

Date 8 June 2021

Bulletin n° 5 for: "Simulations for MV X-Press Pearl chemical and oil leaks in support of response and clean-up"

The bulletin is built by CMCC and MOI, in collaboration with OrbitalEOS providing remote spill detections, upon the information on the current (provided by Copernicus Marine Service) and wind (ECMWF provided by Italian Met Office) products used to force the MEDSLIK-II oil spill model.

The bulletin contains the hindcast/forecast of transport of microplastic granules and nitric acid released in the marine environment as well as the bunker oil that at risk of leaking from the sunken ship.

*DISCLAIMER*

*The information and views set out in this Bulletin are those of the authors (CMCC) and do not necessarily reflect the official opinion of the governments of the area. CMCC does not guarantee the accuracy of the data included in this study. Neither CMCC nor any person acting on the author's behalf may be held responsible for the use, which may be made of the information contained therein.*

## Simulated trajectory for observed spill:

An oil spill has been detected by the CMCC partner, OrbitalEOS, on Sentinel 1 imagery for the 08/06/2021 00:25 UTC (Figure 1).

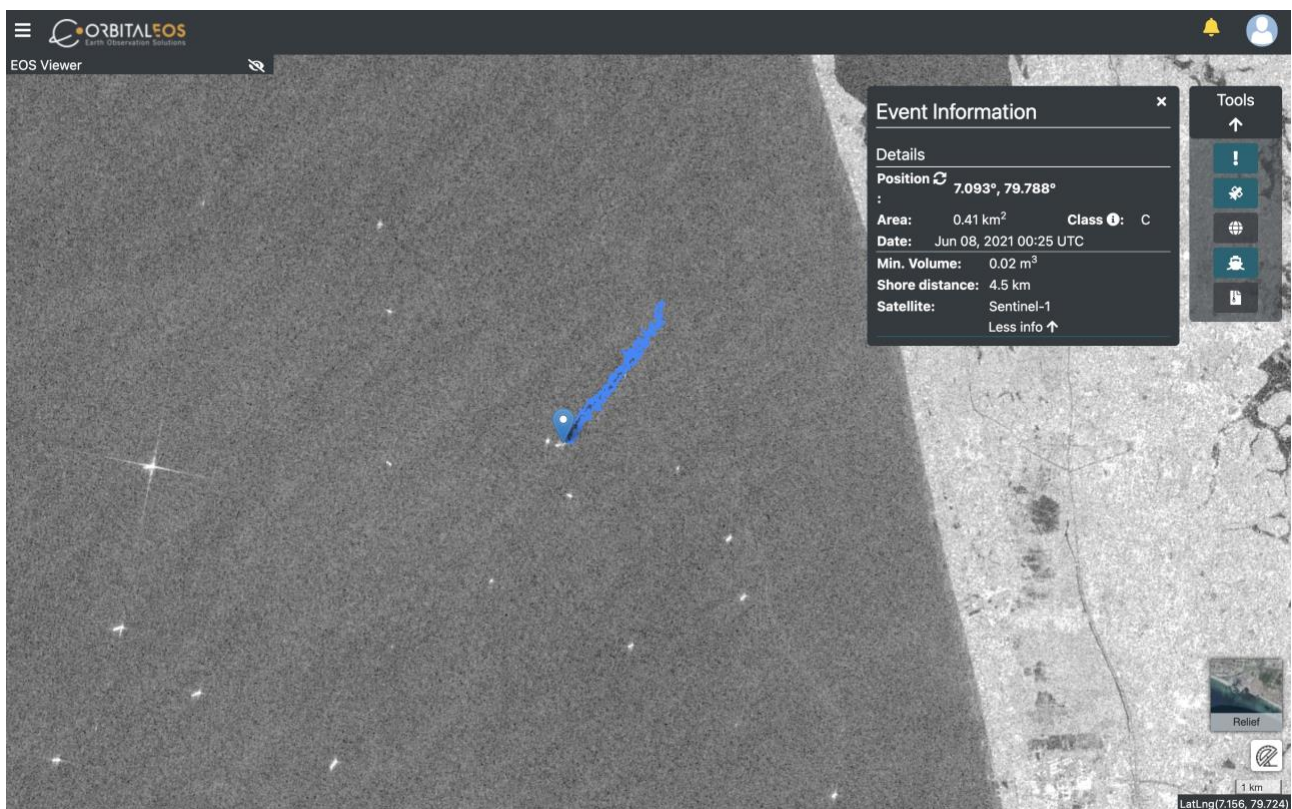


Figure 1 Sentinel-2 image for the 08/06/2021 00:25 UTC processed by the OrbitalEOS team.

The spill was classified and ingested by the oil spill model MEDSLIK – II and used to predict its trajectory and fate (Figures 2 and 3). The spill is likely to move E-NE impacting the Negombo barrier island on the 8<sup>th</sup> at 8AM UTC.

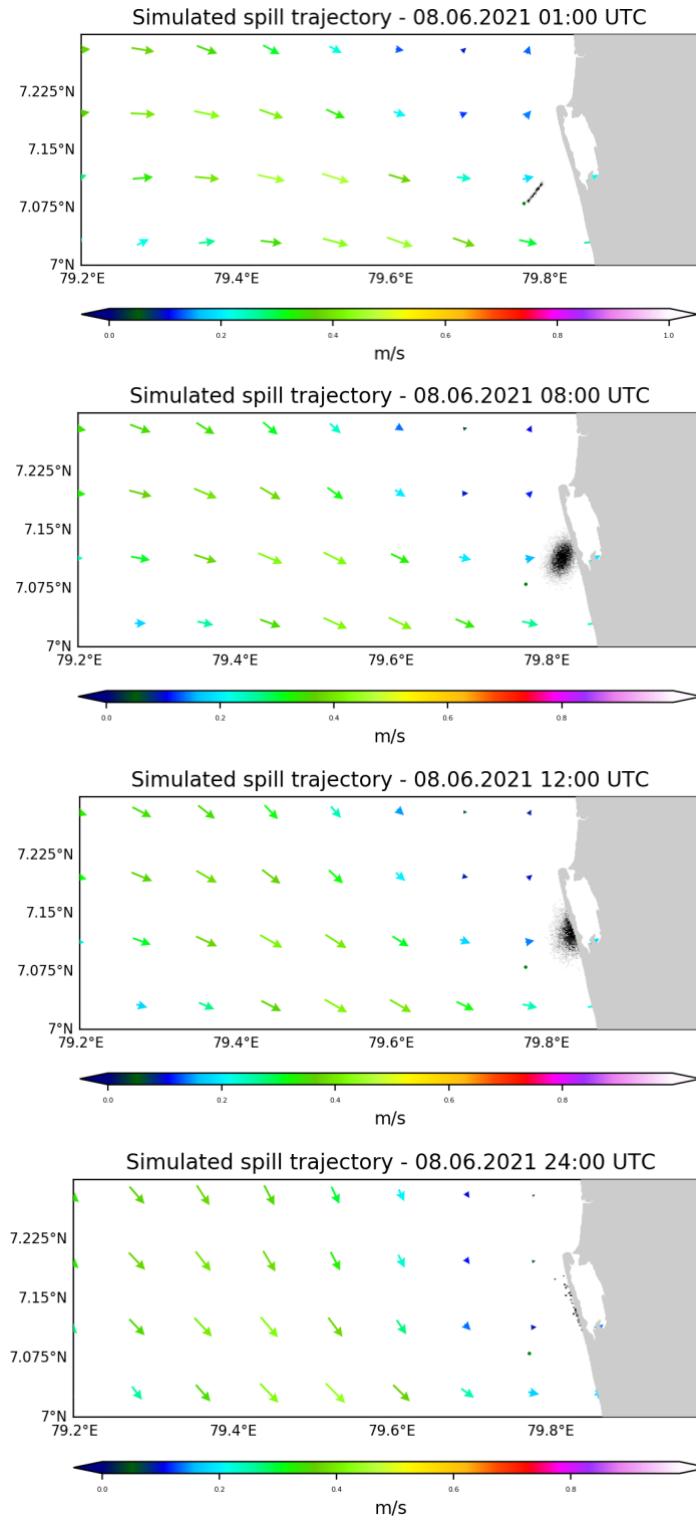
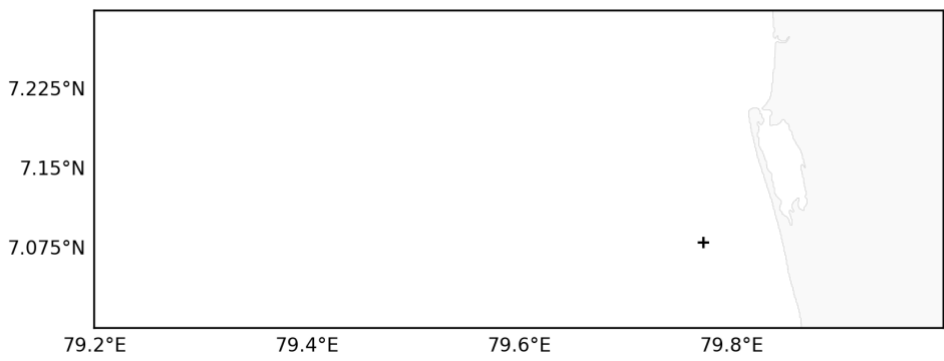
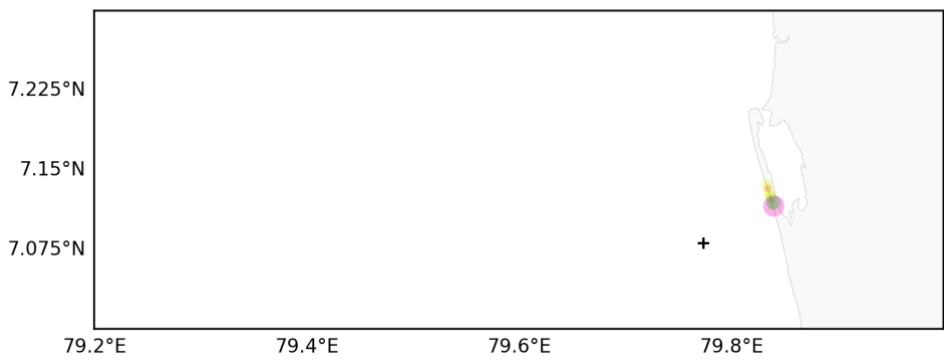


Figure 2 Predicted oil spill trajectory

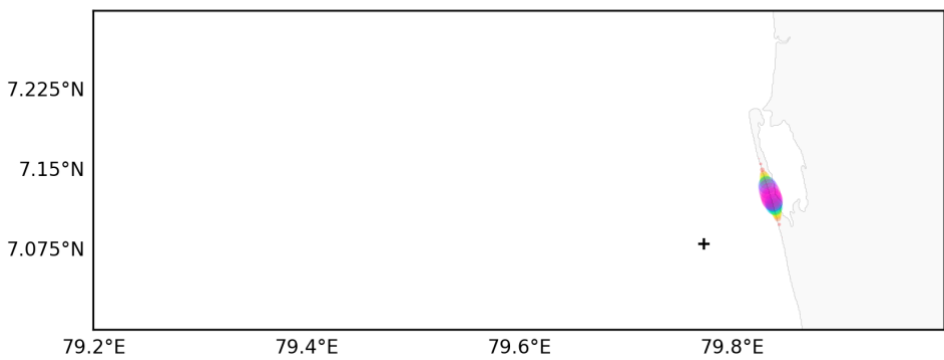
Beached oil forecast for 08.06.2021 02:00 UTC



Beached oil forecast for 08.06.2021 08:00 UTC



Beached oil forecast for 08.06.2021 12:00 UTC



Beached oil forecast for 08.06.2021 24:00 UTC

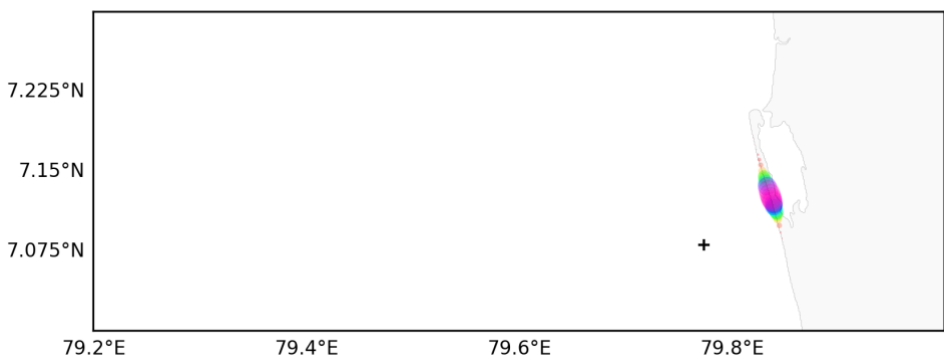


Figure 3 Predicted oil beaching

## Potential oil spills trajectory

A hypothetical continuous oil spill was simulated using the MEDSLIK-II model starting on June 8, 2021, at 14:00 UTC. The mean drift of hypothetical oil is directed to NE. The numerical forecast indicates potential beaching 13h (Figure 3) after the spill (09/06/2021 02:00 UTC) impacting the Negombo barrier island for the following hours (Figure 4).

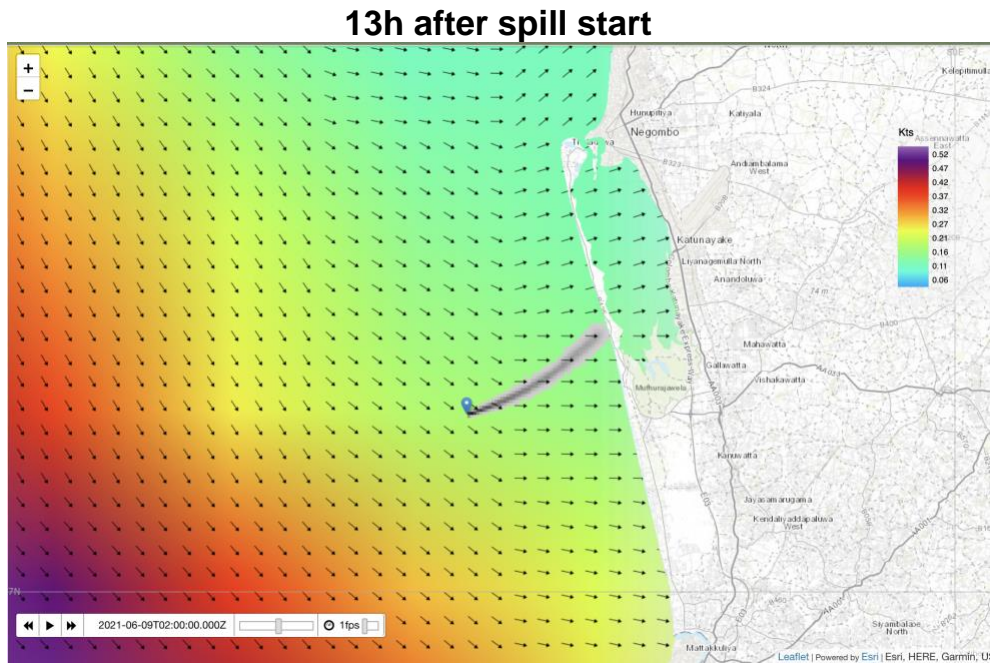


Figure 4 Forecasted surface and beached oil concentrations : 09/06/2021 02:00

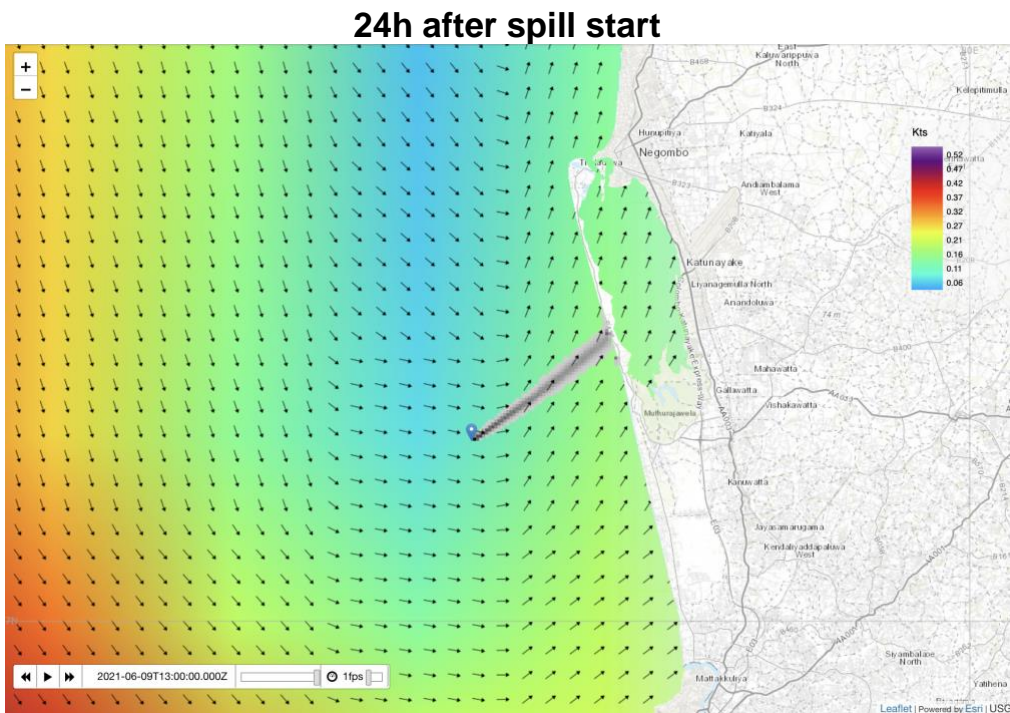


Figure 5 Forecasted surface and beached oil concentrations : 09/06/2021 13:00

## Reconstruction of the initial nitric acid and microplastic dispersion

Nitric acid leakage and microplastic granules' discarding (represented by 10 000 Lagrangian elements) were simulated starting at 06:00 on 25 May 2021, at the assumed moment of explosion onboard. The conducted 240h-long hindcast/forecast are based on regularly updated meteo-oceanographic datasets.

Nitric acid is assumed to be dissolved quickly and transported in the upper layer of a 120 m thickness. While microplastic is transported at the sea surface due to its positive buoyancy. Potentially impacted areas include the Negombo barrier island and the Panumugama area. The mean transport direction of nitric acid (Figure 5) and plastic (Figure 6) varied from NE to E and SE during the first 36 hours of the drift.

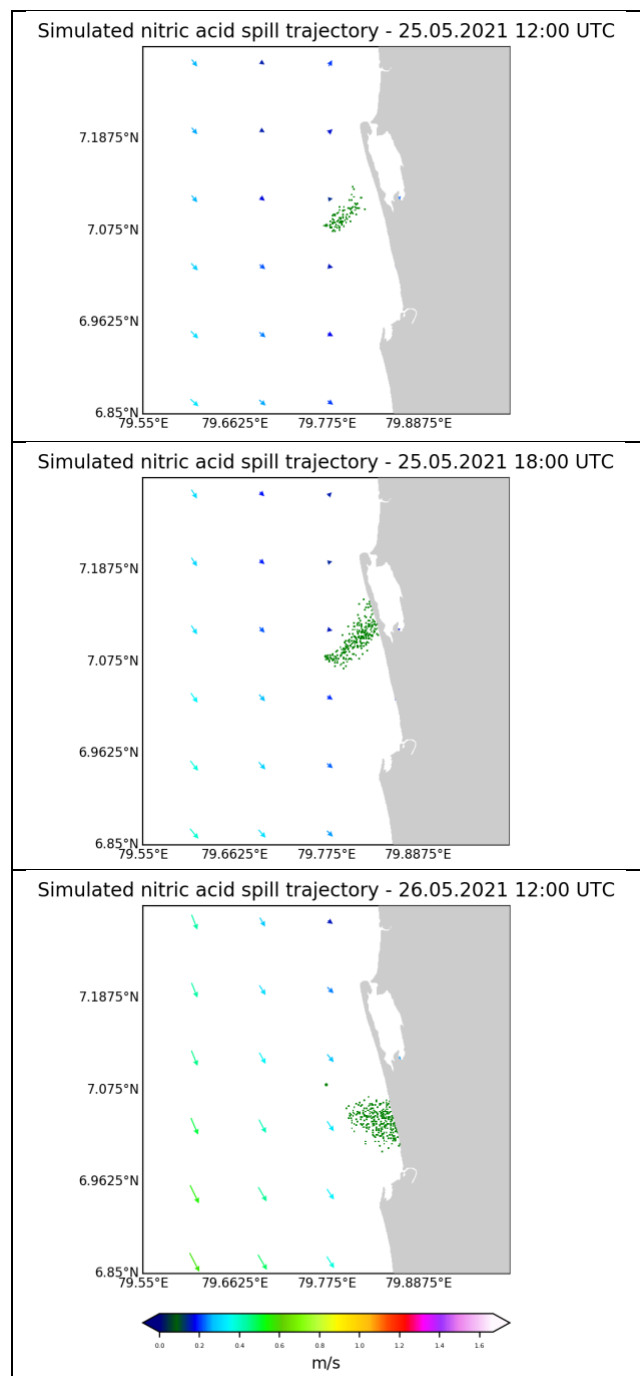
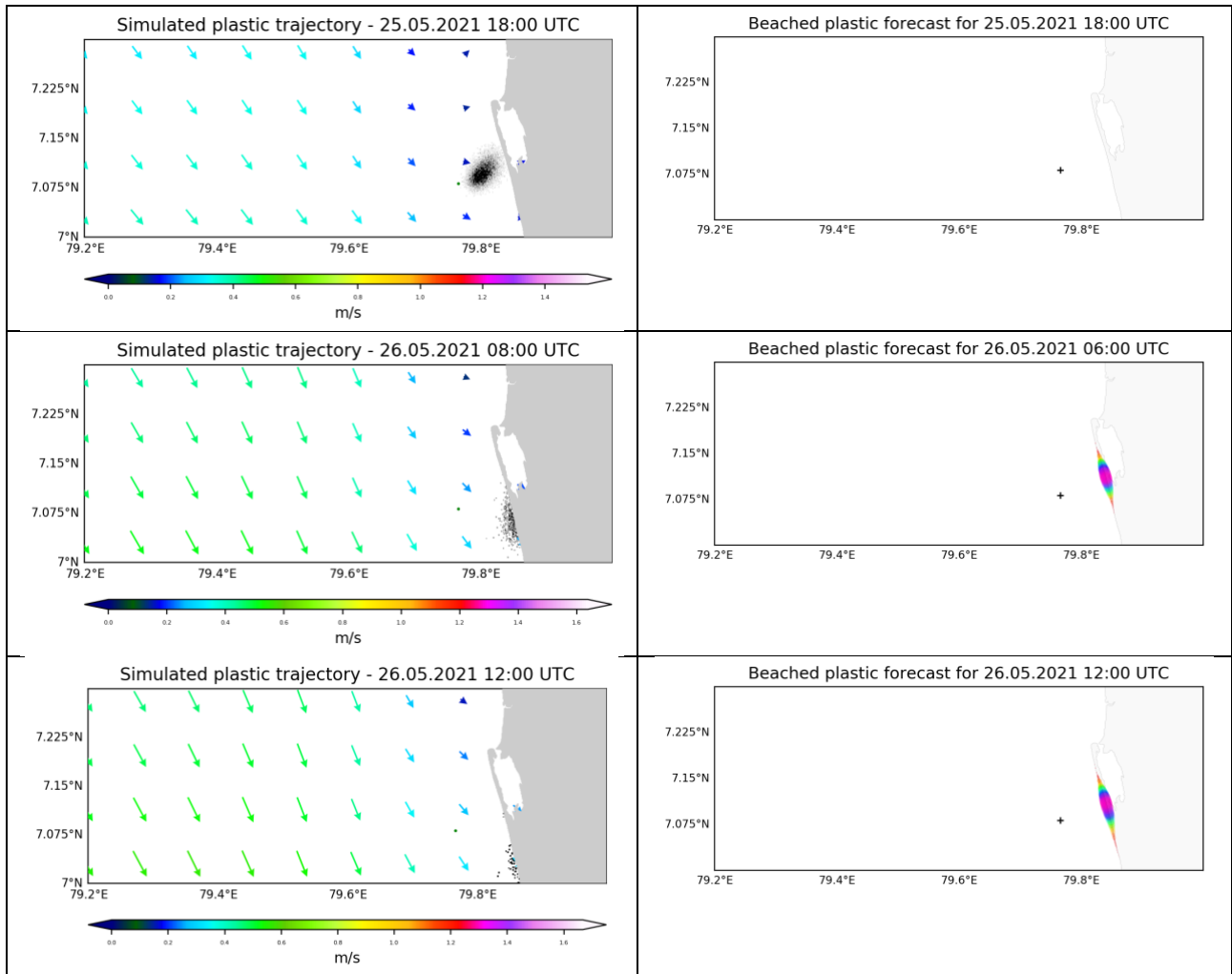


Figure 6 Nitric acid forecasted trajectory for the first 36h after spillage

**Plastic spill trajectory (left column) and impacted coastal areas (right column)**



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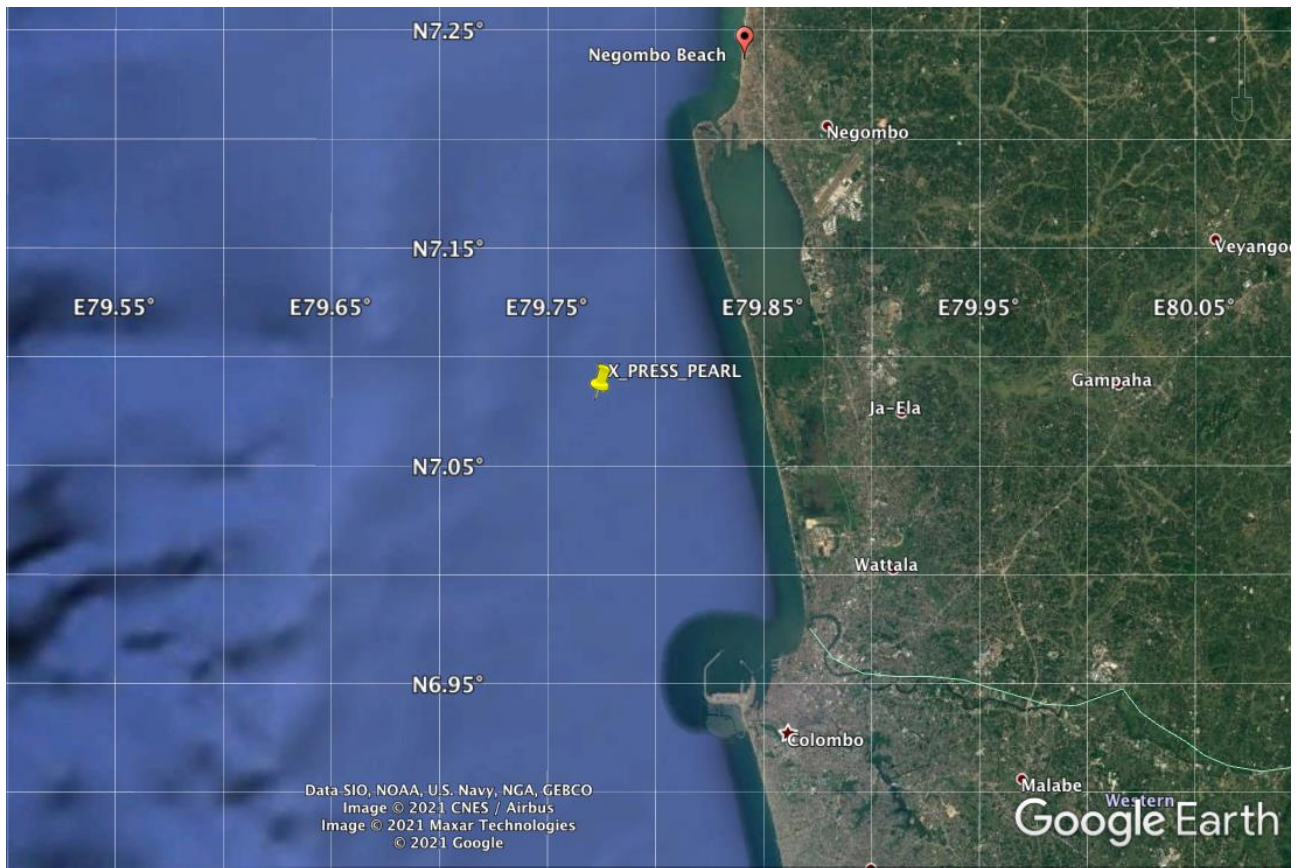
**Acknowledgement:** Currents are provided by Copernicus Marine Environment Monitoring Service (CMEMS) Global Ocean forecasting system (**GLOBAL\_ANALYSIS\_FORECAST\_PHY\_001\_024**). Wind from ECMWF system is provided by Italian Meteorological Office (USAM-CNMCA).

## ANNEX I

### Geographic coordinates of the accident:

lat\_degree=7.080575°N

lon\_degree=79.77184°W



**Fig. 2** Possible location of the accident (start position of the simulations)