KSAT
KONGSBERG SATELLITE SERVICES

MARTINE ESPESETH
HUGO ISAKSEN

Framtidens Satellittbasert Oljetjeneste

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Agenda

Informasjon

- Nye satellitter

- Sky
- Automatisering
- Utvidelse av bakkenettverk

- Tykkelse
- SAR metocean
- Drift
- Tidsserie
- Web-løsning

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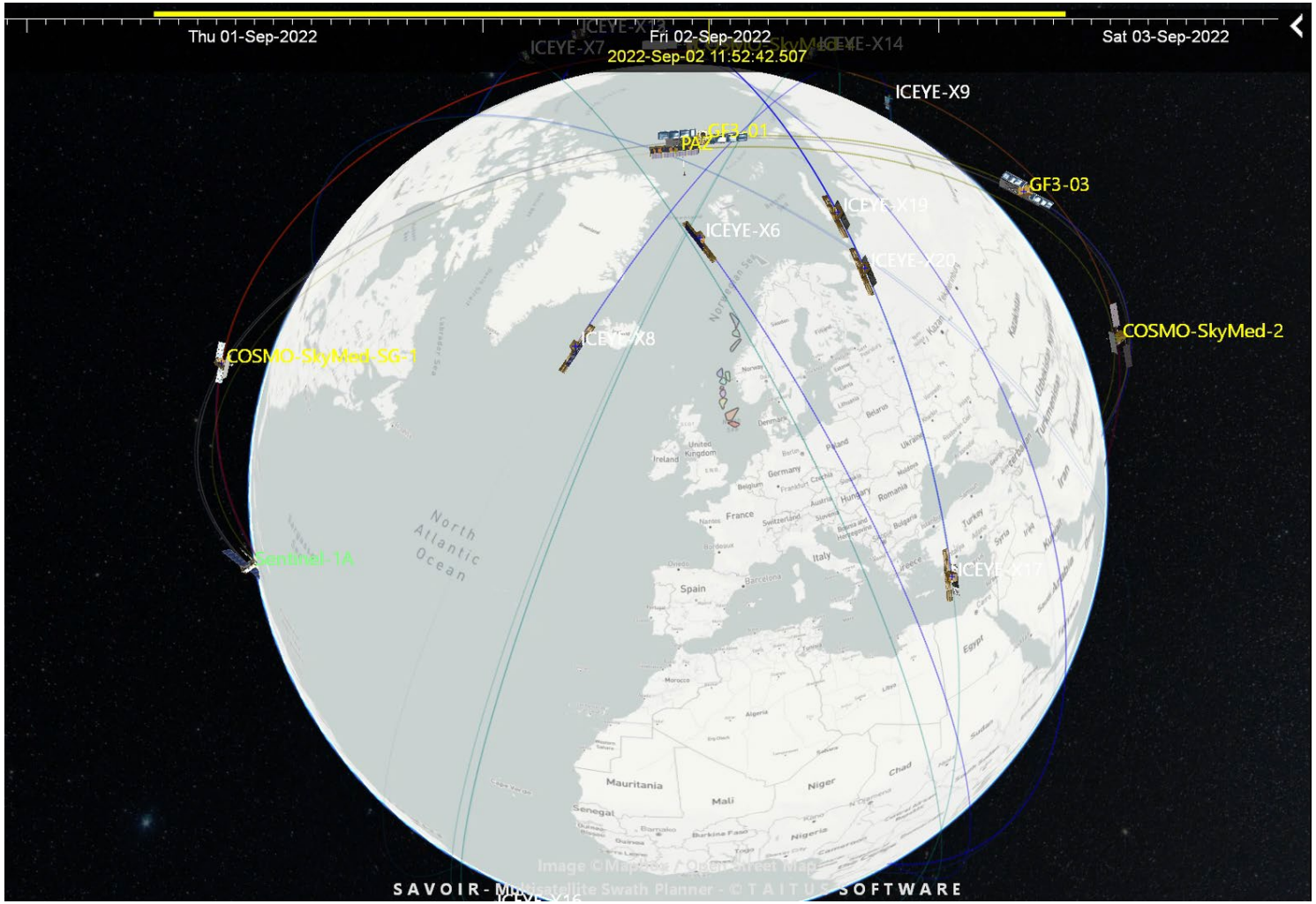
Oftere informasjon

Nye Satelliter

Space

SAR
- Radarsat-2
- TerraSAR-X
- PAZ-1
- Sentinel-1
- Cosmo Skymed
- Cosmo 2nd
- ICEYE
- GF-3
- RISAT*
- Capella*

Optical
- Sentinel-2
- Landsat
- Superview
- Kompsat



Oftere informasjon

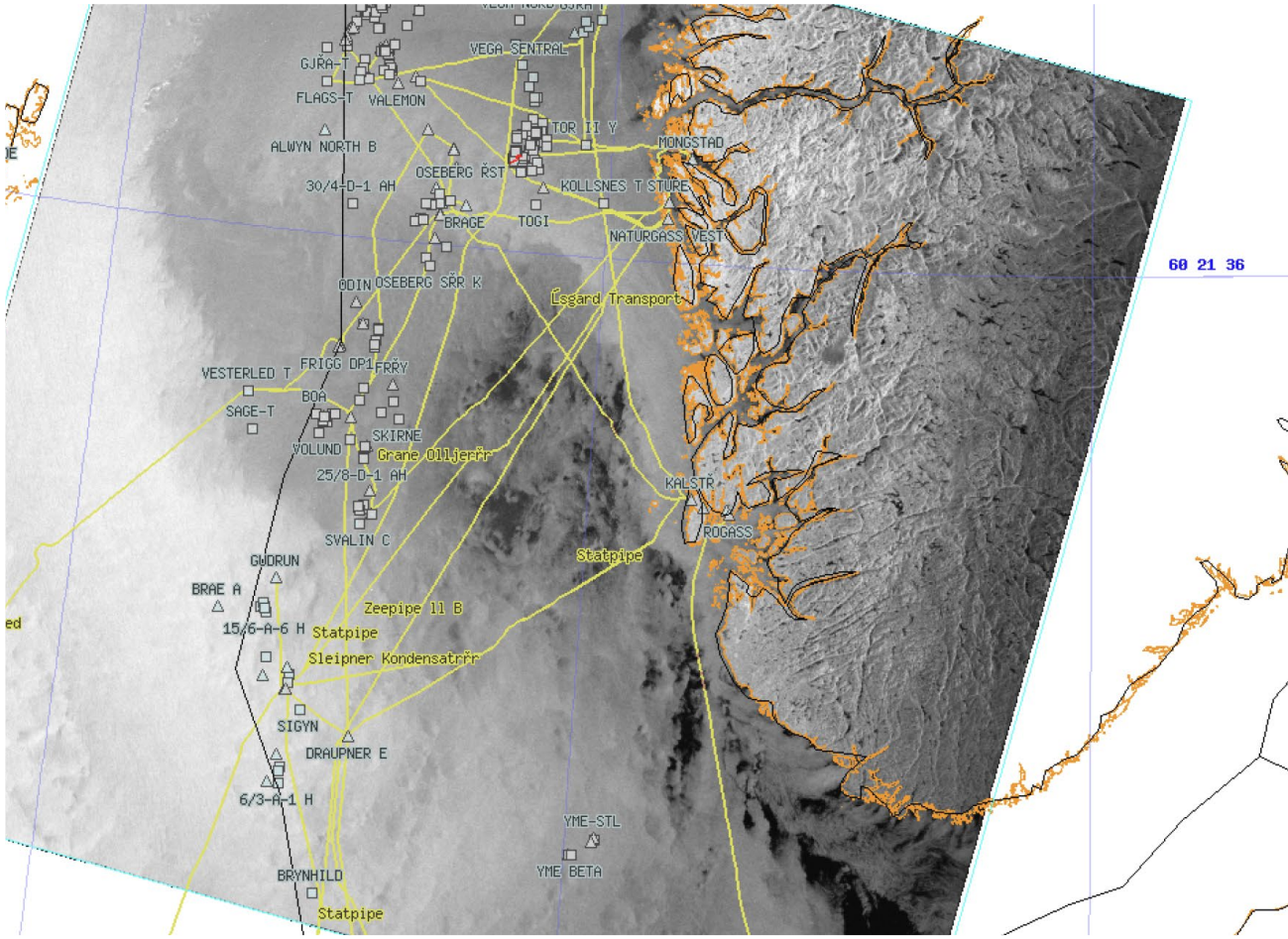
Nye Satelliter

Size matters, but why?

1. A large scene gives the overview and it is possible to discriminate between low wind areas, biogenic slicks, and manmade slick

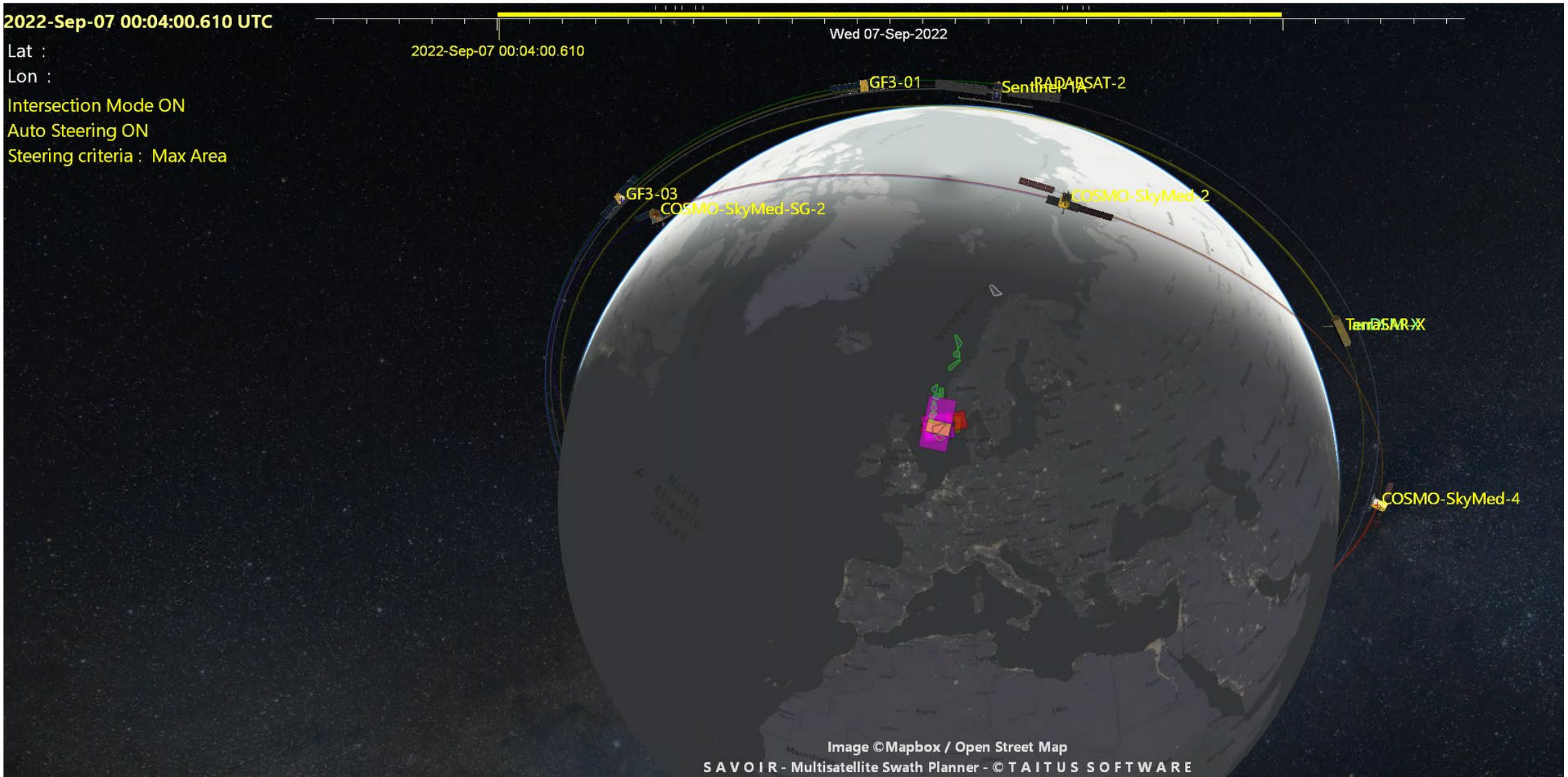
2. Oil spills drift and there's a delay from ordering to imaging.

3. Cost and data transfer efficiency



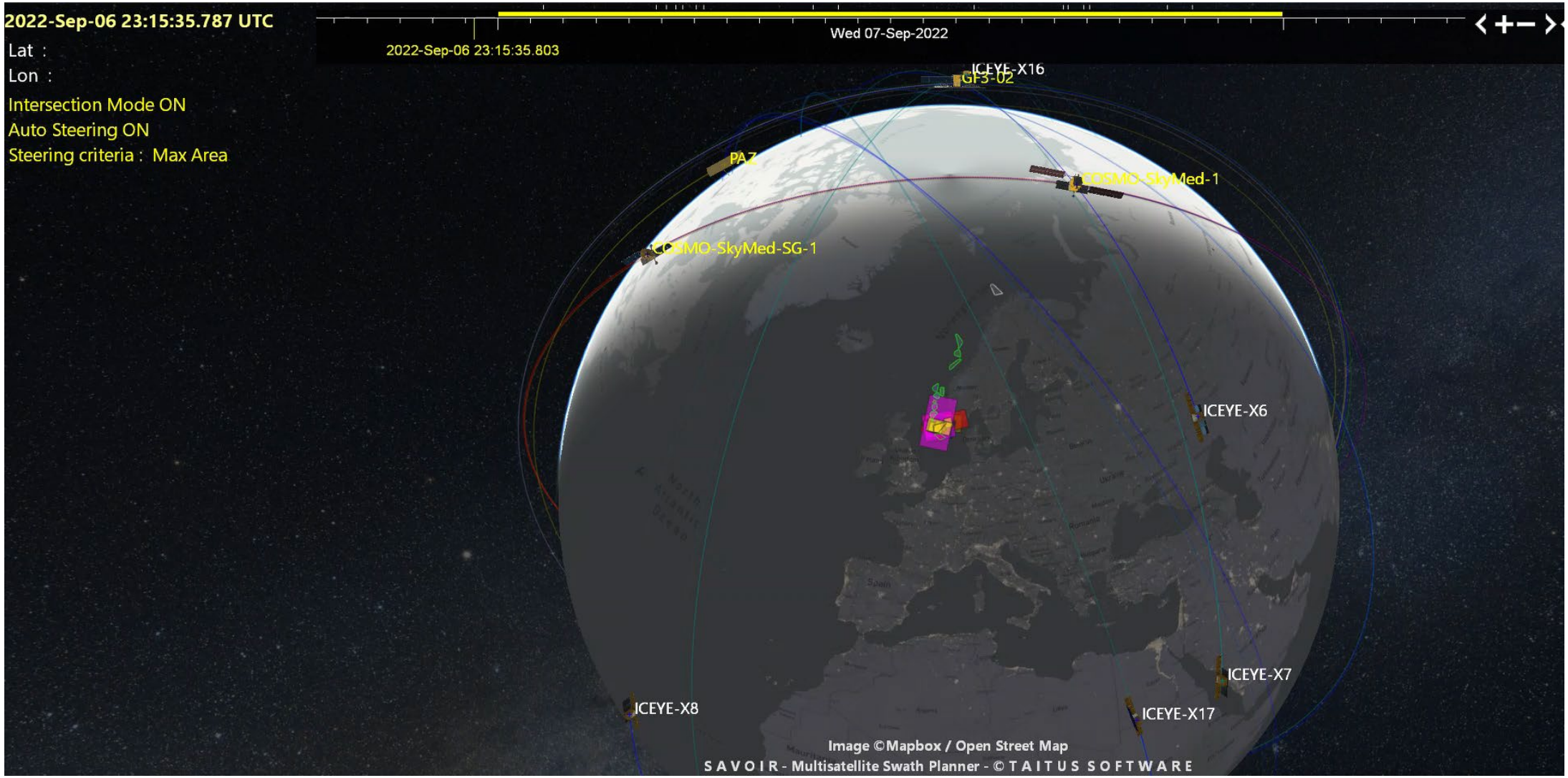
Oftere informasjon

Nye Satelliter



Oftere informasjon

Nye Satelliter



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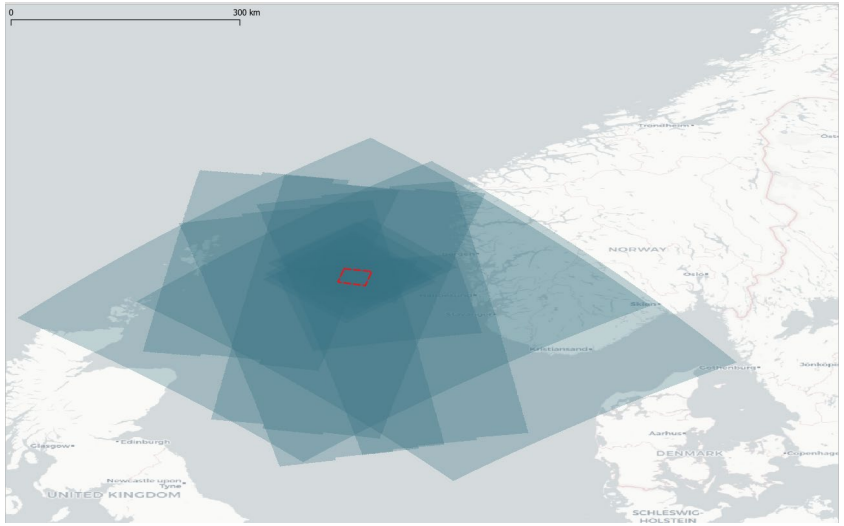
Nye Satelliter



OPV 2022 (20 SAR scener på 10 dager!)

Dag/ Tid	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							SAR											SAR						
2							SAR											SAR						
3							SAR						SAR					SAR			SAR			
4						SAR	SAR					Optical						SAR						
5							SAR					Optical						SAR						
6						SAR	SAR											SAR						
7							SAR					Optical												
8																								
9												Optical			SAR	SAR								

SPACE NORWAY

MicroSAR

MicroSAR

World leading satellite for Maritime Monitoring

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Pressemelding
2608 2022

Nyheter

OVERVÅKER: Fra 2025 vil satelitter se etter skip som forsøker å skjule identiteten sin. Illustrasjon: Surrey Satellite Technology

Unik teknologi skal vokte norske interesser fra 600 kilometers høyde

Satellittsystemet MicroSAR er skreddersydd for havovervåkning og kan fange opp små fartøy over store områder. Kombinasjonen i denne teknologien er unik, ifølge konserndirektør Dag Stølan.

Stephan Pettersen
SP@FOFO.NO

PUBLISERT Fredag 26. august 2022 - 09:08 SIST OPPDATERT Fredag 26. august 2022 - 10:05

See also:

[Pressemelding: Space Norway bygger satelittsystem for sanntidsovervåking av norske havområder | Space Norway]

[KSAT adds new satellite to its multi mission vessel detection service - KSAT - Kongsberg Satellite Services]

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About MicroSAR

- Optimized for maritime surveillance / monitoring (VDS) using a unique combination of high resolution and wide area coverage

- SAR + AIS

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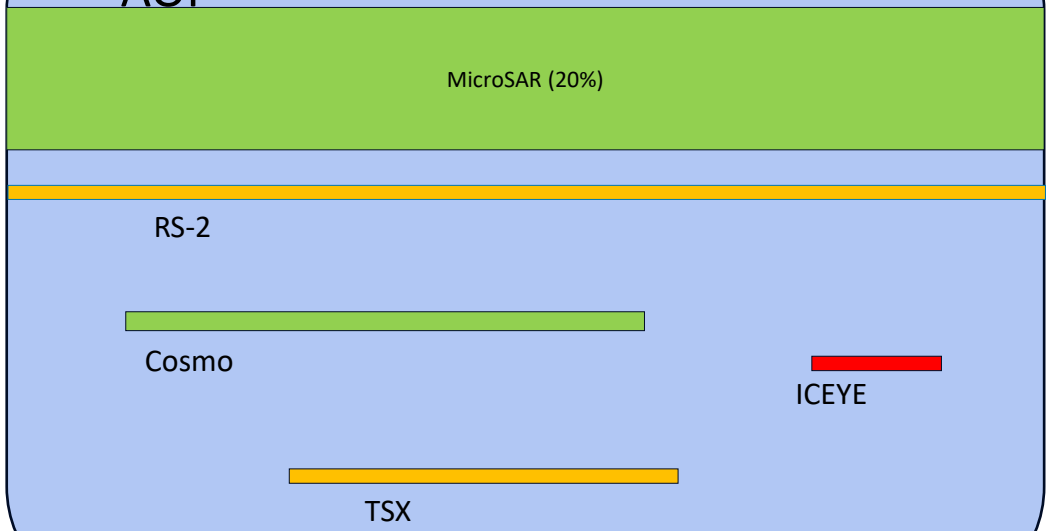
MicroSAR: Worlds best for Maritime Surveillance!

- Coverage:
  - As much as possible of the AOI
- Sensivity:
  - < 100 m^2
  - Sufficient for detecting small vessels
- Resolution:
  - 3m x 3m
  - Sufficient for classification

Theoretical coverage per orbit vs No AOI



- MicroSAR:
  - 10 times coverage and resolution
    - 100 times as much information
  - High speed downlink
  - Similar detection capability as the market leader

Satellite / Mode	Resolution [m]	Swath [km]	Length [km]	Coverage [M km^2]	FoM
TerraSAR-X, Strip map	3	30	1500	0,045	0,55
TerraSAR-X, Wide ScanSAR	40	270	1500	0,405	0,55
RadarSAT-2; High Resolution	5	30	6000	0,18	1,18
RadarSAT-2; ScanSAR Medium	50	300	6000	1,8	1,18
RadarSAT-2; ScanSAR Wide	100	500	6000	3	1,18
Cosmo Skymed MT2 WAS	100	200	2000	0,4	1,65
Cosmo Skymed MT2 IMA	3	40	2000	0,08	1,65
ICEYE X1 SM	3	30	500	0,015	0,26
ICEYE X1 SC	15	100	100	0,01	0,26
MicroSAR	3	300	4000	1,2	1,14

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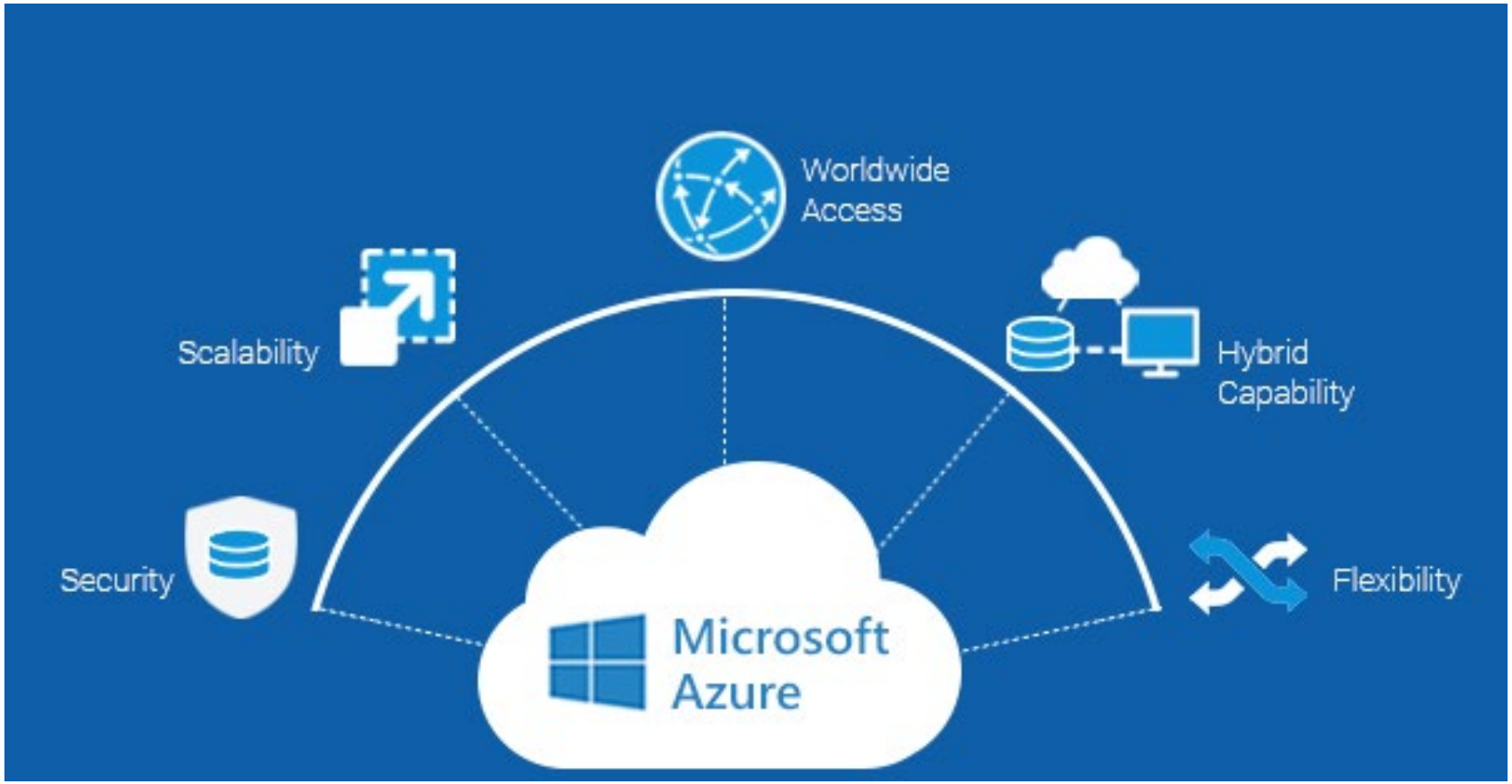
Raskere informasjon

Skyprosessering



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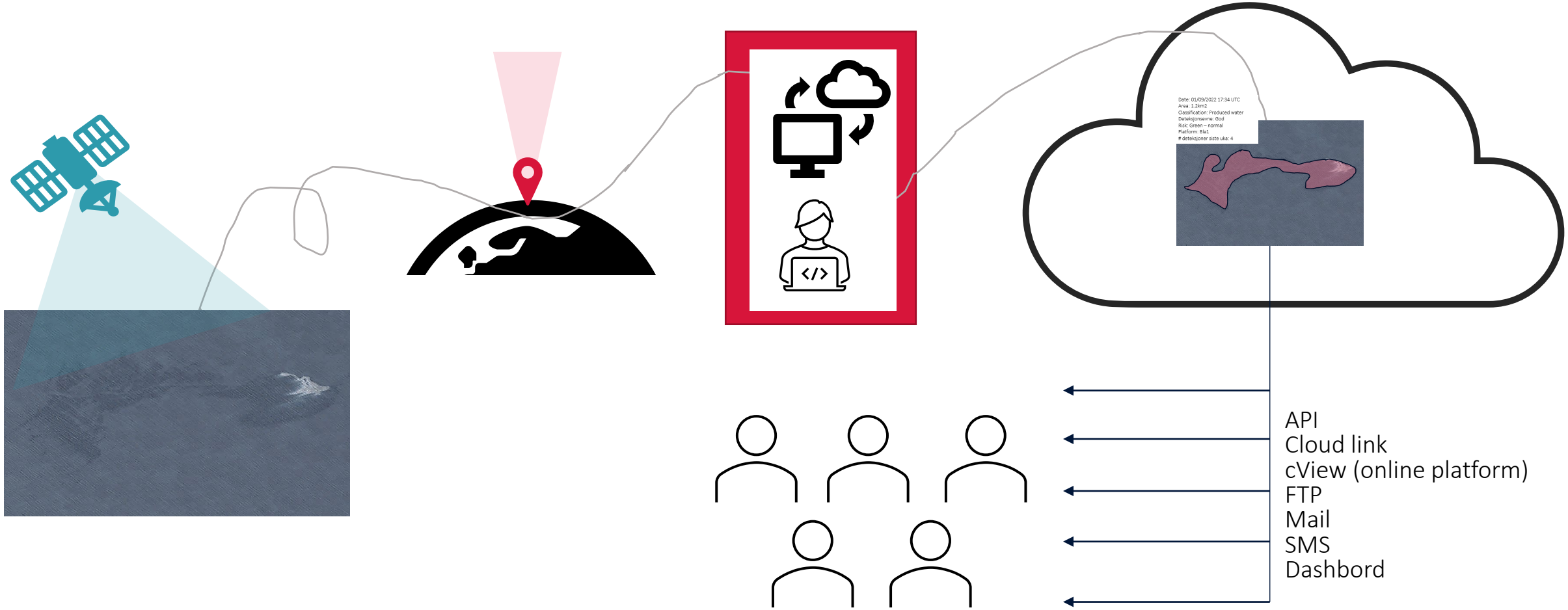
Raskere informasjon

Automatisk tjeneste



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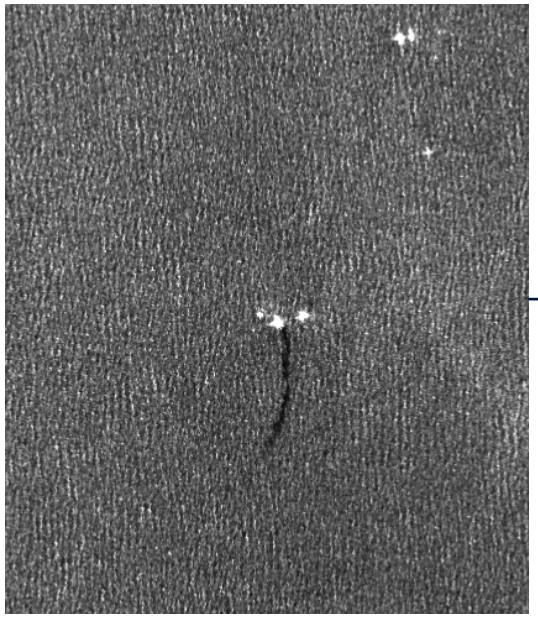
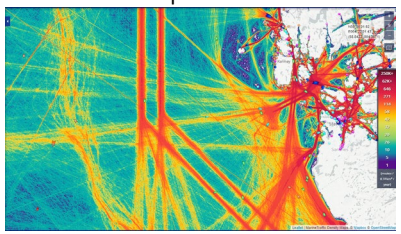
Raskere informasjon

Automatisk tjeneste – Oljedeteksjon og klassifisering

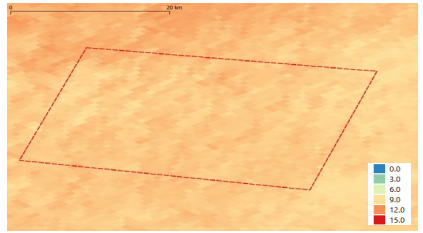


Machine Learning

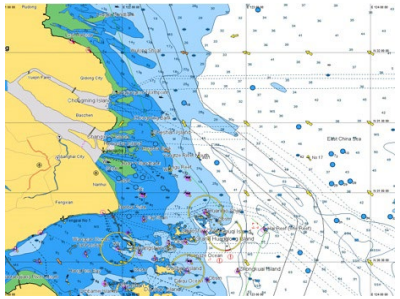
Skips trafikk



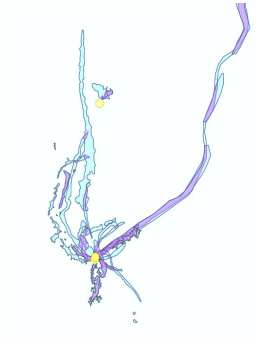
Vind



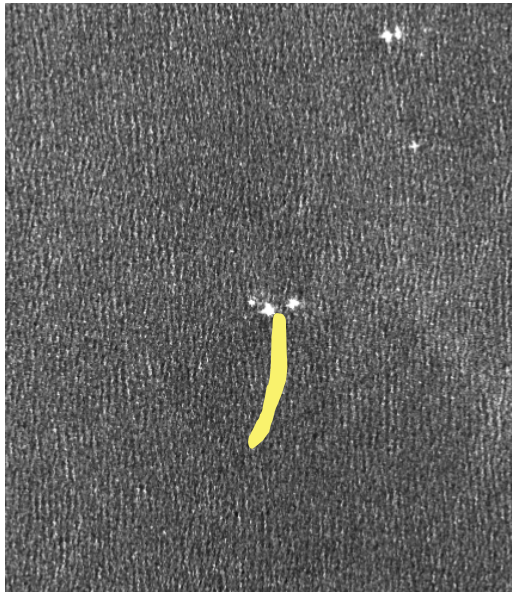
Sjøkart



Historikk



Date: 01/09/2022 17:34 UTC
Area: 1.2km2
Classification: Produced water
Deteksjonsevne: God
Risk: Green – normal
Platform: Bla1
deteksjoner siste uka: 4



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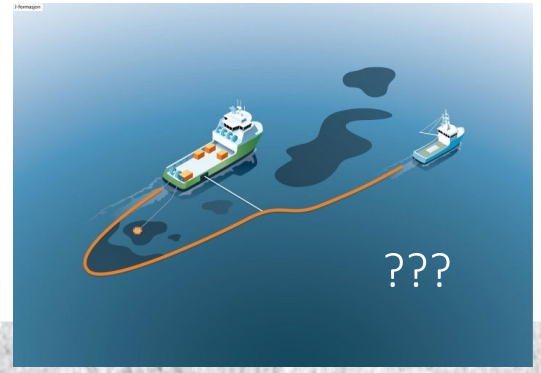
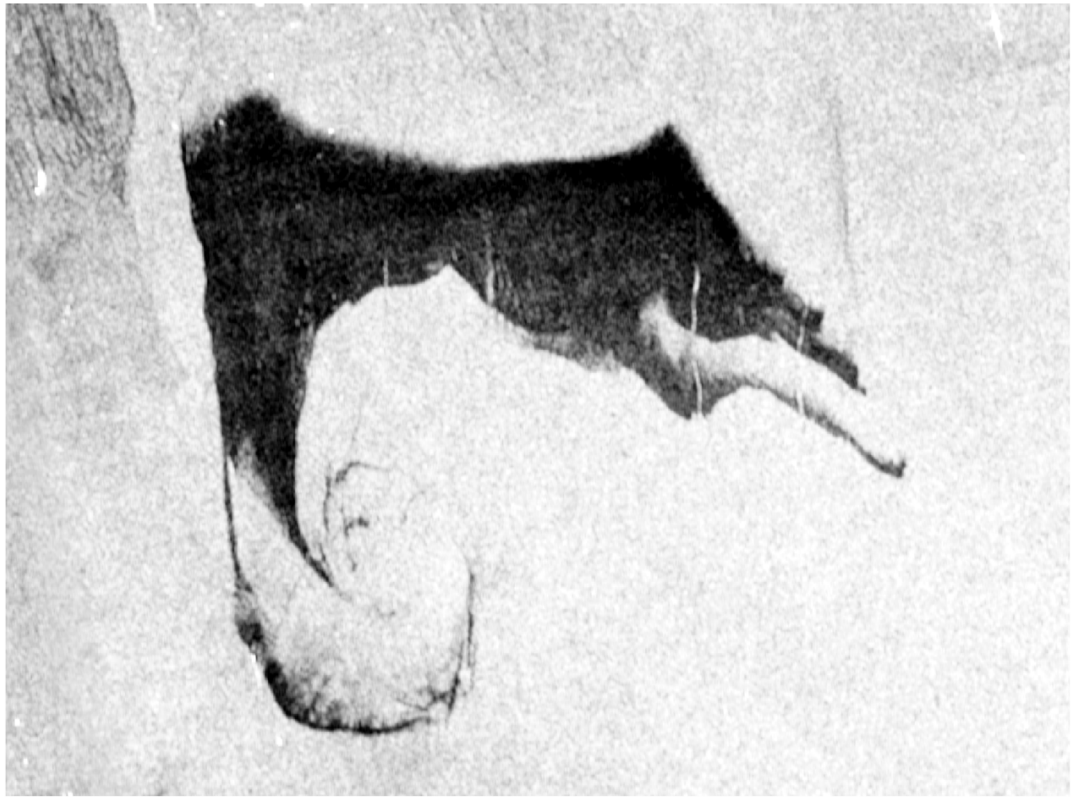
Mer Informasjon

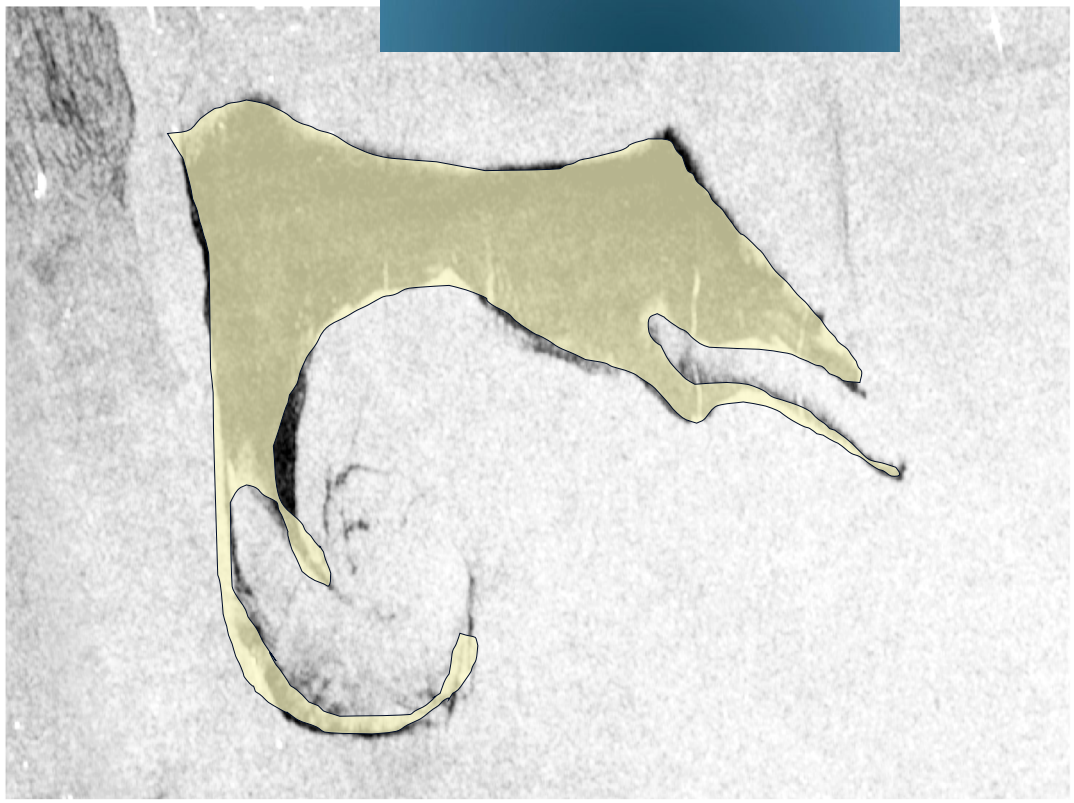
Tykkelse



SAR bile med oljesøl



Oljedeteksjon

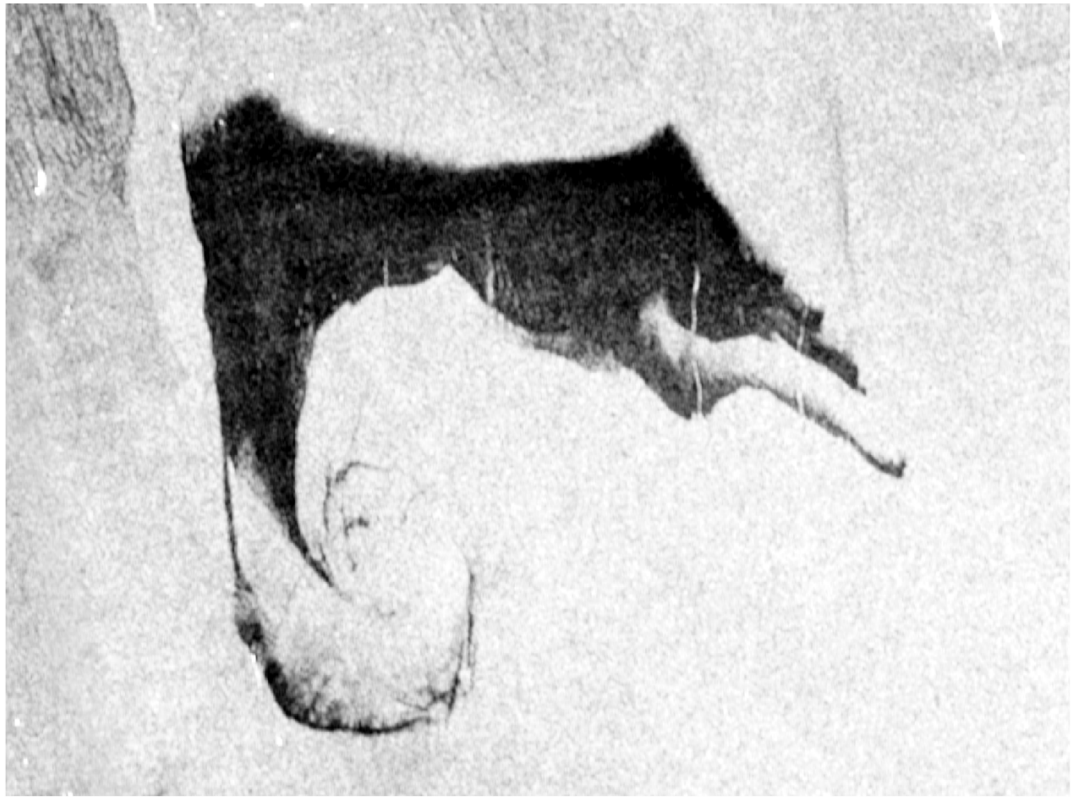


20km2 = 3400 fotballbaner

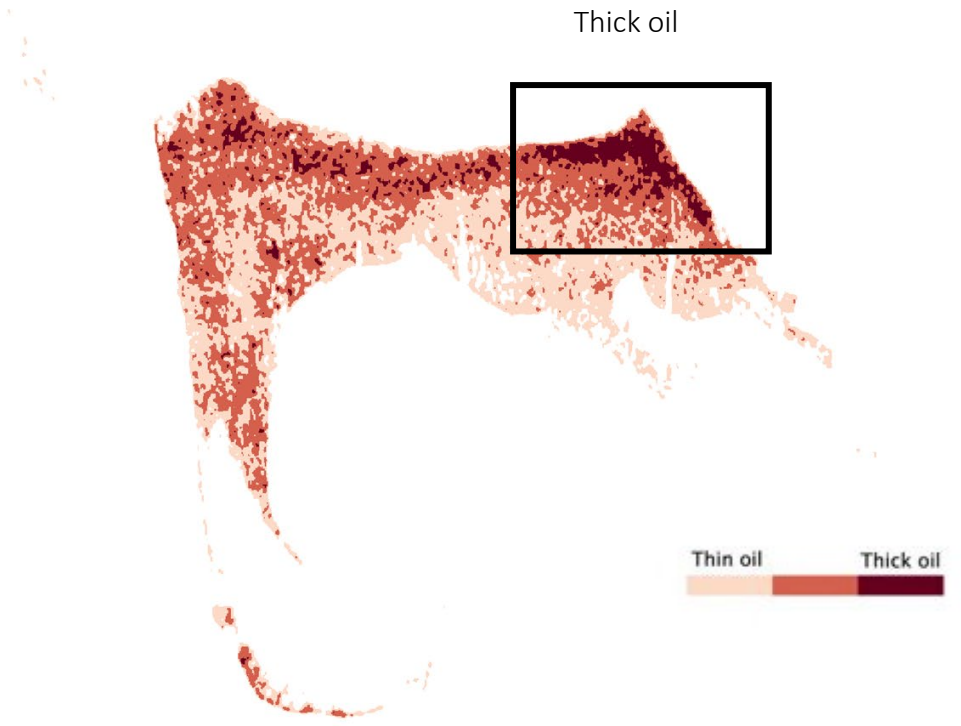
Mer Informasjon

Tykkelse

SAR bile med oljesøl



Damping Ratio ~ Relative thickness

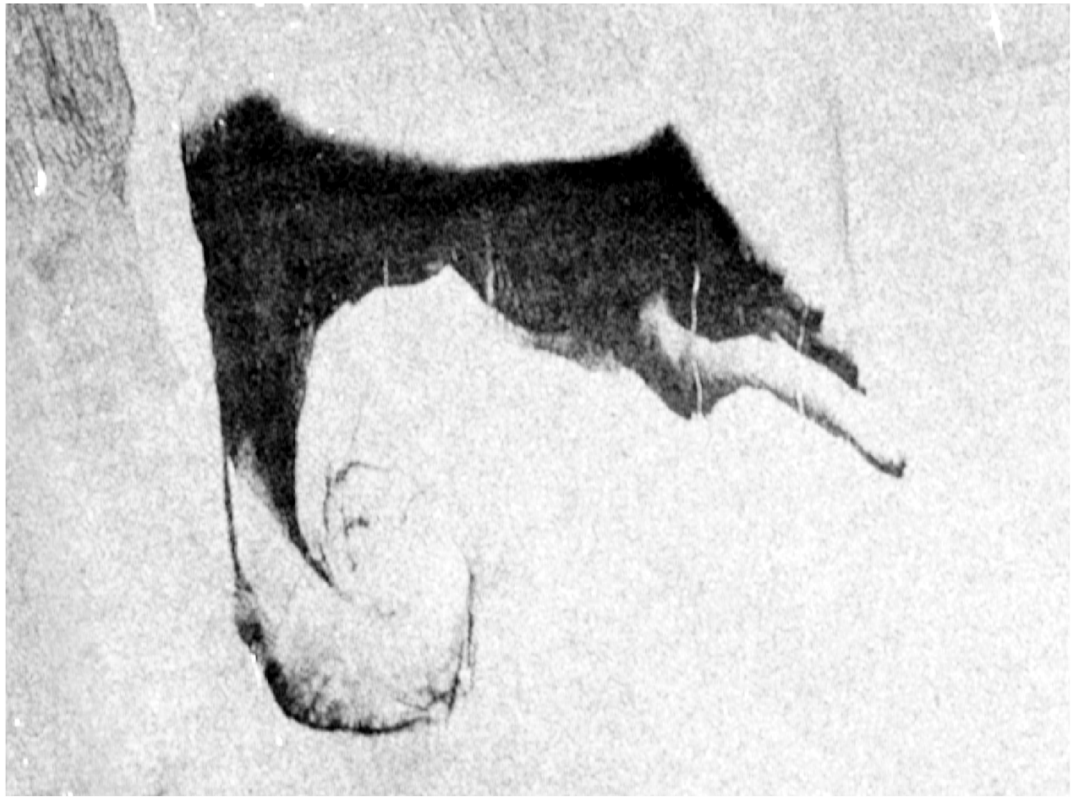


20km2 = 3400 fotballbaner

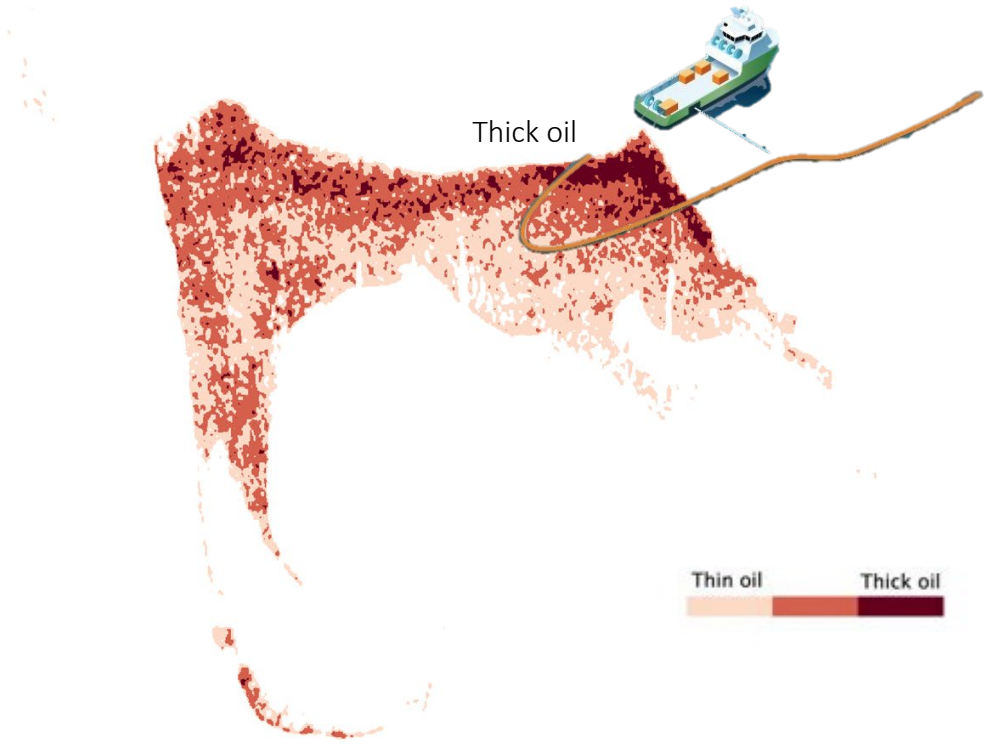
Mer Informasjon

Tykkelse

SAR bile med oljesøl



Damping Ratio ~ Relative thickness



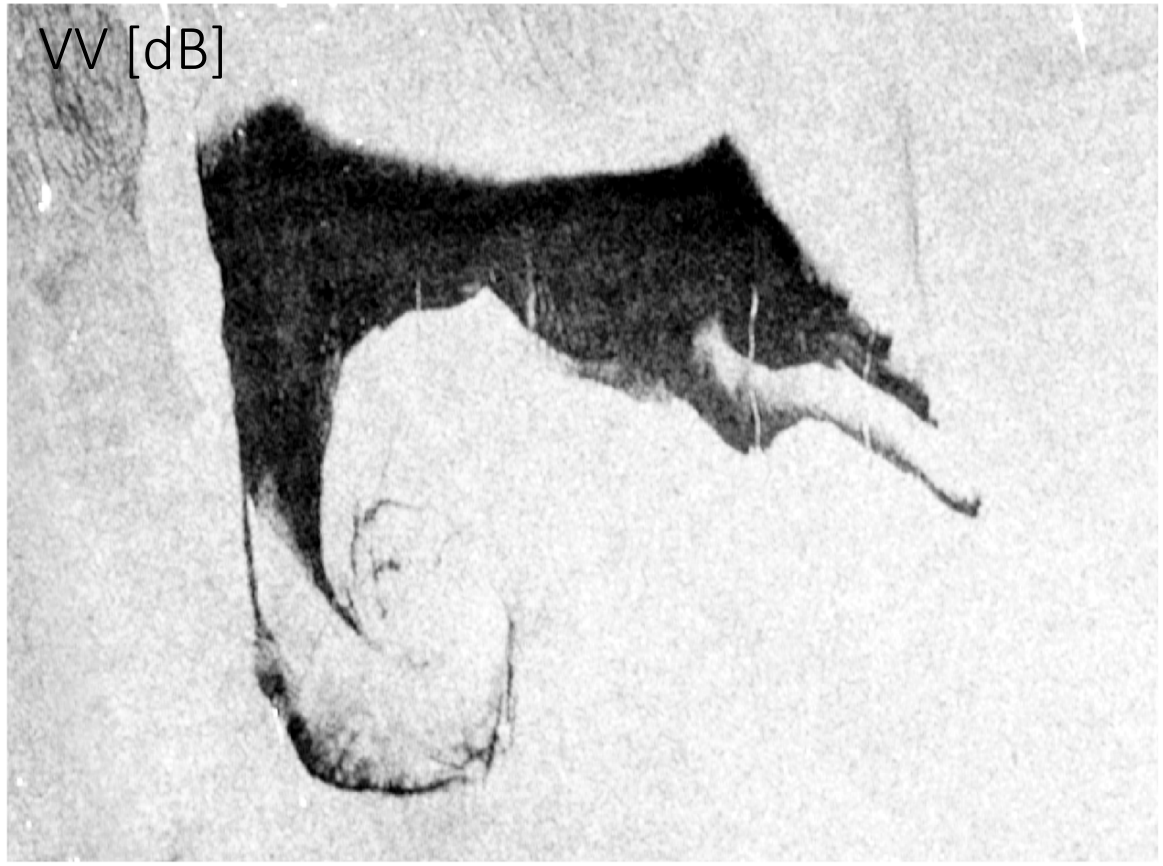
20km2 = 3400 fotballbaner

Mer Informasjon

Tykkelse

Sentinel-2

Gaofen-3

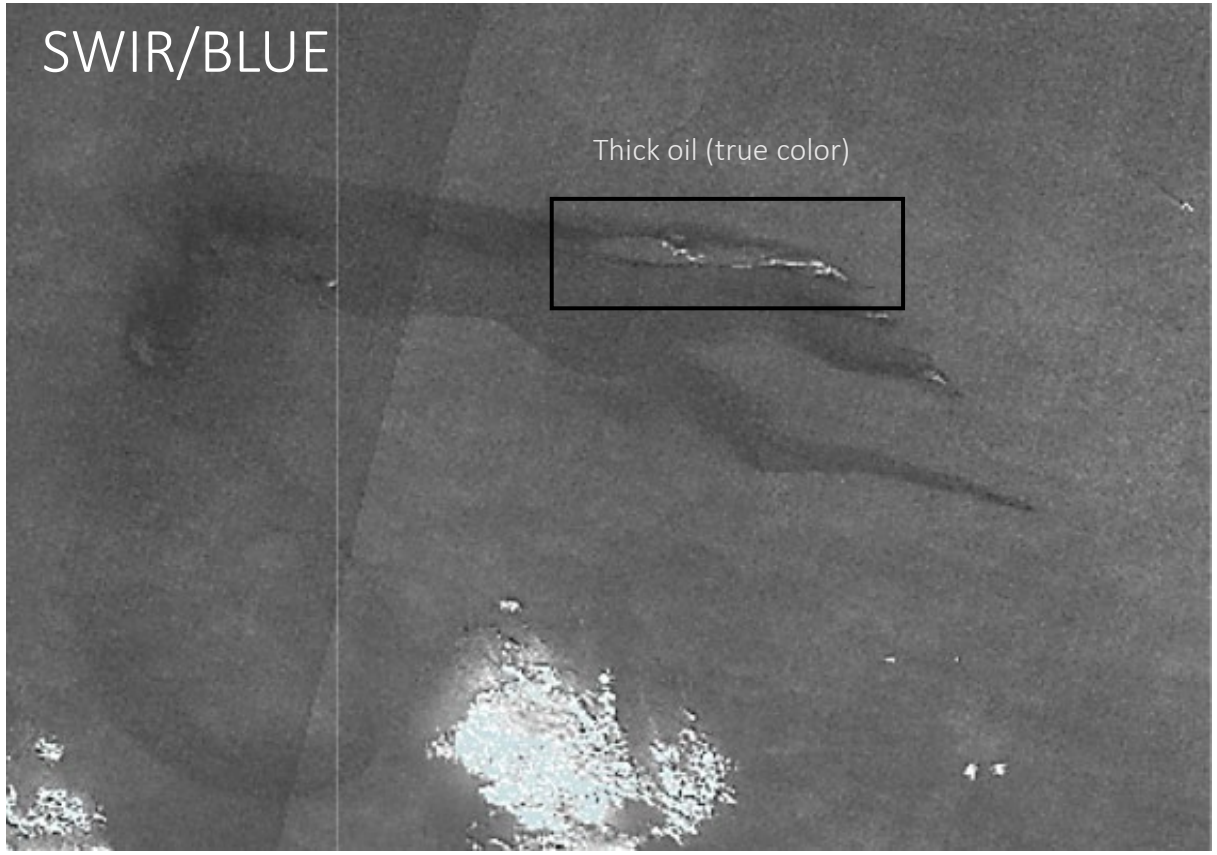


Contains modified Copernicus Sentinel data 2022, processed by KSAT

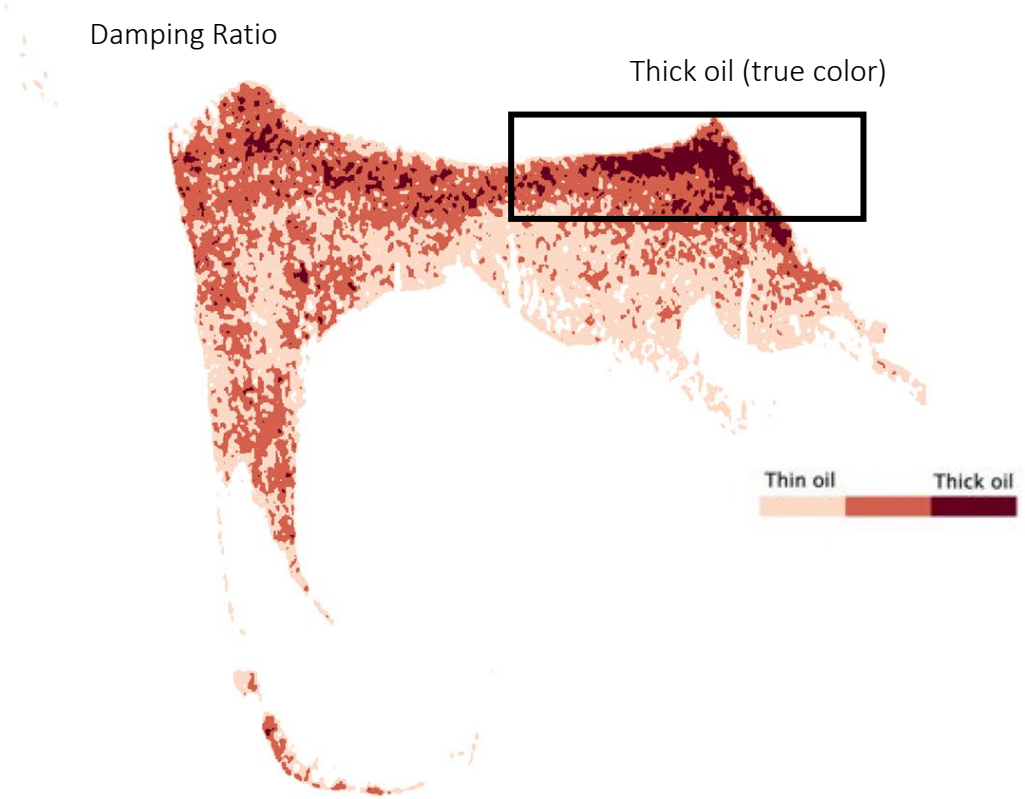
Mer Informasjon

Tykkelse

Sentinel-2



Gaofen-3



Damping ratio proxy to **relative oil thickness**. Still in testing phase.

Contains modified Copernicus Sentinel data 2019, processed by KSAT

Mer Informasjon

Optisk

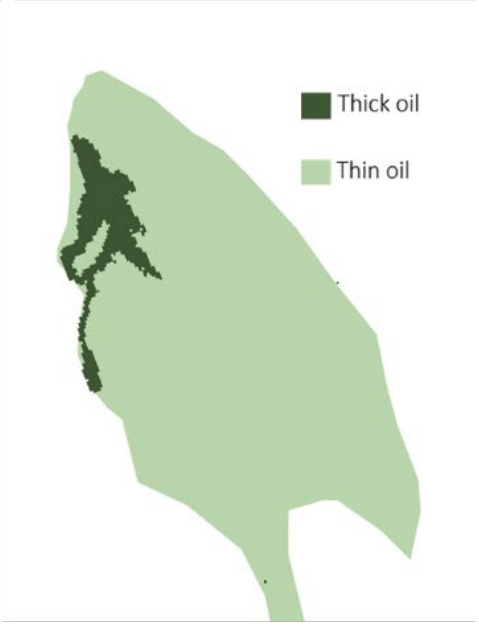
3 Probable Spill Detection

Detection	
Detection Time	2021-08-09 06:56UTC
Central Position Lat Lon	25°25'39.520"N 54°28'59.470"E
Thickness Positions Lon Lat	1) 25°25'43.780"N 54°29'11.290"E 2) 25°25'21.660"N 54°28'51.650"E
Area (sq km)	7
Comment	Two thickness classes detected. True colored oil observed in the center part of the slick.

Sentinel-2: RGB

Sentinel-2: SWIR

Detections



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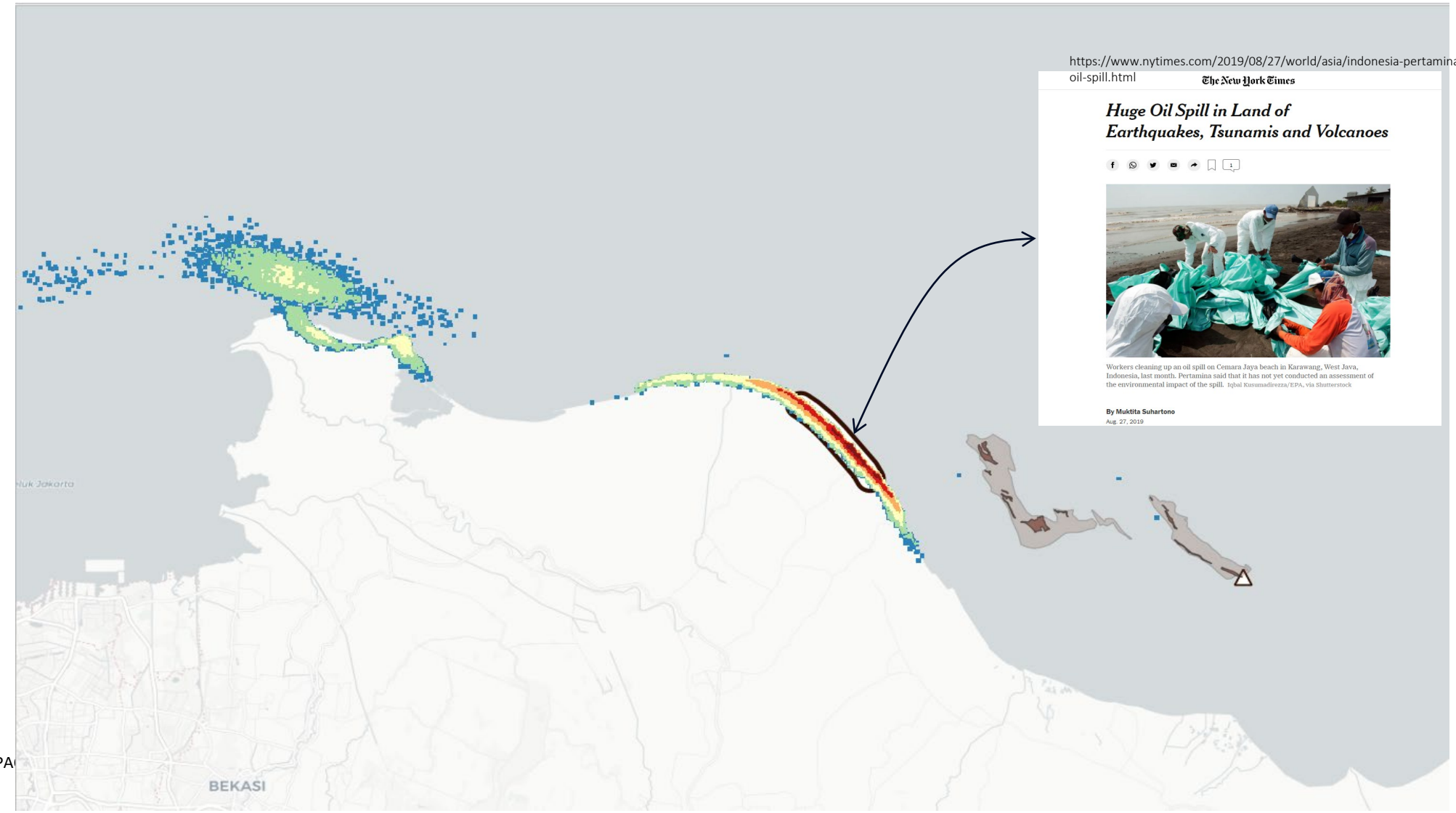
Mer Informasjon

Drift



https://www.nytimes.com/2019/08/27/world/asia/indonesia-pertamina-oil-spill.html

The New York Times

Huge Oil Spill in Land of Earthquakes, Tsunamis and Volcanoes

Workers cleaning up an oil spill on Cemara Jaya beach in Karawang, West Java, Indonesia, last month. Pertamina said that it has not yet conducted an assessment of the environmental impact of the spill. Iqbal Kusumadireza/EPA, via Shutterstock

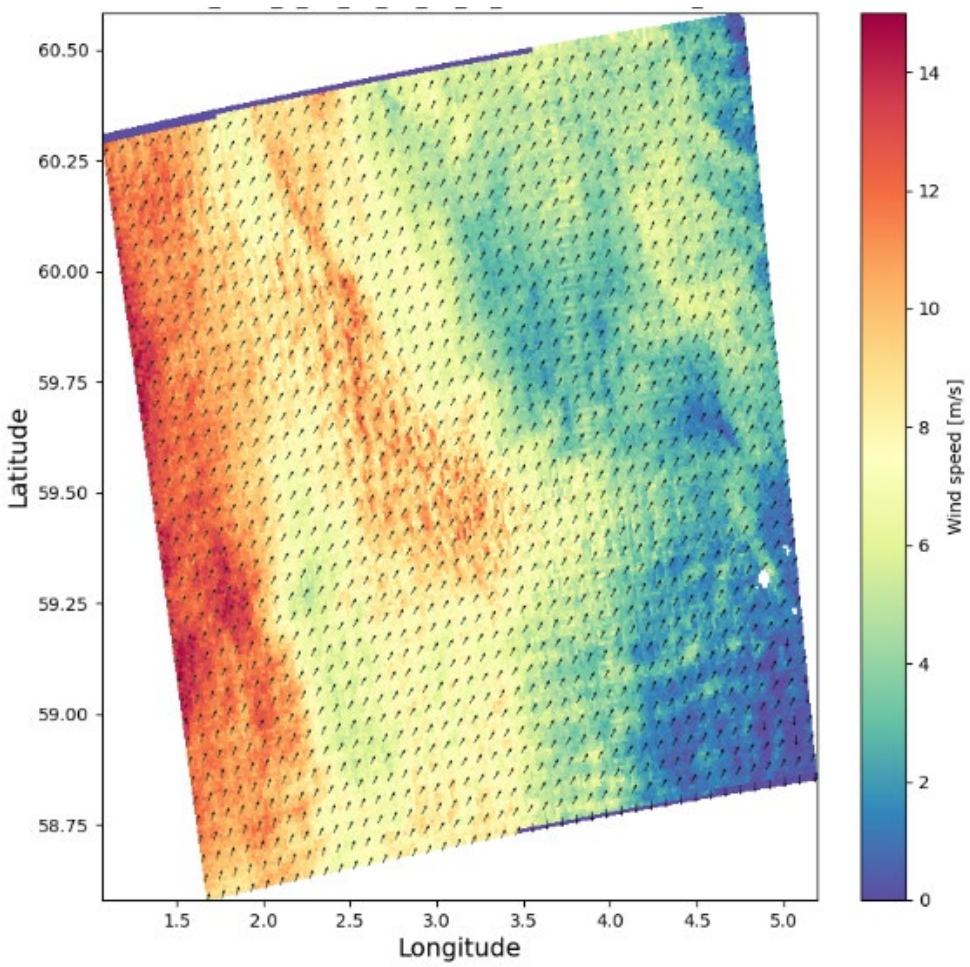
By Muktita Suhartono

Aug. 27, 2019

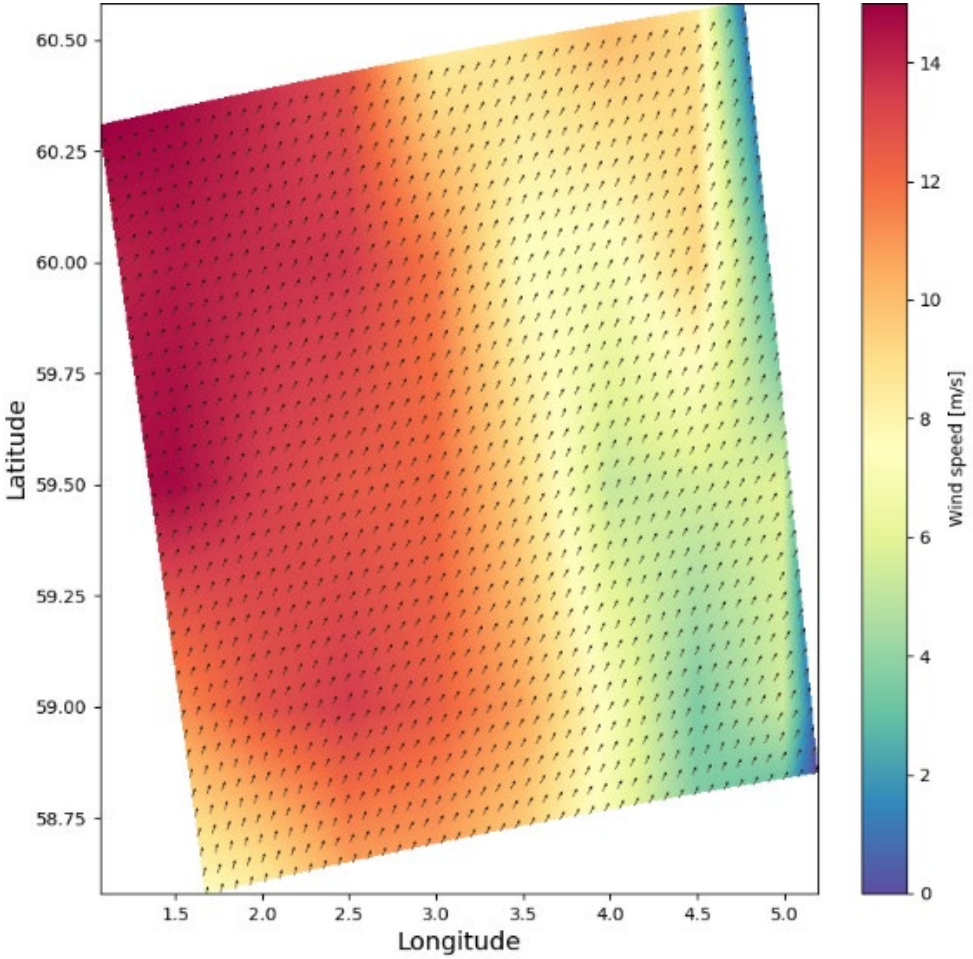
Mer Informasjon

SAR metocean

SAR Wind

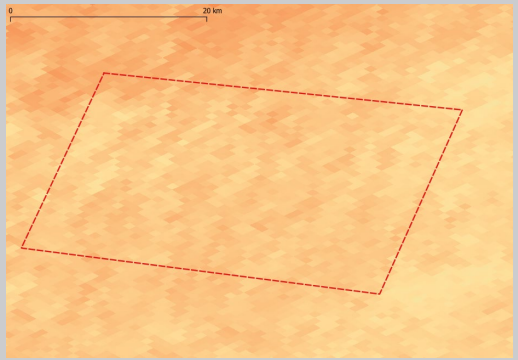
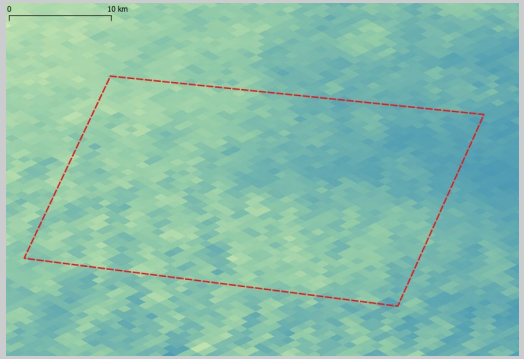
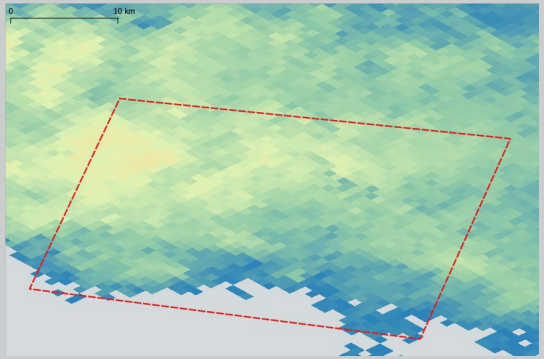
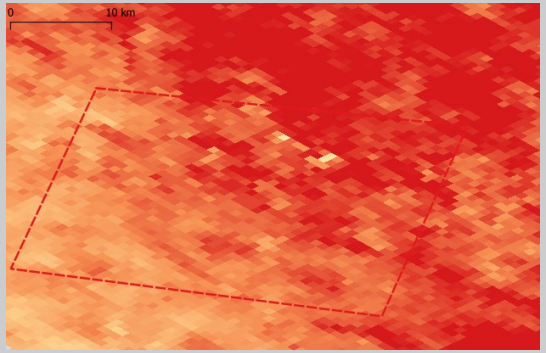


Model wind



Mer Informasjon

SAR metocean

2022-Jun-07 06:12 UTC	2022-Jun-08 06:04 UTC	2022-Jun-09 12:40 UTC	2022-Jun-09 20:06 UTC
			
SAR wind ~10m/s SAR wave height ~0.2m	SAR wind ~2m/s SAR wave height ~0.22m	SAR wind ~3-5m/s SAR wave height ~2.5-5.0m	SAR wind ~12-14m/s

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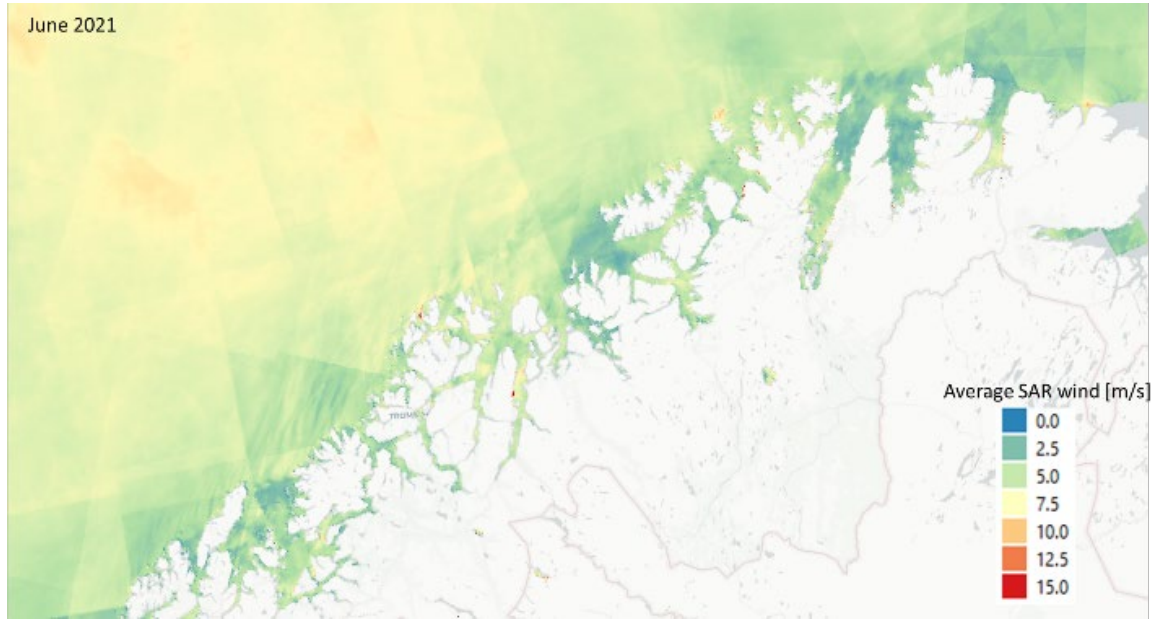
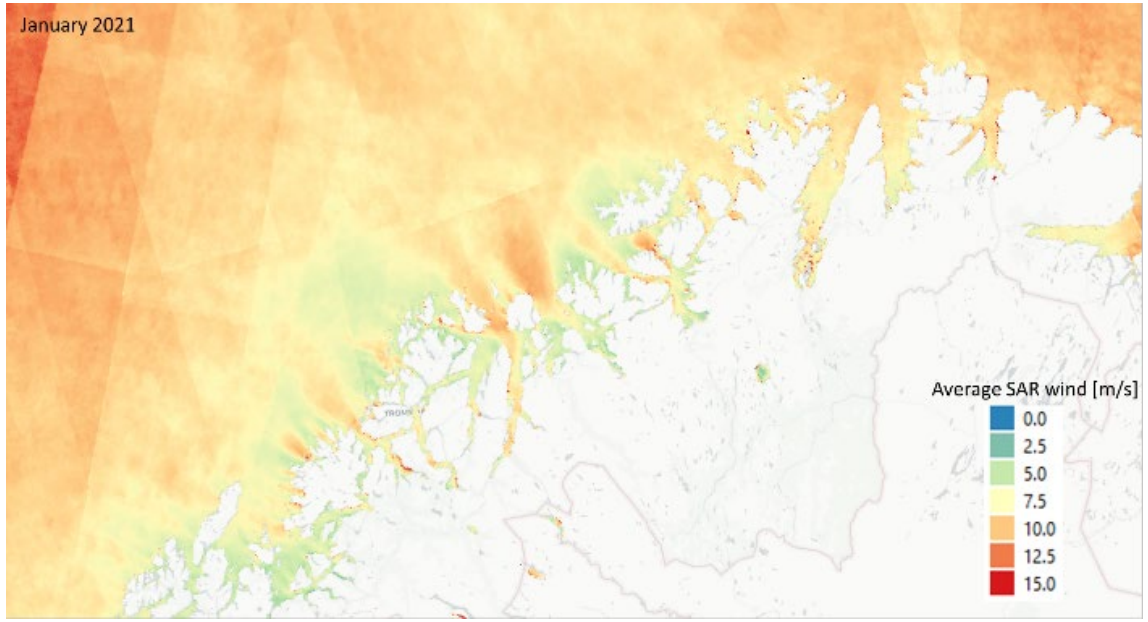
Mer Informasjon

SAR metocean + tidsserie





Green polygons = all detections in 2021. most of the detections in summer months.

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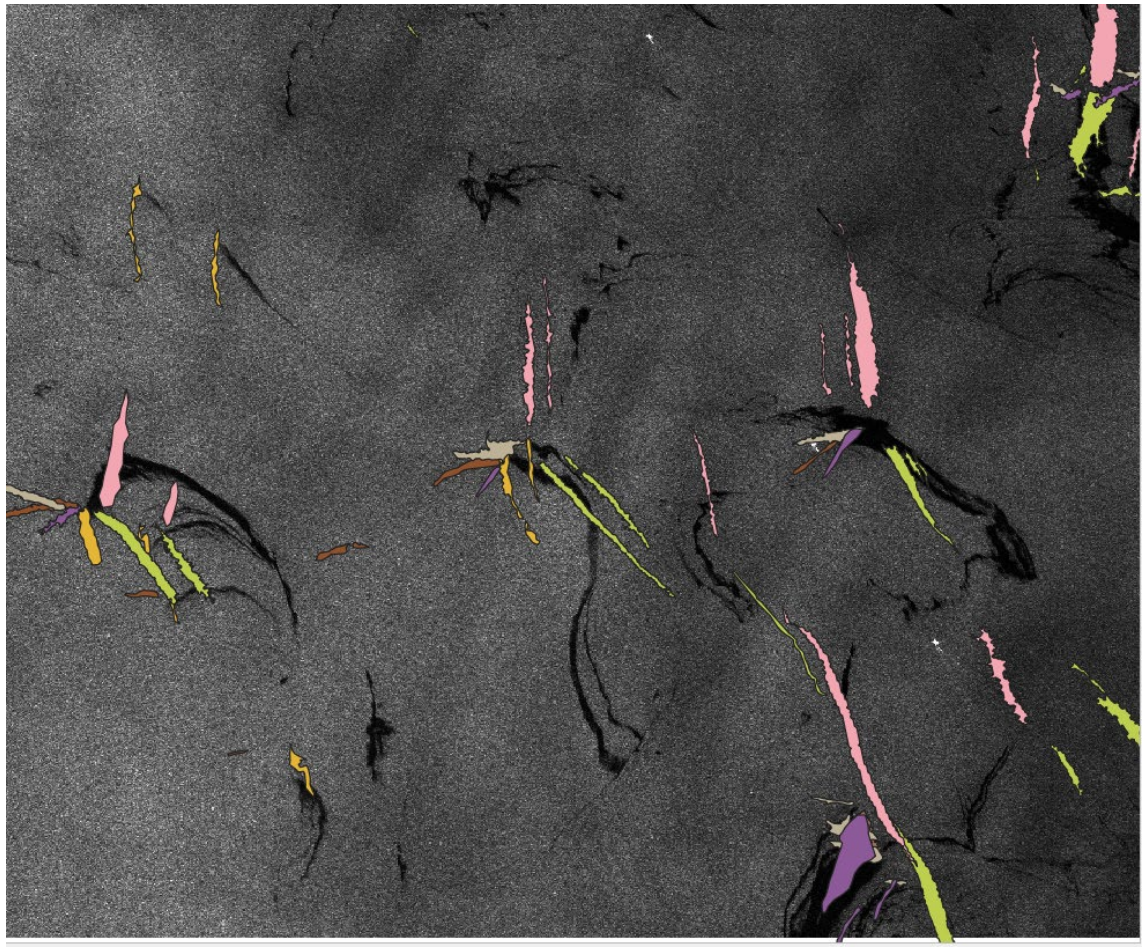
Mer Informasjon

Tidsserie – Seepstudie



Sentinel-1 ©ESA Copernicus

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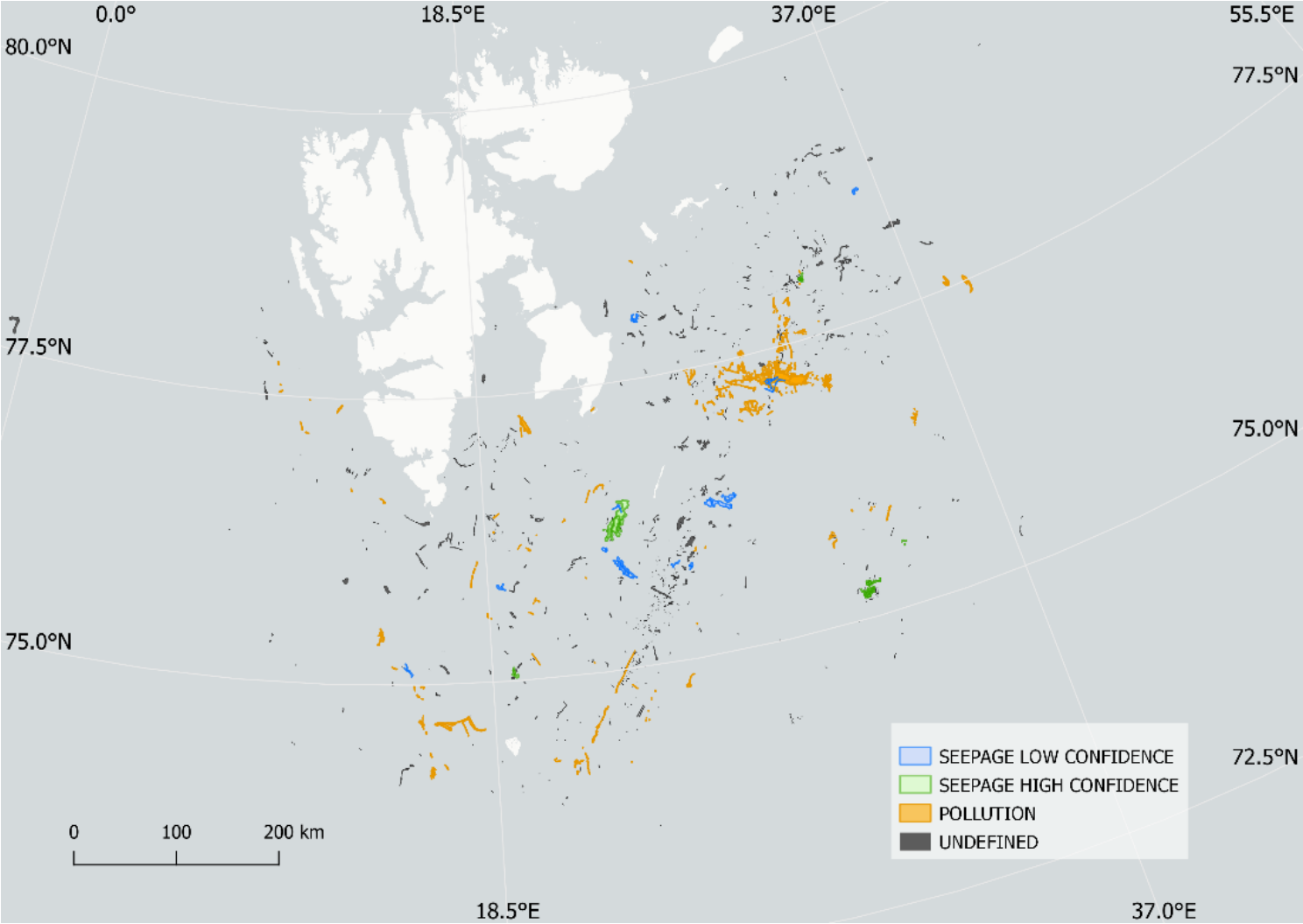
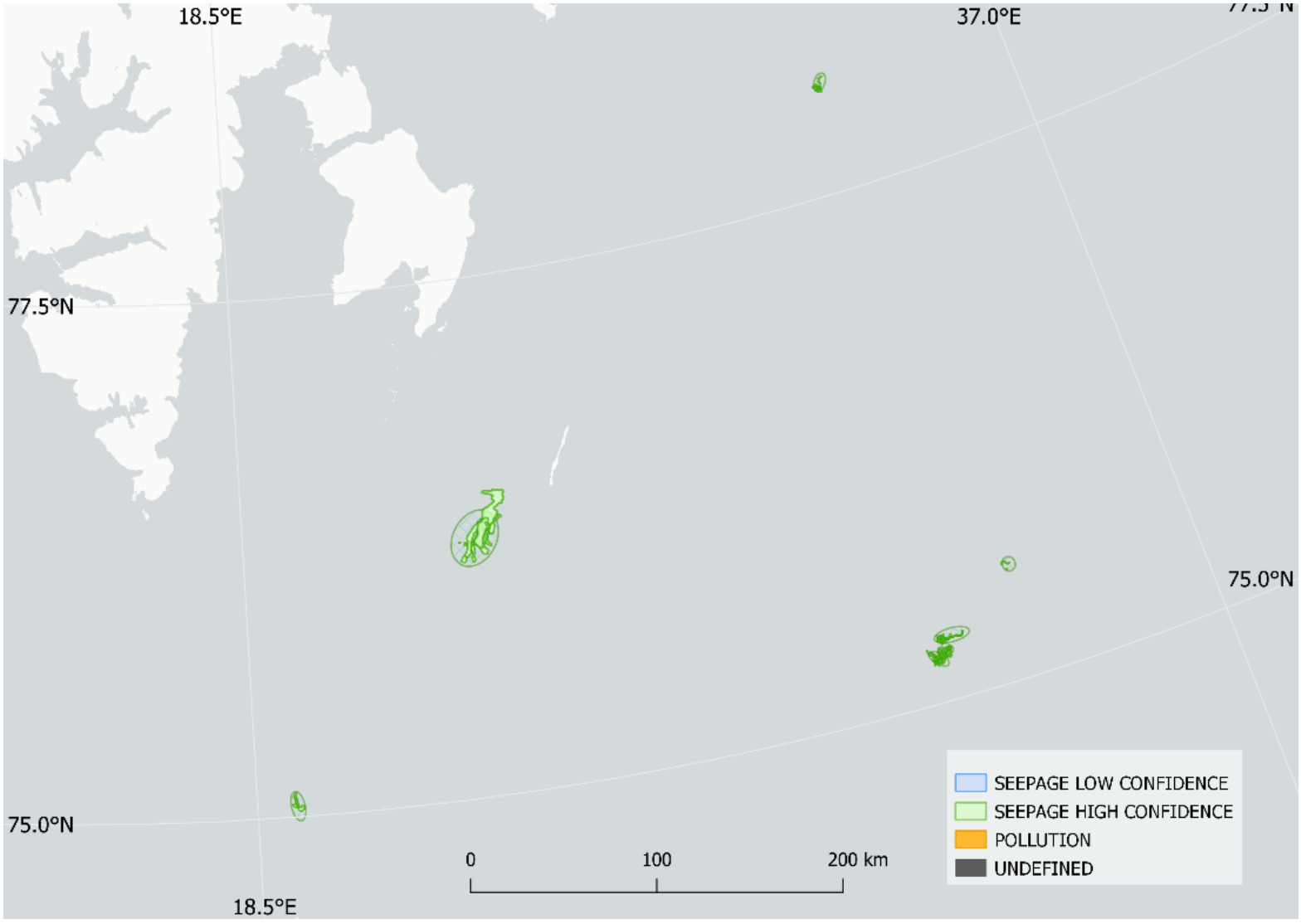
Tidsserie - Seepstudie



Mer Informasjon

Tidsserie – Seepstudie (2017-2021)



WE CONNECT SPACE AND EARTH

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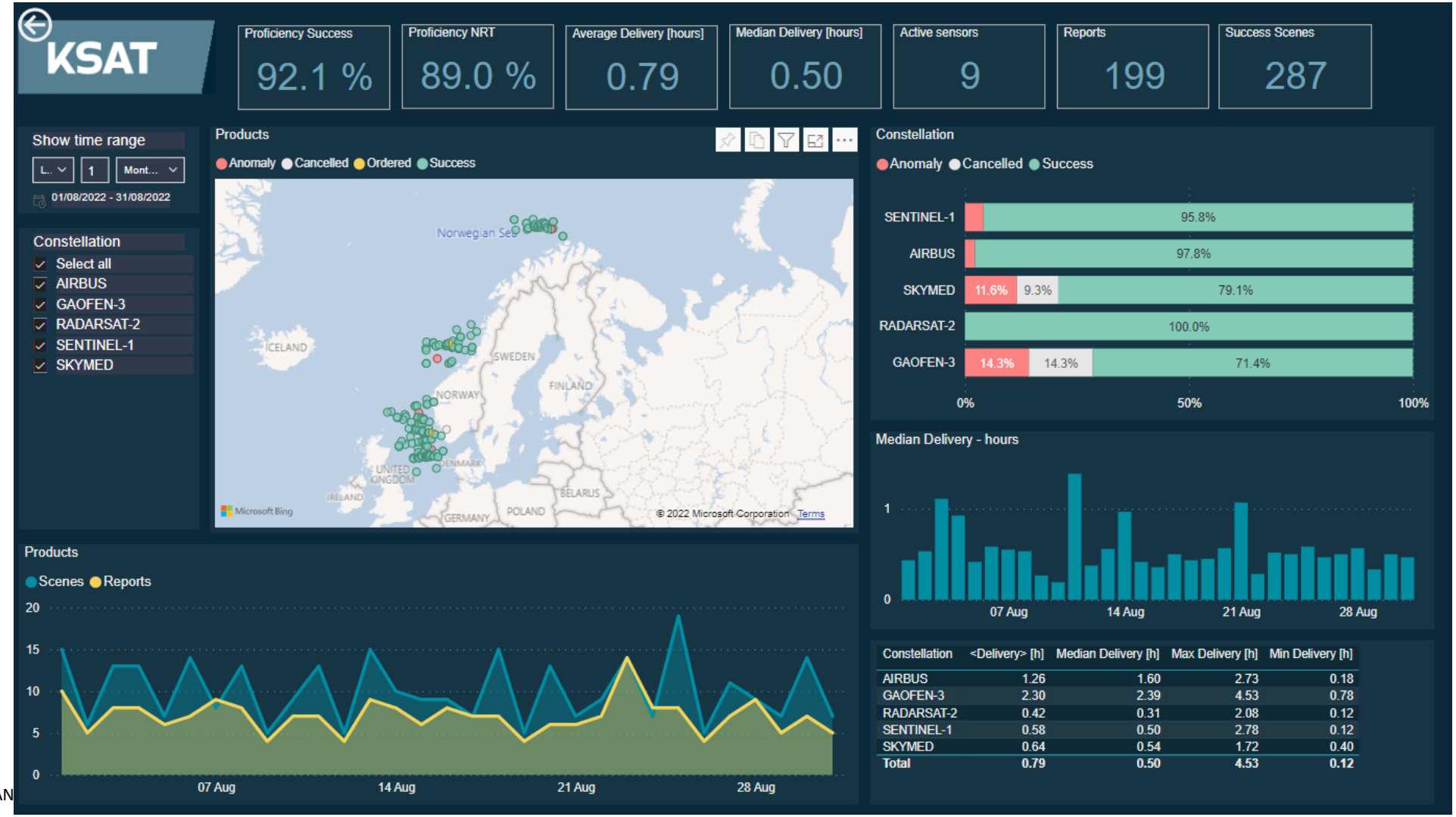
Dashbord



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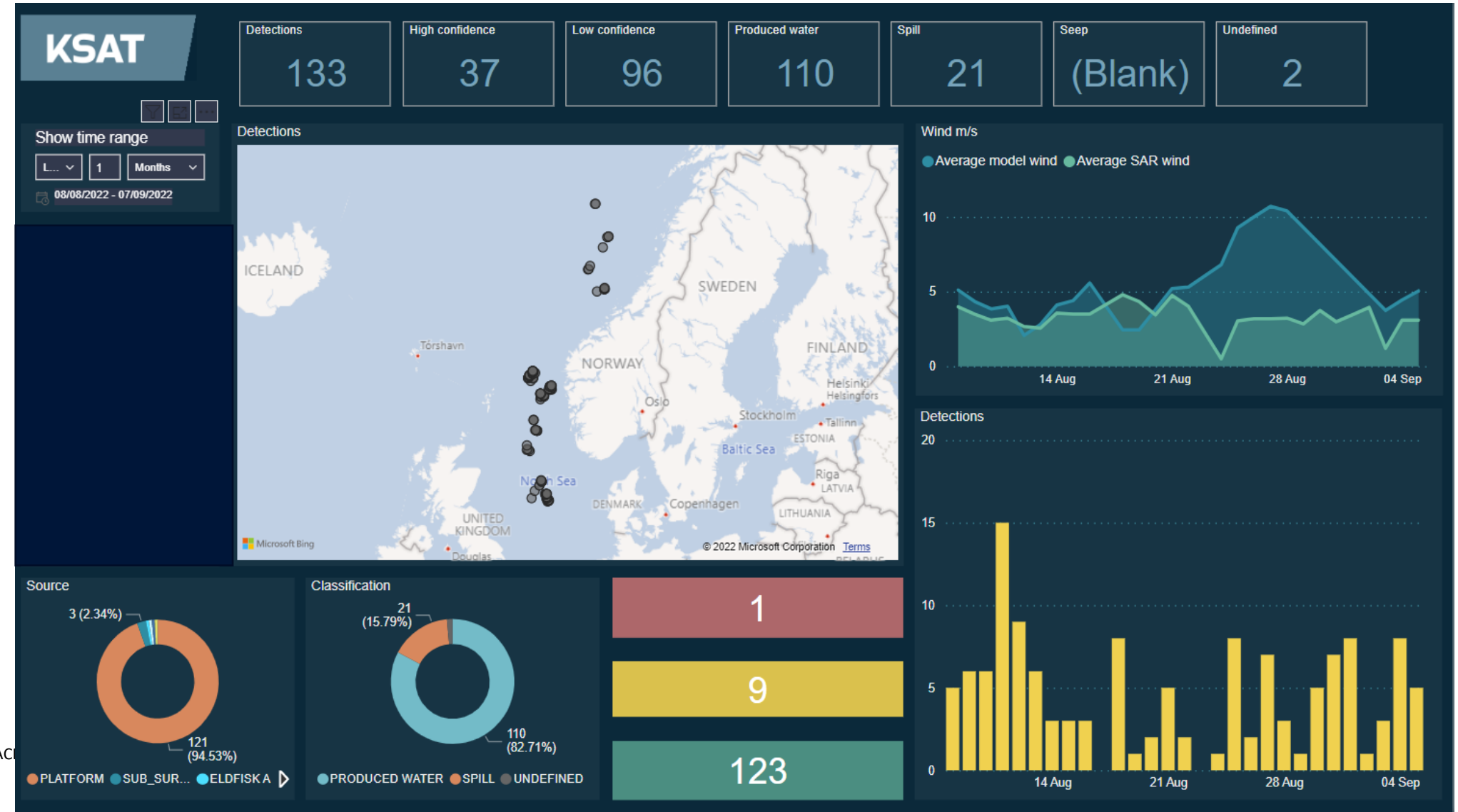
Dashbord