.com/articles/d41586-022-00333-x?error=cookies_not_supported&code=4875a51f-9eba-4fc8-be41-809b966f6fba)

The Tonga volcano caused an oil spill on Peru's coast. Fishermen are protesting (2022, January 19). *NPR*. [https://www.npr.org/2022/01/19/1074089271/peru-tonga-oil-spill-volcano?utm\\_source=share&utm\\_medium=copylink](https://www.npr.org/2022/01/19/1074089271/peru-tonga-oil-spill-volcano?utm_source=share&utm_medium=copylink)

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