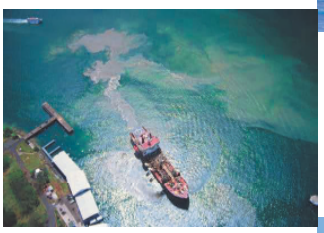
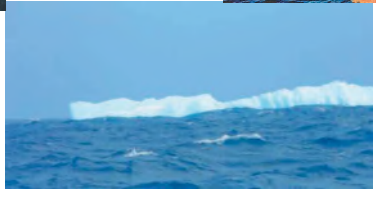
Marine Debris Trajectory Simulation

MOBIDRIFT, an operational drift tool

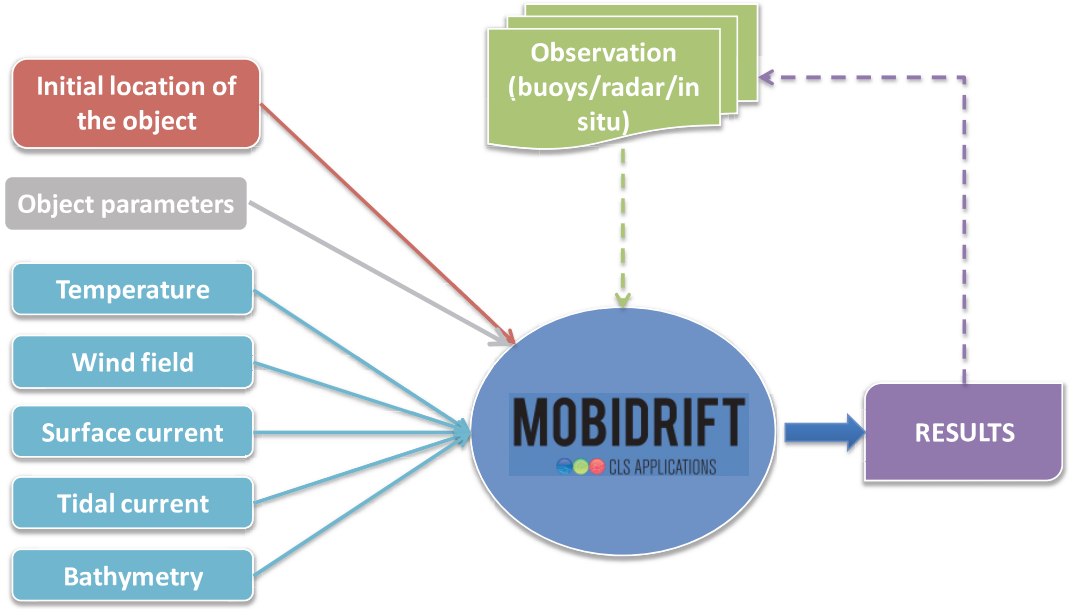
- ❑ A tool for operationnal drift simulations at ocean surface
- ❑ Global ocean coverage
- ❑ 6-months archive, real-time and forecast data
- ❑ Multi-objects



MOBIDRIFT
CLS APPLICATIONS

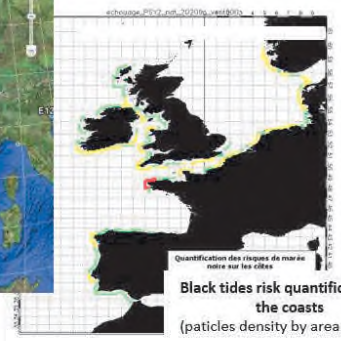


MOBIDRIFT, an operational drift tool



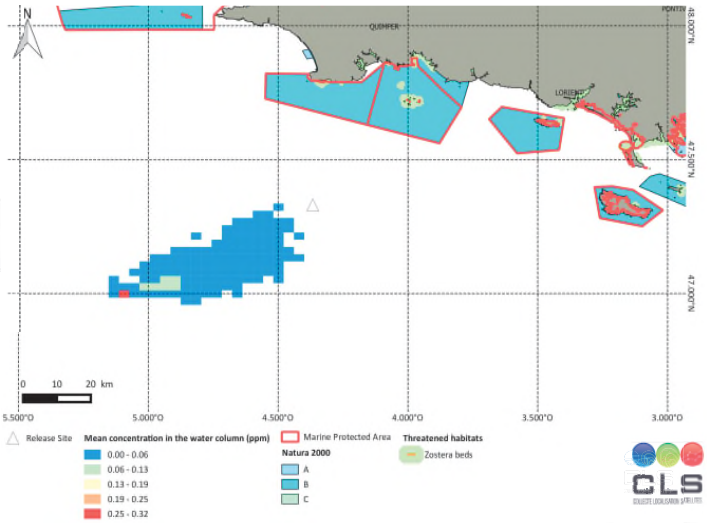
Oil Spill

MOBIDRIFT
CLS APPLICATIONS



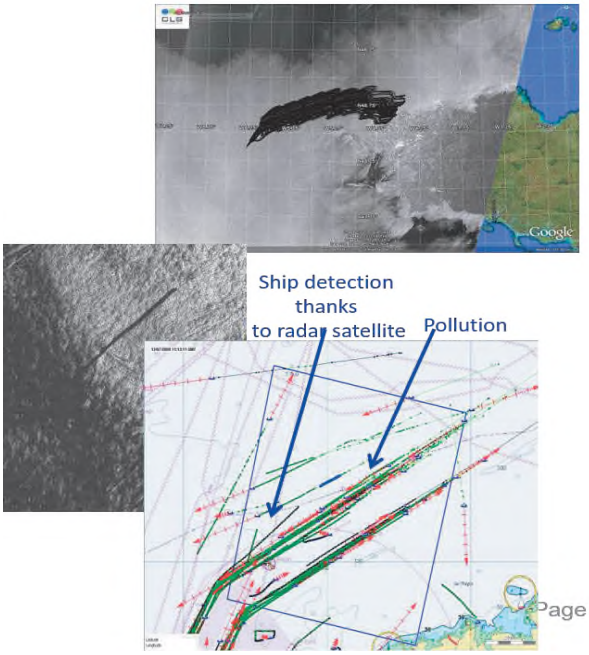
Black tides risk quantification on the coasts
(paticles density by area of 1°x1°)

❑Pollution risk / indicators

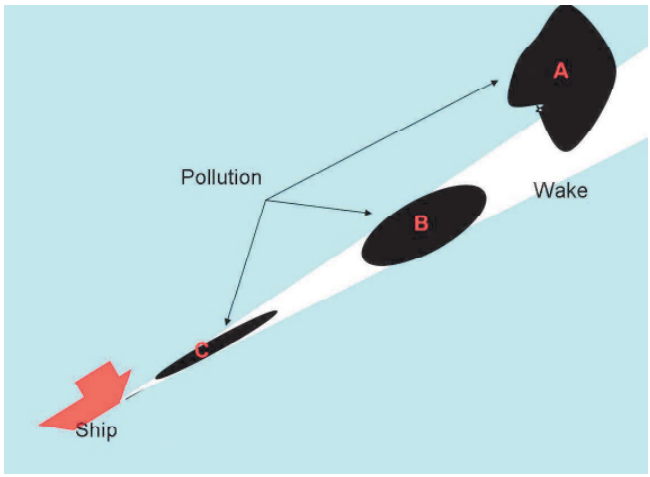


Oil Spill

MOBIDRIFT
CLS APPLICATIONS



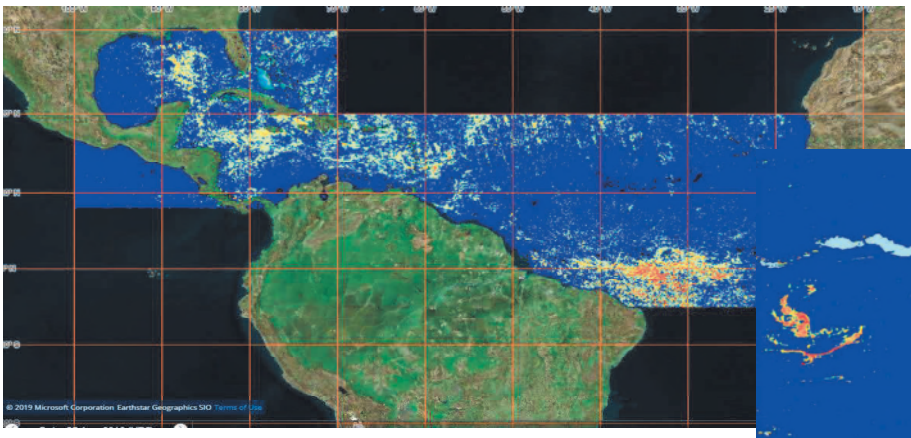
❑Polluter Identification



Sargassum Algae

MOBIDRIFT
CLS APPLICATIONS

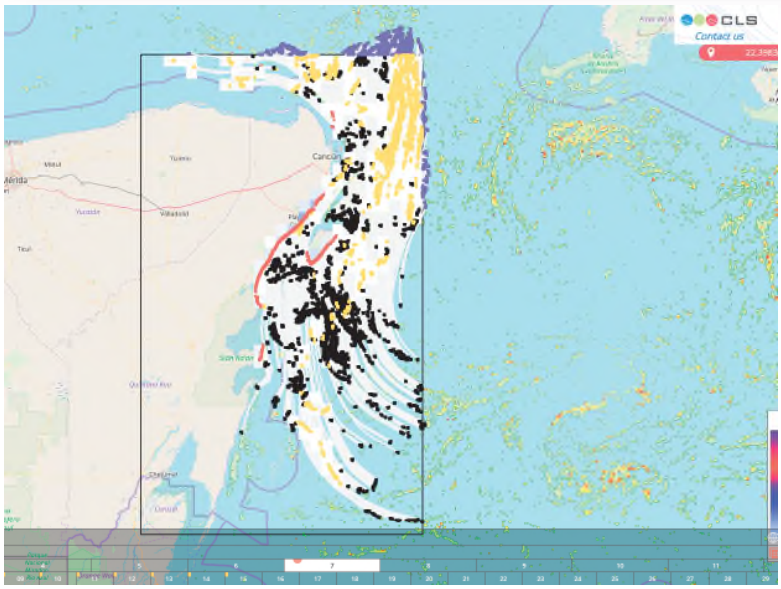
❑ Early Detection by satellite



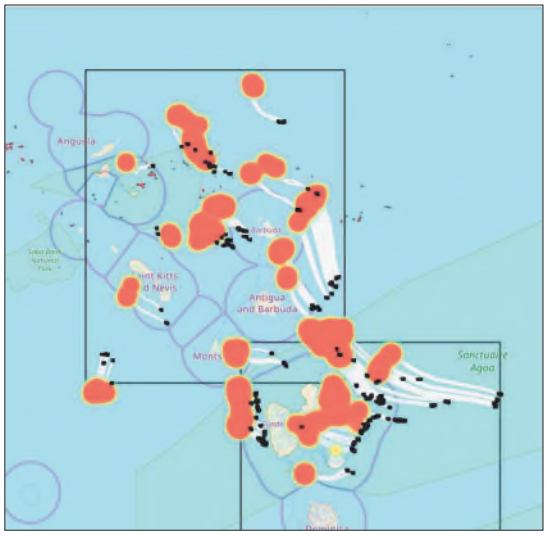
- ✓ **Synergy of optical sensors**
- ✓ **Normalized Floating Algae Index**
- ✓ Spatial resolution: **300m -> 20m**

Sargassum Algae

MOBIDRIFT
CLS APPLICATIONS



❑ Daily drift forecast



Marine Debris drift

Marine Debris drift

Marine debris displacement Speed =

Wind_drag_coeff x Wind speed

+

OceanCurrent_drag_coeff x OceanCurrent speed

+

TidalCurrent_drag_coeff x TidalCurrent speed

Marine Debris drift

Marine debris displacement Speed =

3% Wind_drag_coeff x Wind speed

+

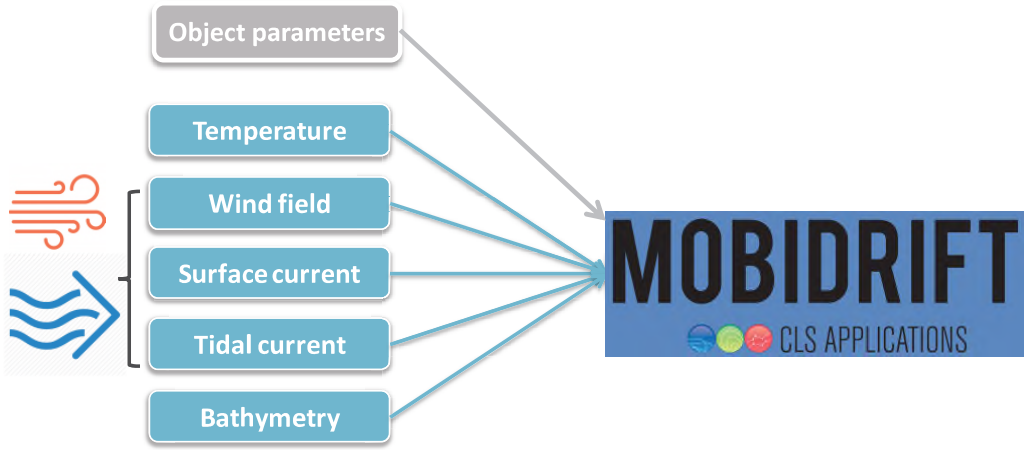
100% OceanCurrent_drag_coeff x OceanCurrent speed

+

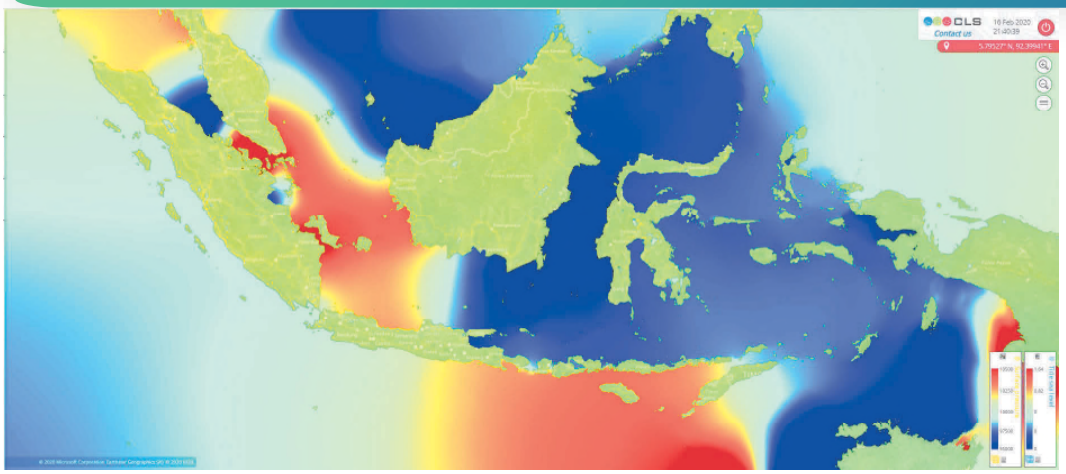
100% TidalCurrent_drag_coeff x TidalCurrent speed

Wind / Current ratio depending on the buoyancy of the drifting object

MOBIDRIFT inputs

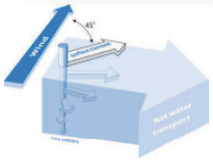


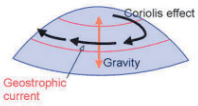
Global Tidal Currents

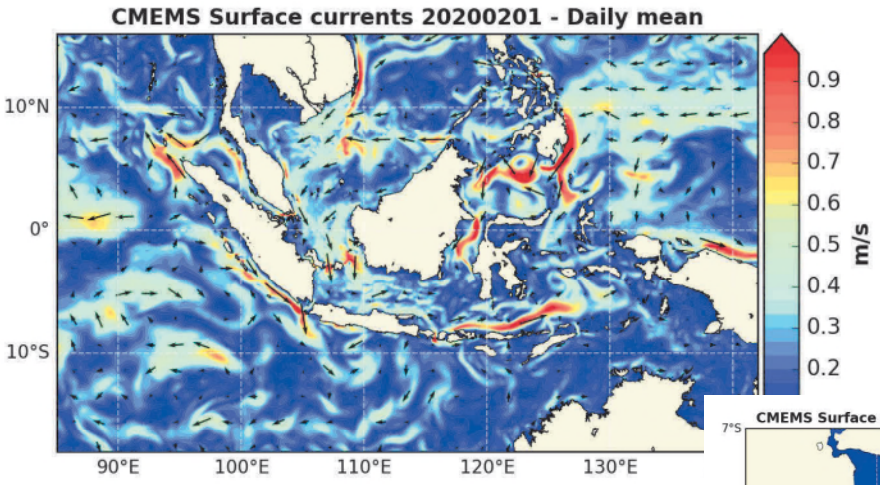


- ❑ tidal current FES2014
- ❑ Global model 1/16°
- ❑ Hourly

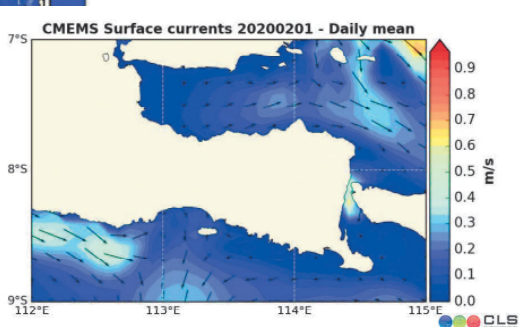
Global Ocean Currents -1





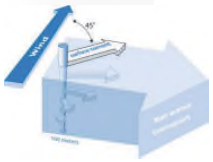


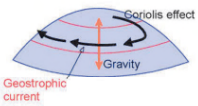
Copernicus Marine Service

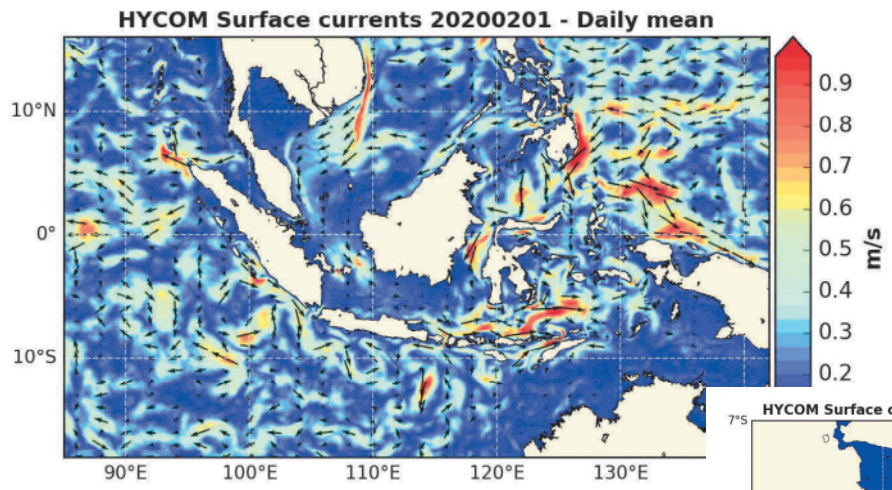


- ❑ Global 1/12° model (8km)
- ❑ No tides
- ❑ Hourly fields

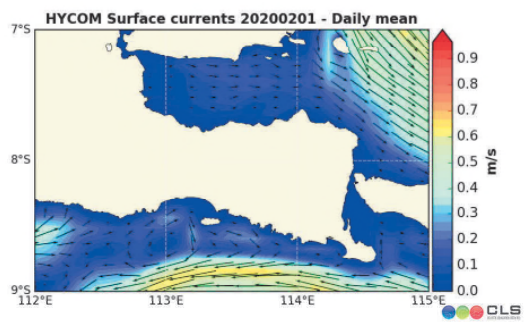
Global Ocean Currents -2





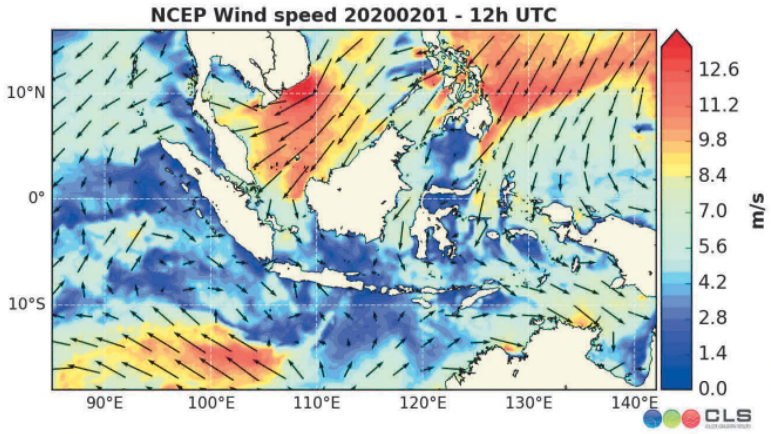


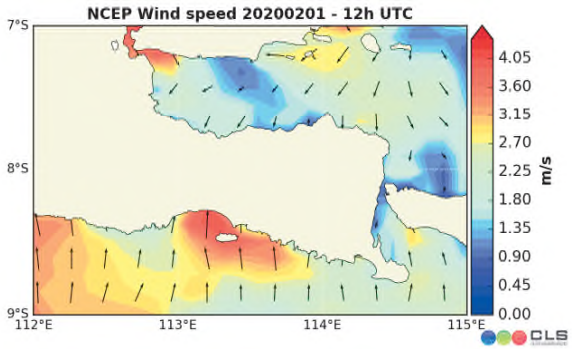
HYCOM



- ❑ Global 1/12° model (8km)
- ❑ No tides
- ❑ Daily fields

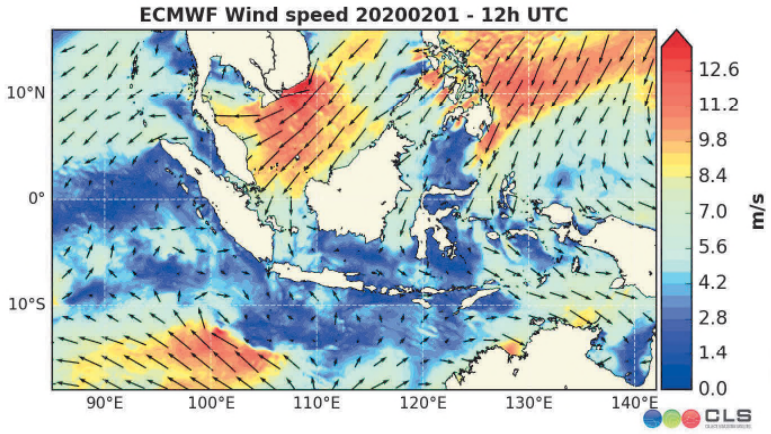
Global Winds -1

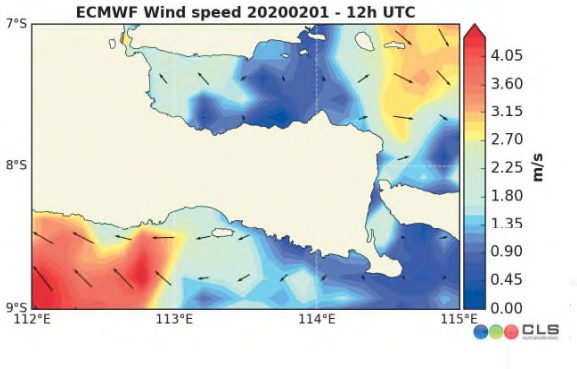




- Global model GFS 1/9° (10km)
- 6-hourly

Global Winds -2

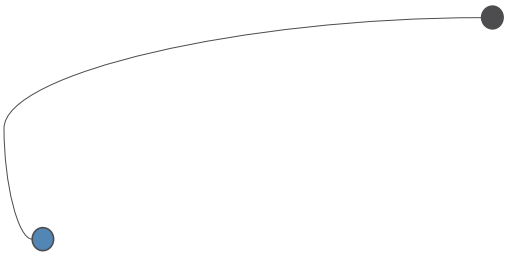




- Global model IFS 1/8° (12km)
- 6-hourly

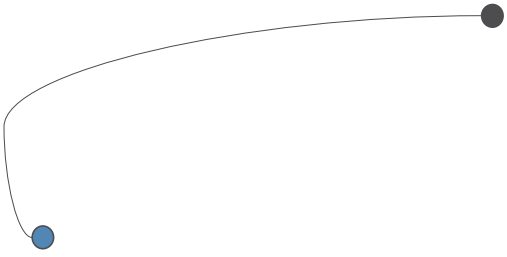
Deterministic vs Probabilistic Drift

- 1 drifting particle affected by
  - Winds 
  - Currents 



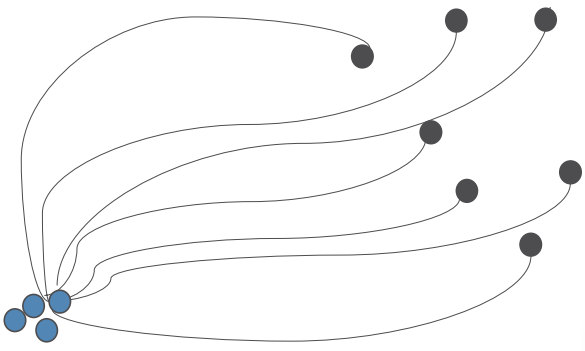
Deterministic vs Probabilistic Drift

- 1 drifting particle affected by
  - Winds 
  - Currents 



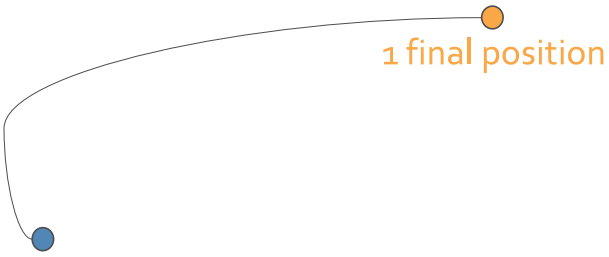
- Ensemble of drifting particles affected by:
  - Winds + disturbance 
  - Currents + disturbance 

possibly with a shift in initial points

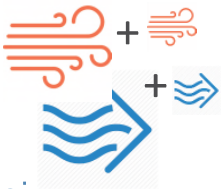


Deterministic vs Probabilistic Drift

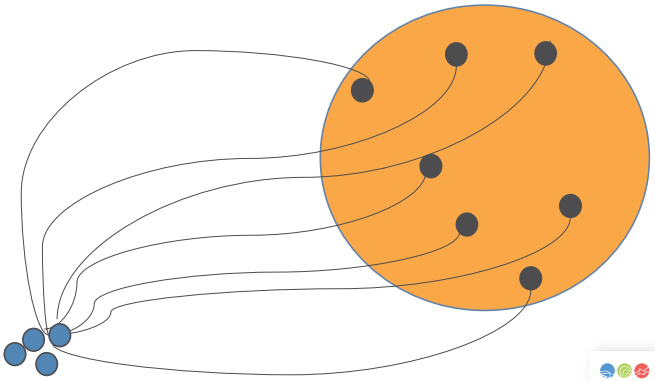
- 1 drifting particle affected by
  - Winds
  - Currents



- Ensemble of drifting particles affected by:
  - Winds + disturbance
  - Currents + disturbance



possibly with a shift in initial points



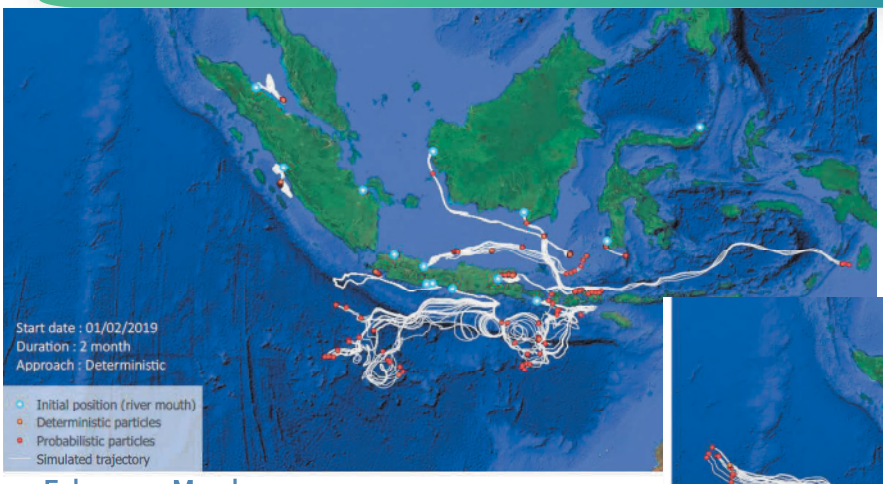
Drift Study Workplan

- Selection of Indonesian rivers for the marge-T drifters release campaigns (on-going)

Selection of rivers as sources

The 16 most polluted rivers after theOceanCleanUp estimation

Selection of rivers as sources



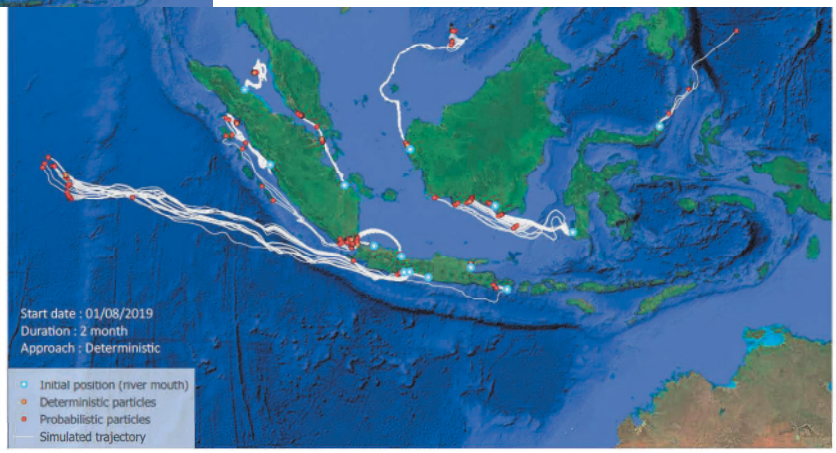
February –March 19

HYCOM currents + tides 100%

NCEP winds 3%

No disturbance winds/currents

25 initial points at each river



August-Septembre 19

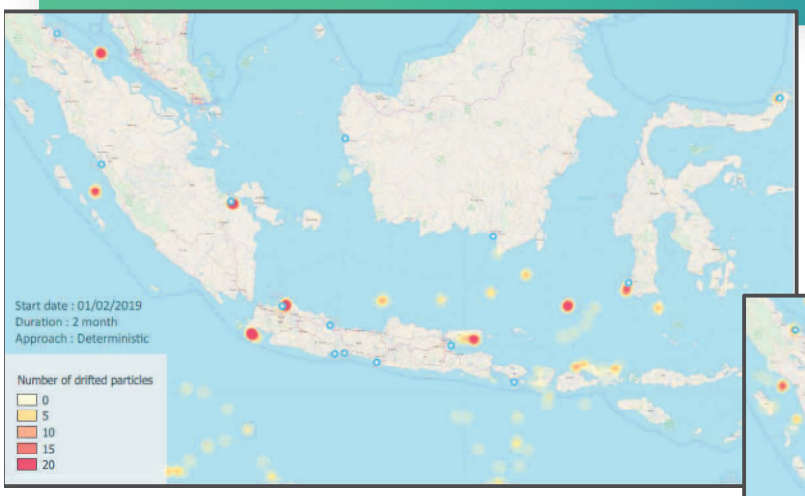
Selection of rivers as sources

HYCOM currents + tides 100%

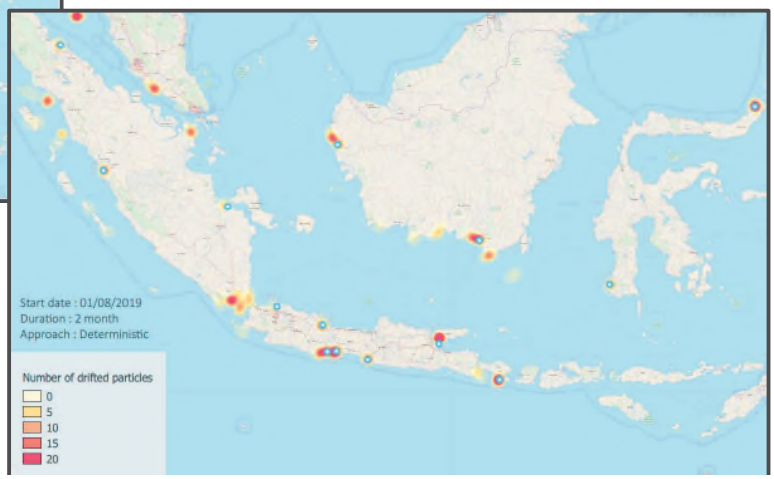
NCEP winds 3%

No disturbance winds/currents

25 initial points at each river



February –March 19



August-Septembre 19

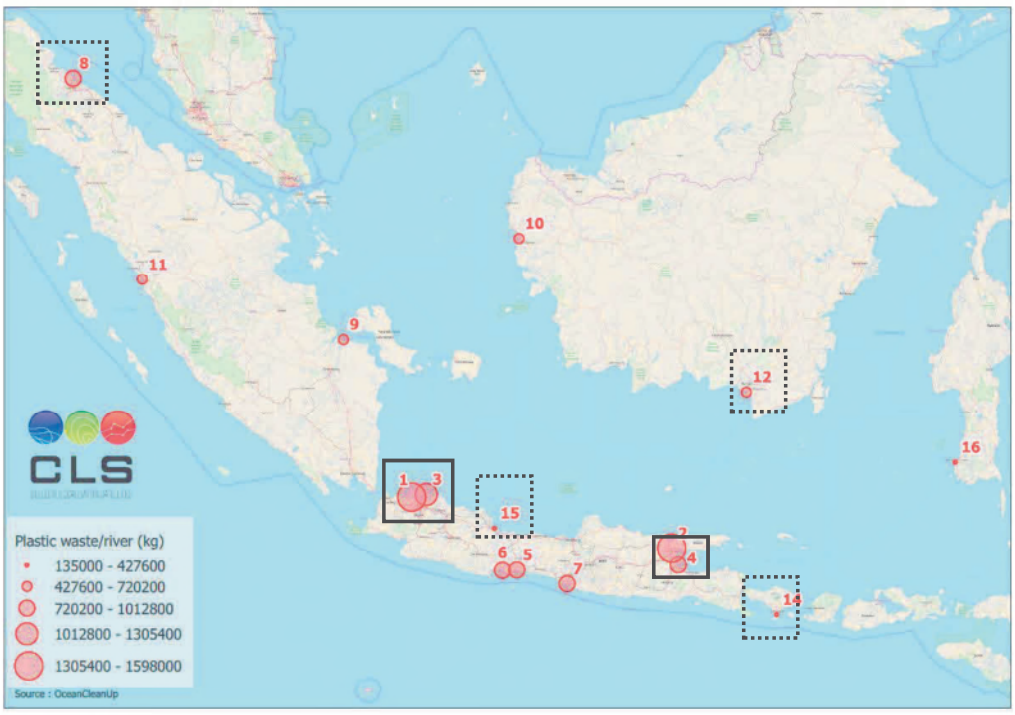
Selection of rivers as sources

5-6 rivers

to be first studied

for their impact

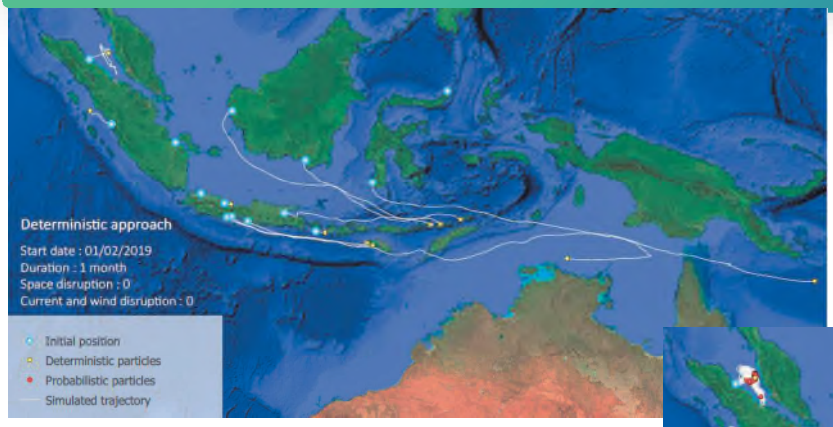
into Indonesian seas



Drift Study Workplan

- ❑ Selection of Indonesian rivers for the marge-T drifters release campaigns (on-going)
- ❑ For each selected river, run a **set of probabilistic** drift simulations considering (starting)

Set-up of probabilistic drift



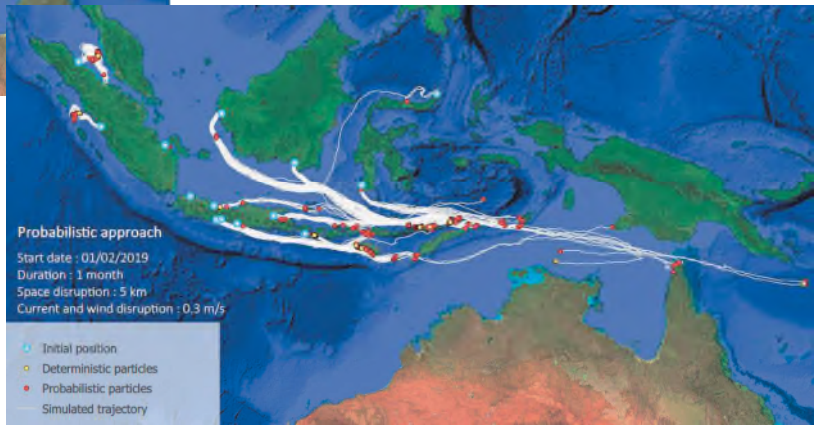
No disturbance winds/currents (**deterministic**)

February 19

CMEMS currents + tides 100%

NCEP winds 3%

Single initial position



with disturbance winds/currents (**probabilistic**)

Drift Study Workplan

- ❑ Selection of Indonesian rivers for the marge-T drifters release campaigns (on-going)
- ❑ For each selected river, run a **set of probabilistic** drift simulations considering (starting)
  - ✓ Different **starting dates /** seasons / climatology
  - ✓ Different drift **durations**

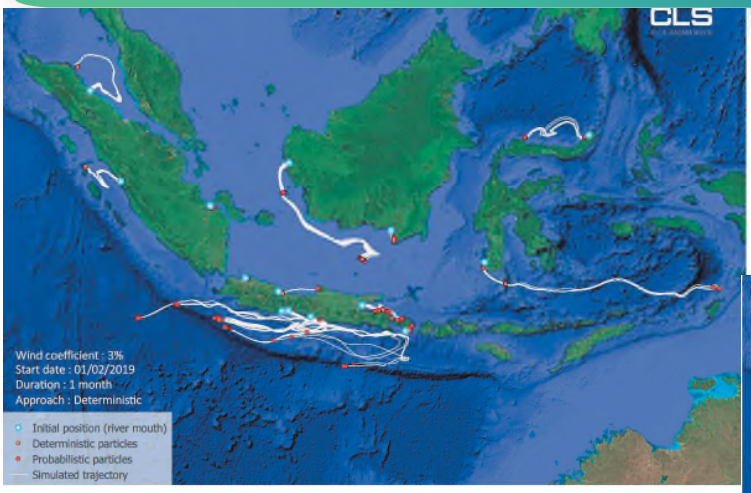
Drift Study Workplan

- ❑ Selection of Indonesian rivers for the marge-T drifters release campaigns (on-going)
- ❑ For each selected river, run a **set of probabilistic** drift simulations considering (starting)
  - ✓ Different **starting dates /** seasons / climatology
  - ✓ Different drift **durations**
  - ✓ Different **wind/current** forcing

Drift Study Workplan

- ❑ Selection of Indonesian rivers for the marge-T drifters release campaigns (on-going)
- ❑ For each selected river, run a **set of probabilistic** drift simulations considering (starting)
  - ✓ Different **starting dates /** seasons / climatology
  - ✓ Different drift **durations**
  - ✓ Different **wind/current** forcing
  - ✓ Different marine debris shapes (**wind/current drag coefficient)**

Test on wind drag coeff



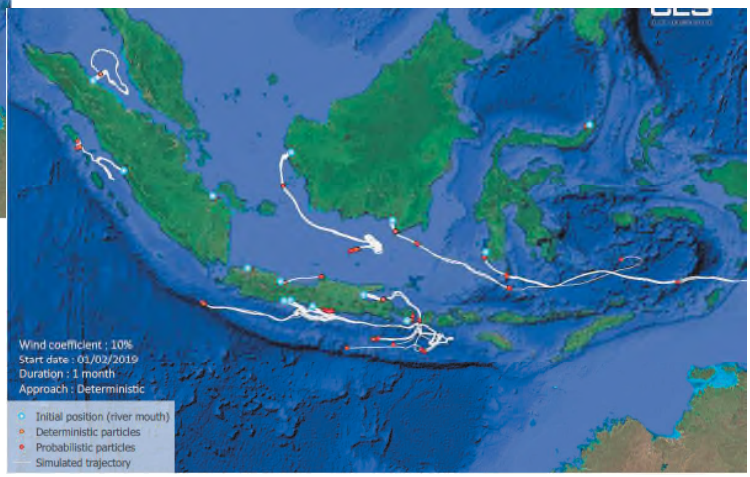
NCEP winds **3%**

February 19

CMEMS currents + tides 100%

No disturbance winds/currents

25 positions around each river



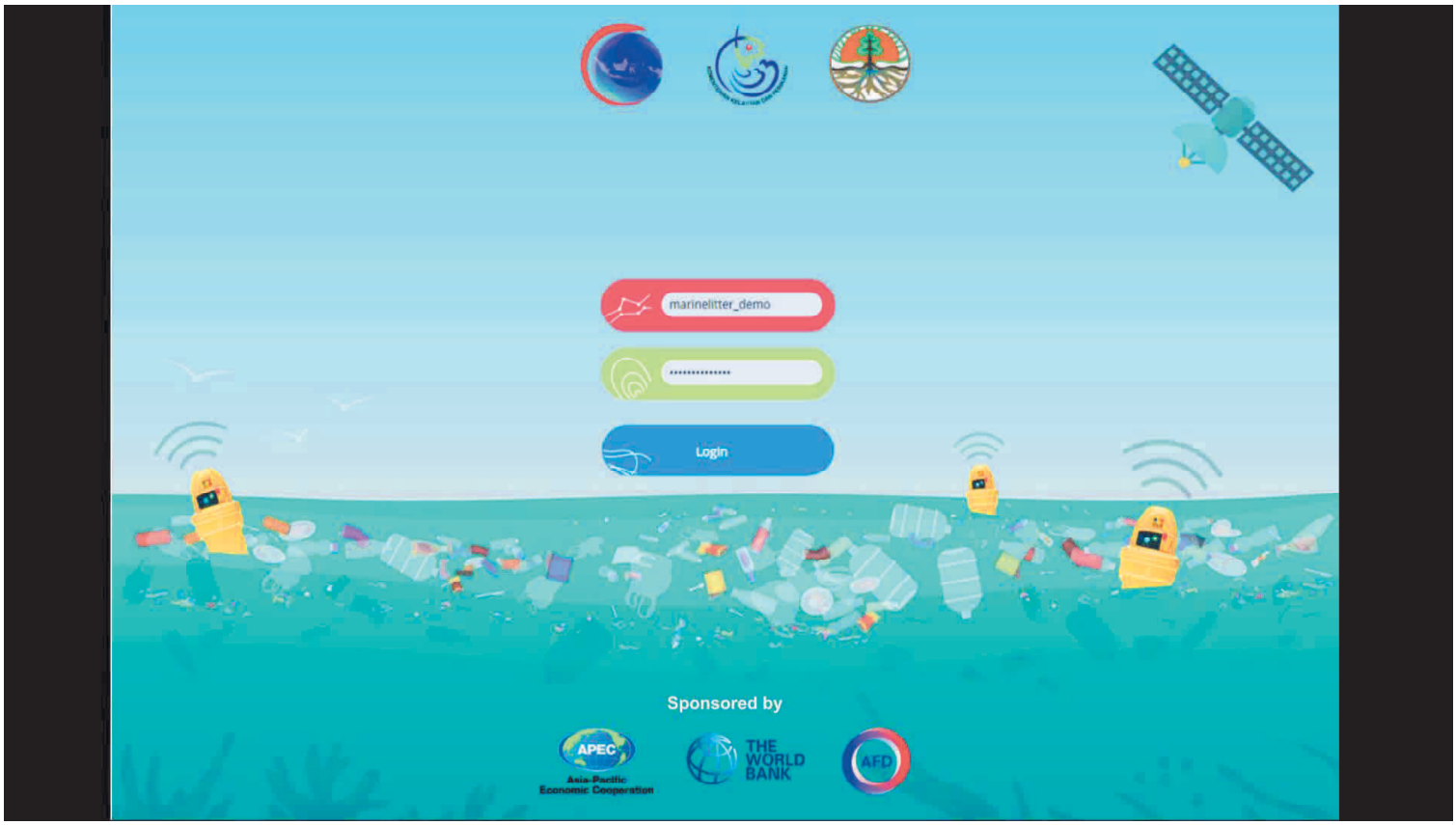
NCEP winds **10%**

Drift Study Workplan

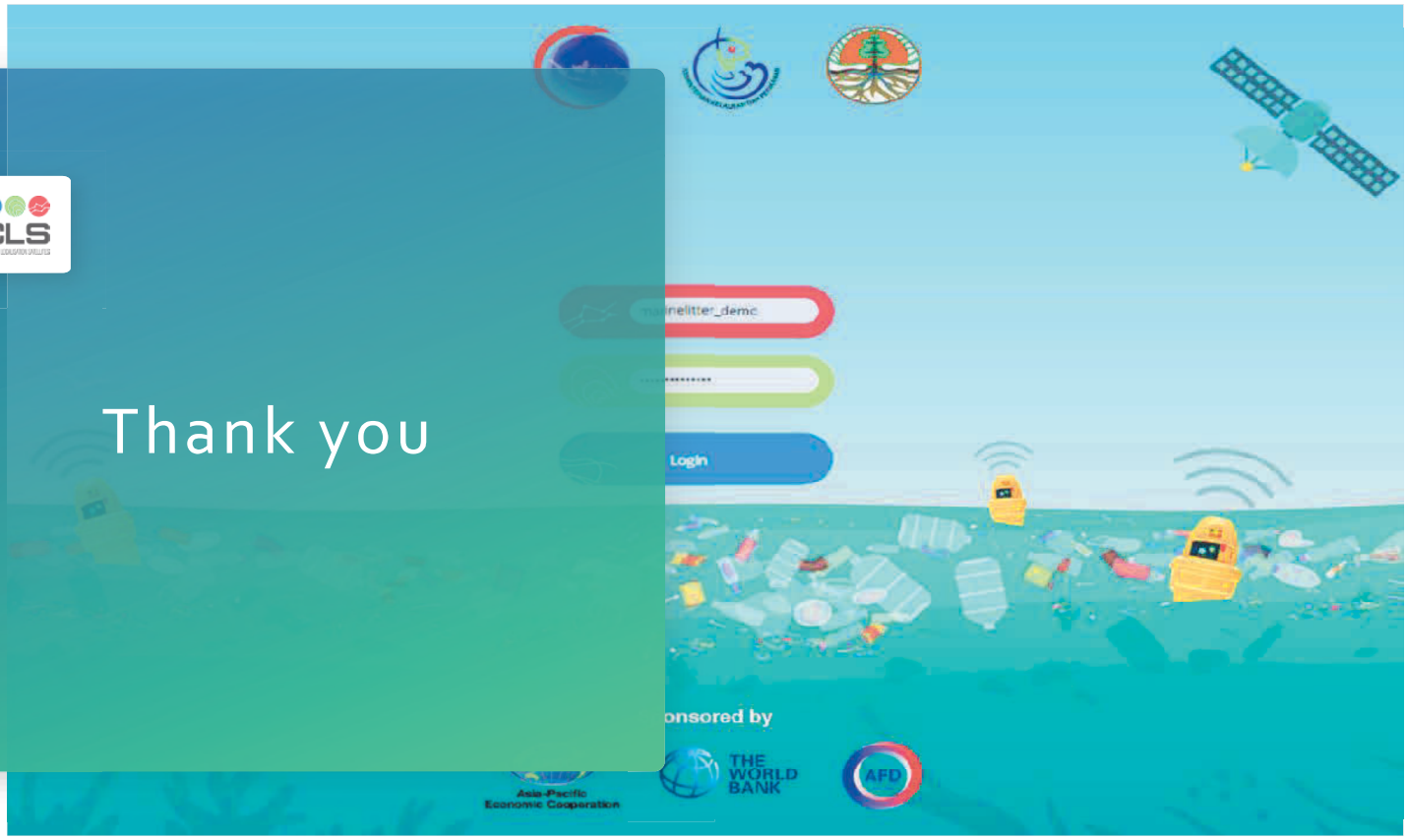
- ❑ Selection of Indonesian rivers for the marge-T drifters release campaigns (on-going)
- ❑ For each selected river, run a set of probabilistic drift simulations considering (starting)
  - ✓ Different **starting dates /** seasons / climatology
  - ✓ Different drift **durations**
  - ✓ Different **wind/current** forcing
  - ✓ Different marine debris shapes (**wind/current drag coefficient)**
- ❑ Summarize the results : indicators of accumulation hotspots and pathways

Drift Study Workplan

- ❑ Selection of Indonesian rivers for the marge-T drifters release campaigns (on-going)
- ❑ For each selected river, run a set of probabilistic drift simulations considering (starting)
  - ✓ Different **starting dates /** seasons / climatology
  - ✓ Different drift **durations**
  - ✓ Different **wind/current** forcing
  - ✓ Different marine debris shapes (**wind/current drag coefficient)**
- ❑ Summarize the results : indicators of accumulation hotspots and pathways
- ❑ Comparison with hotspots and pathways observed in 2020 with marge-T drifters


marinelitter_demo
Login
Sponsored by
APEC
Asia-Pacific Economic Cooperation
THE WORLD BANK
AFD

Thank you


Login
onsored by
THE WORLD BANK
AFD
Asia-Pacific Economic Cooperation