

INFORMATION SYSTEMS

Oil Observing Tools: Spaceborne Radar

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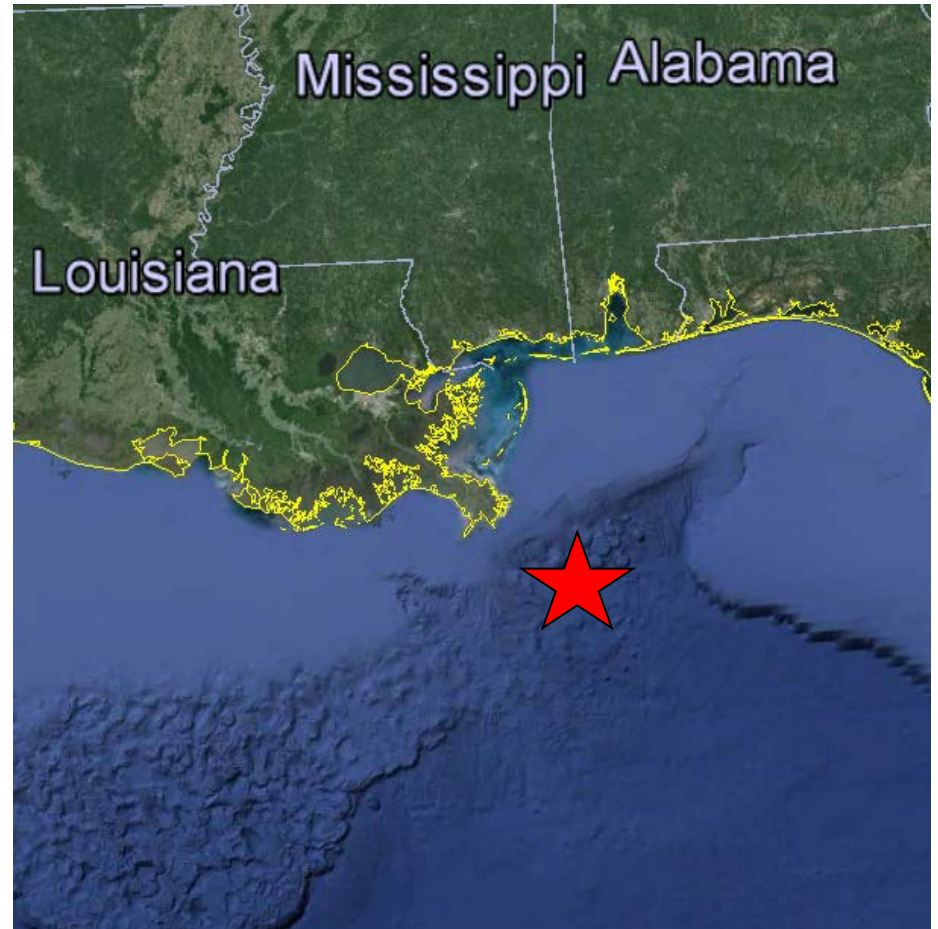
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Oil Spill Scenario

- An oil spill has been reported in the Gulf of Mexico on Tuesday Oct 20 at 2 PM local time.
- The spill was reported at $\sim 89^{\circ}$ W and 28° N



Spill Reported (Spill + 0 hours)

- You call the MDA On Call Acquisition Planner (OCAP) who is available 24/7.

- The OCAP needs to know:
 - Location
 - Approximate size
 - Preferred RADARSAT-2 imaging mode (optional)

- The OCAP starts the acquisition planning process

Acquisition Plan: Downlink Options



There are three options for direct downlink: Gatineau, Miami, Prince Albert

Acquisition Plan: Image Acquisition

- Due to the size of the spill, ScanSAR Narrow (50 m res and 300 km swath width) is selected)
- RADARSAT-2 modes are limited in the E-W direction by the swath width (300 km in this case), but not in the N-S → larger area to account for spill drift
- Acquisition date and times
 - Oct 21 12:00:22 UTC (~ 6 AM local time)
 - Oct 23 23:54:24 UTC (~ 6 PM local time)
- Note that there was an acquisition at ~ 6 PM local time on Oct 20:
 - On the cusp of the 12-hour cutoff
 - Acquisition possible if routine monitoring was in place.

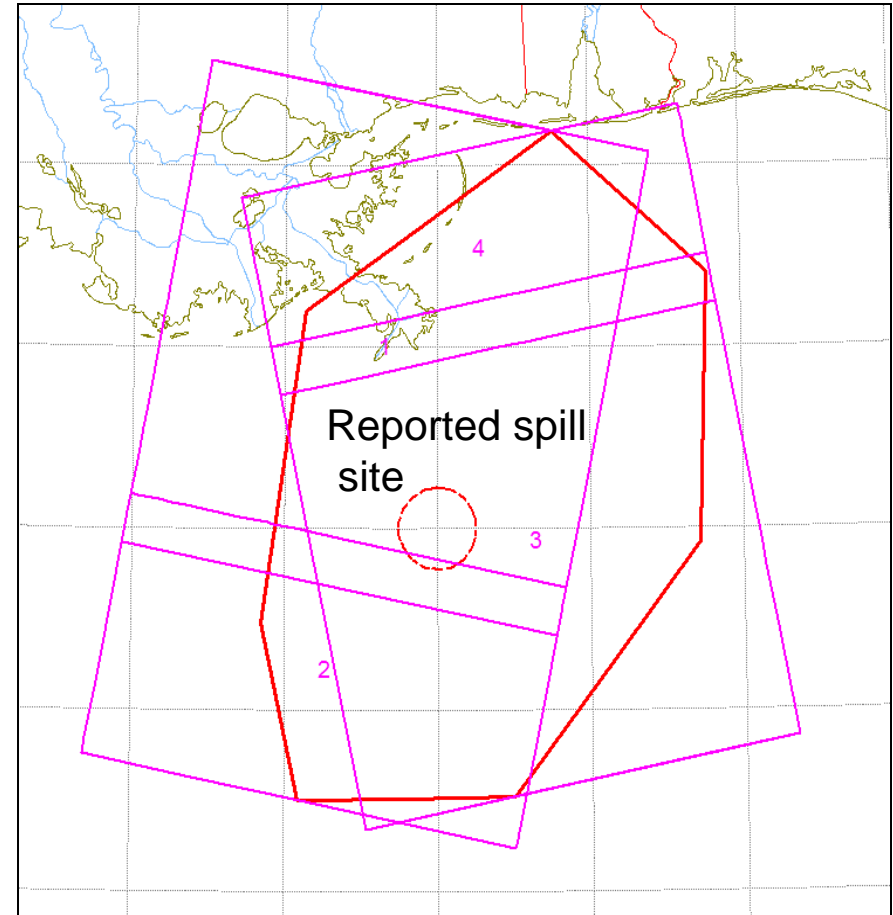


Image Acquisition (Spill + 16 hours)

- The image acquisition is planned for Oct 21 at 12:00:24 UTC with downlink to Gatineau
- The following products and delivery options were requested:
 - Oil spill outline in kml → via email
 - OilTracker report in pdf → via email
 - Processed SAR data → via ftp

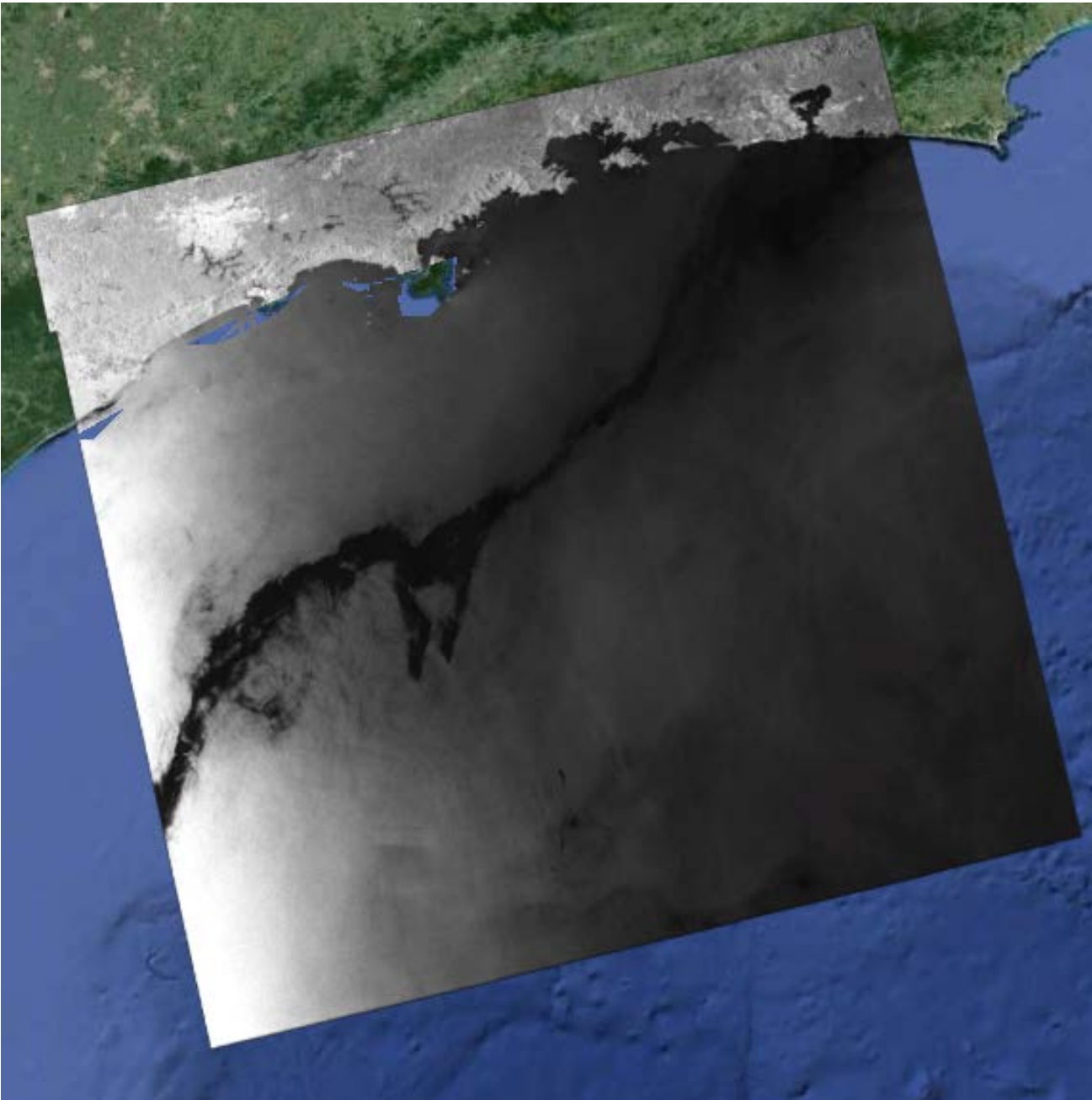
Delivery of Data and Oil Spill Report (Spill + 18 hours)

- The data are downlinked to Gatineau and processed.

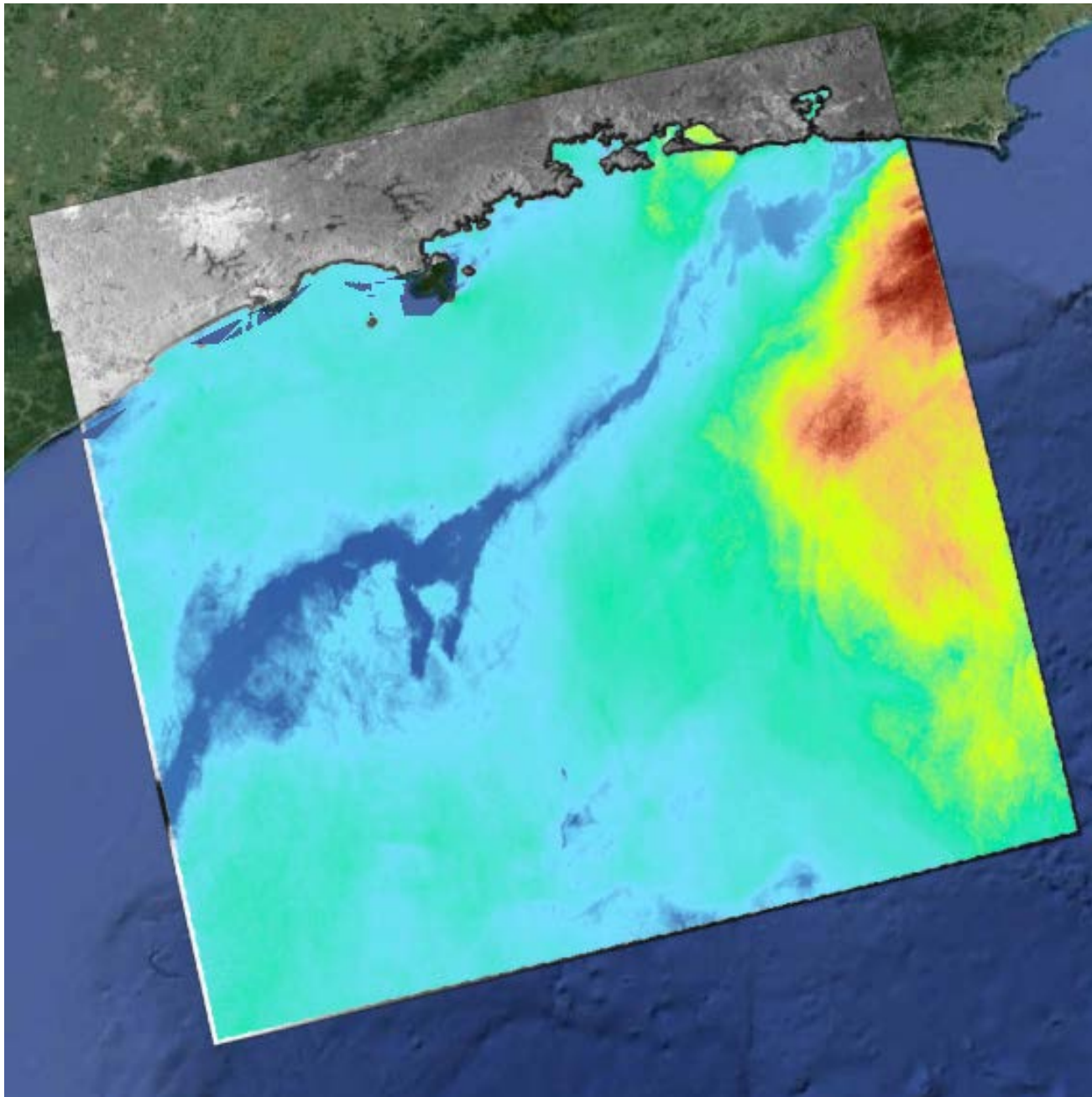
- The image is analyzed:
 - Probable oil slick is delineated
 - False-positives (if detected) are delineated
 - Wind speed is extracted from the image to aid with the image analysis

- The oil spill report is sent via email and the processed data placed on a ftp site.

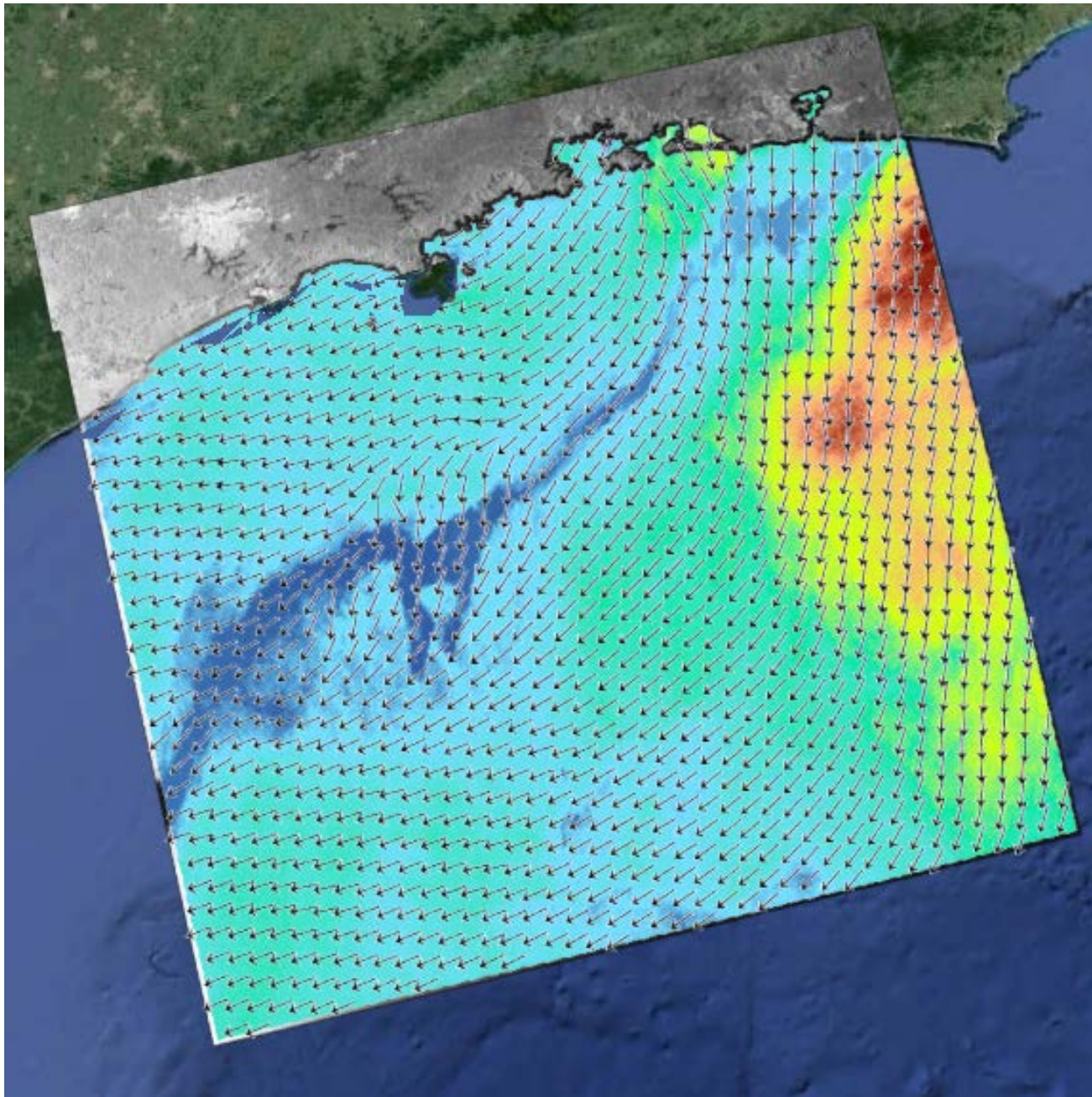
Example of Oil Spill Products



RADARSAT-2
ScanSAR image

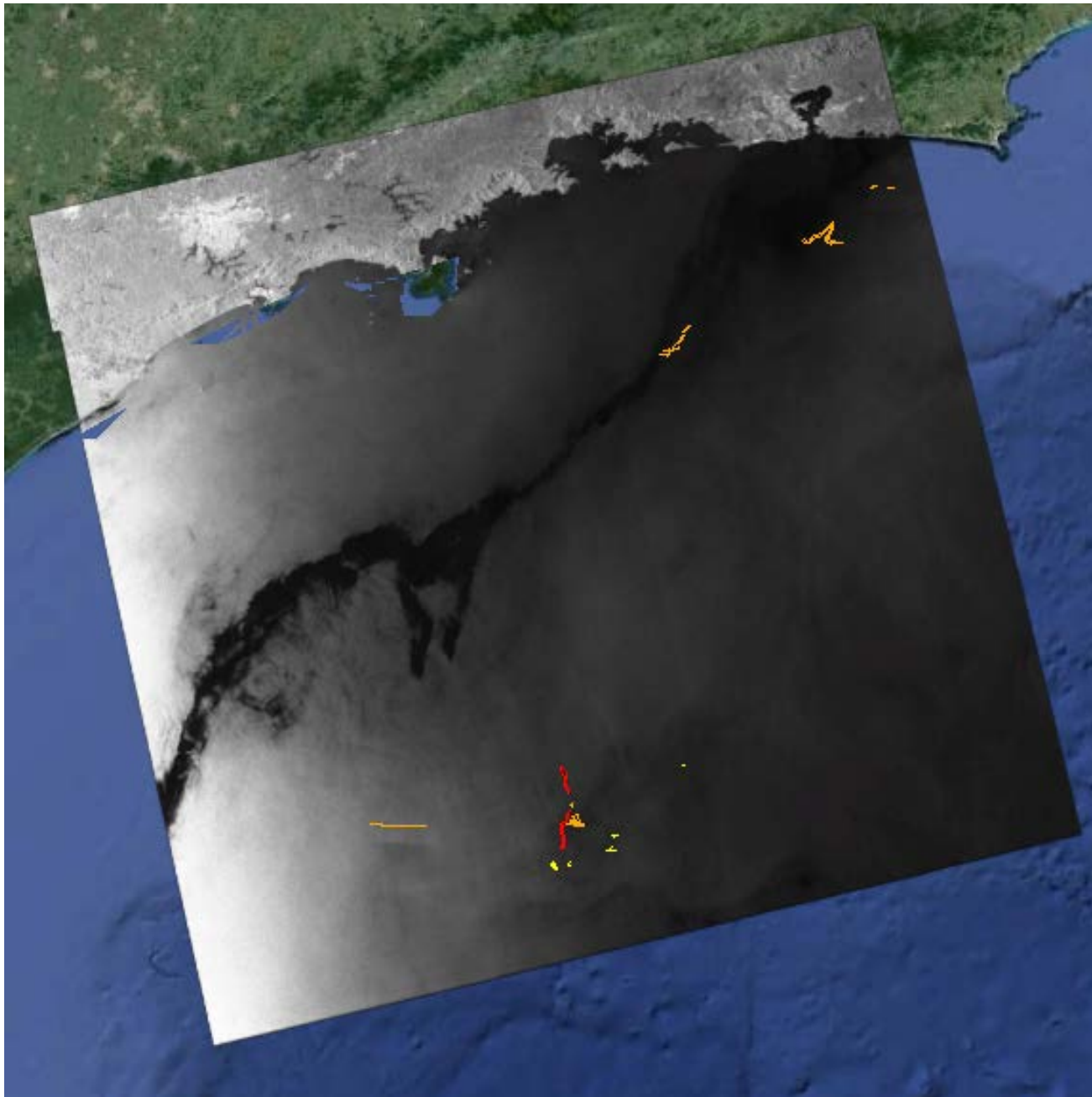


Wind Speed



Wind Speed

Wind Direction

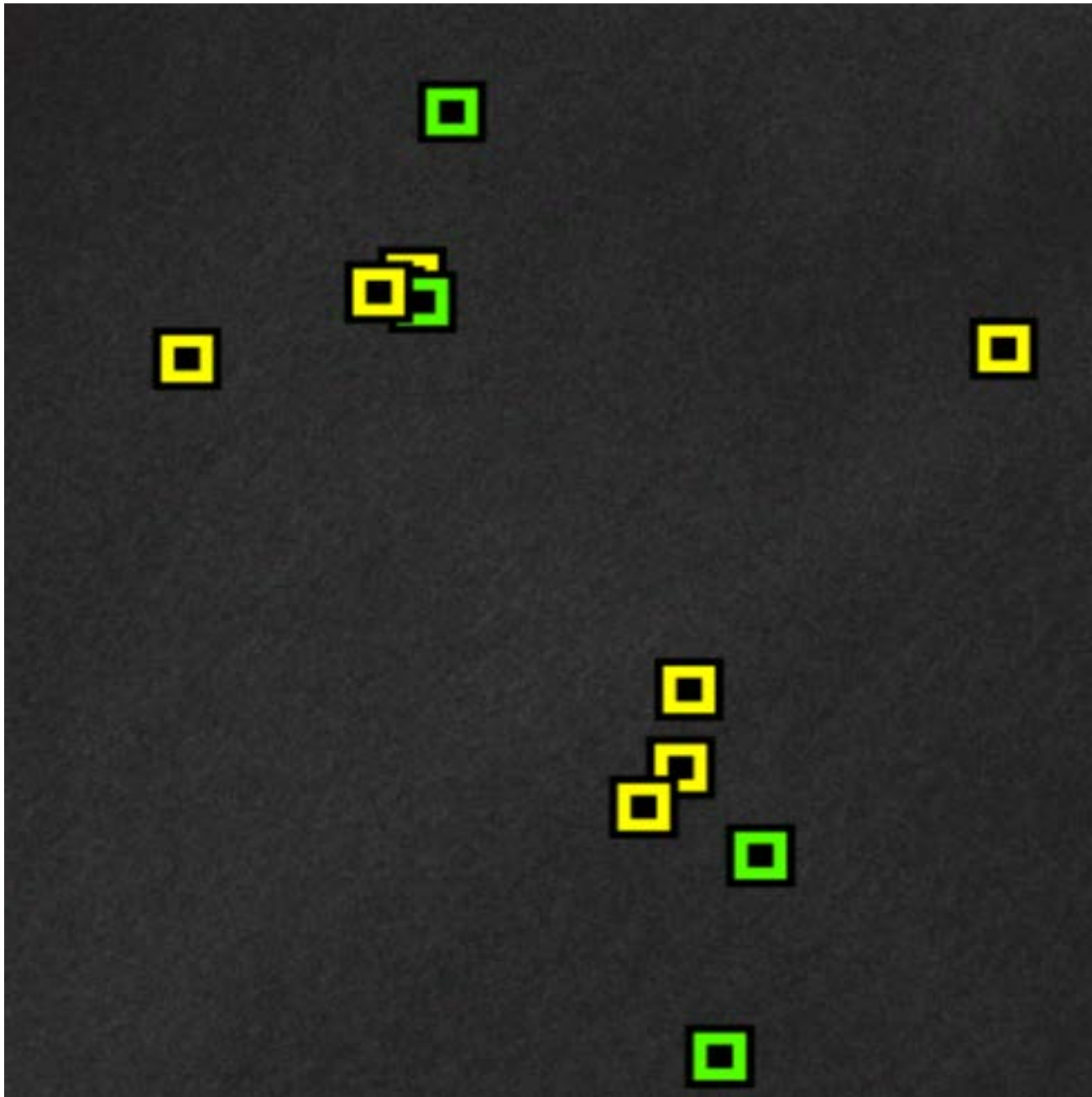


Slicks

- Seeps
- Pollution



Ships/Other



- Ships/Other
- AIS correlated
 - Non-AIS correlated

Summary and Comments

- The practical minimum time from the initial request to acquisition is 12 hours. Note that 4 hours is possible, but only for events defined by the Mission Planning Team (e.g. national security, humanitarian).
- The acquisition was planned using RADARSAT-2 data, but data from other SAR sensors, e.g. TerraSAR-X and COSMO SkyMed, can be acquired.
- The acquisition of the “next available” image was based on there not being a conflict with another planned acquisition. Conflicts can be mitigated by:
 - Asking for favours
 - Acquisitions that have been preplanned for areas of possible oil spills, e.g. shipping convergence zones, areas of intense oil&gas activities
- Once the spill site has been identified, the deterministic nature of satellite orbits means that acquisition date/time and the downlink date/time are known.
- The only variables are the image analysis time (depends on scene complexity) and data delivery (depend on internet bandwidth), but these are typically < 2 hours.

Image Credits and Disclaimer Language

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