marine resources eo4sd

Earth Observation for Sustainable Development

Marine and Coastal Resources

esa

EO-derived information for Blue Economies

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The Blue Economy approach

- Economic growth based on sustainable use of marine and costal resources
  - Improvement of livelihoods & wellbeing of marine-dependent populations
  - Spatial planning to avoid negative impacts from one sector on the activities of another
  - Maintain healthy coastal and marine environments and ecosystem services
    - Low income communities are often highly dependent on local ecosystems for their livelihoods and well-being
- Environmental monitoring essential
  - EO data can deliver information to support Blue Economy planning and management

EO4SD - a new ESA initiative

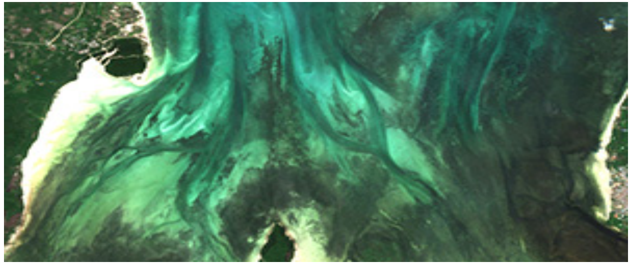
European Space Agency

Aim:

A step change in uptake of EO-derived information used for development initiatives supported by the World Bank and other International Financing Institutions (IFIs).

How?

- Work with stakeholders in IFIs and their Client States to define and implement a large-scale demonstration of how EO-derived information can support sustainable development

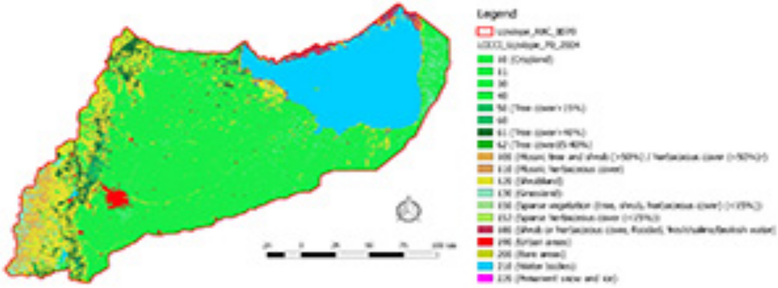


8 service 'clusters' so far

- More information at http://eo4sd.esa.int
- EO4SD-Marine consultations from October 2018

Service portfolio

Based mainly on Copernicus Sentinel data

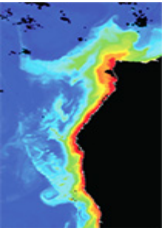


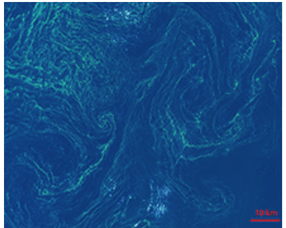
Cartography and mapping services

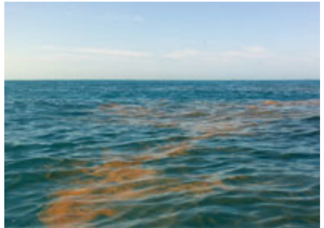
- Land use in river watersheds
- Shoreline change
- Shallow water bathymetry

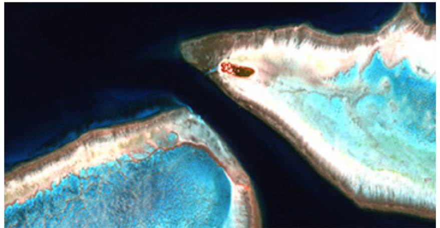
Coastal environment services

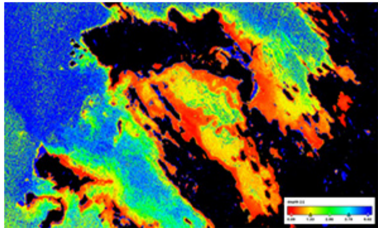
- Water quality
- Benthic habitat status (corals, macro-algae, sea grass..)
- Coastal habitat status (mangrove, coastal forests, dunes…)
- Support for Marine Protected Area planning / management









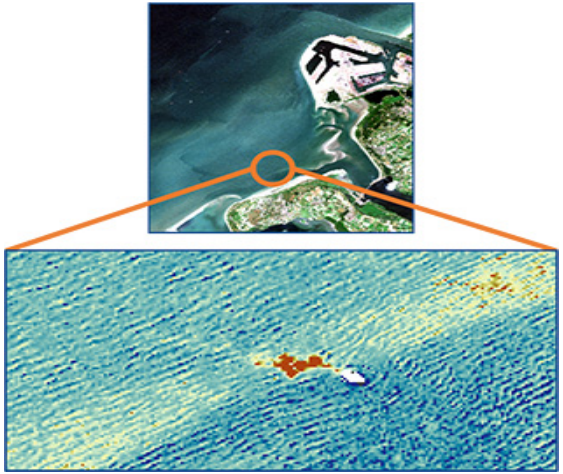


Service portfolio based on Copernicus

- **Near real-time monitoring**
  - Sargassum blooms
  - Fisheries surveillance
  - Oil spills
  - Aggregate extraction, dredging operations

- **Support for blue economy development**

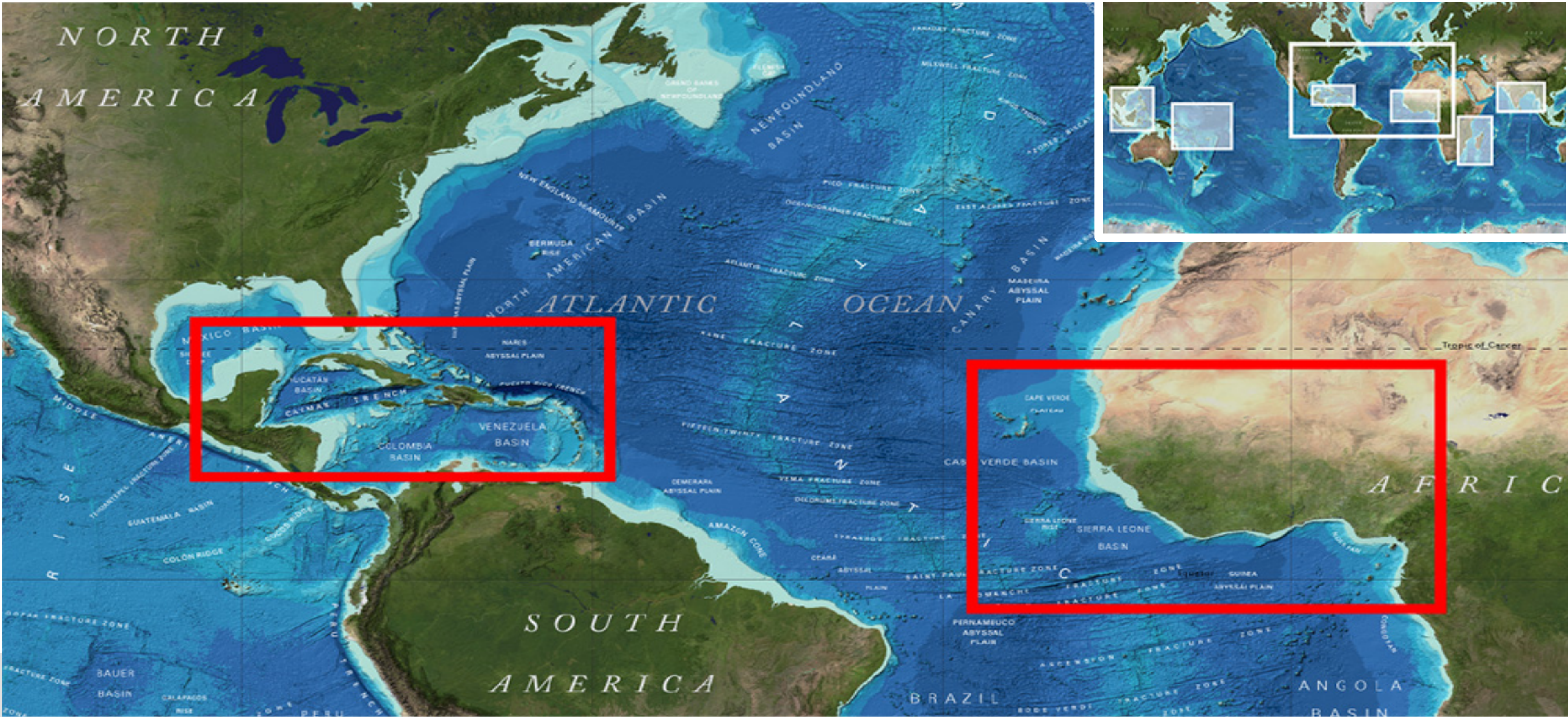
  Advice on selection and use of EO-derived data products
  - Aquaculture site selection
  - Blue Economy planning - tourism, energy, transportation
  - Marine Spatial Planning
  - Environmental Impact Assessment



Capacity development

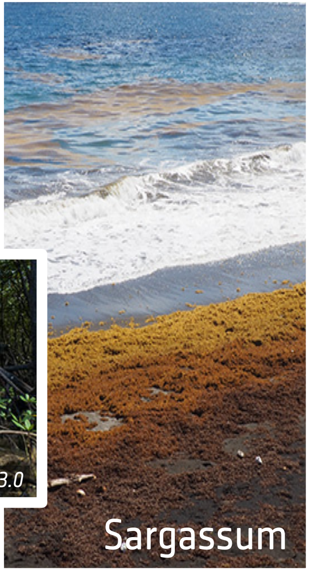
- Training for different user groups
  - Applying the data products to decision support
  - Techinical upskilling for future providers of EO-derived information products and advice to users in each region
- Building on existing regional and local initiatives
  - Collaborate to draw on local expertise and skills
  - Avoid duplication of effort
  - Allow for hand-over to regional delivery centres after EO4SD Phase II

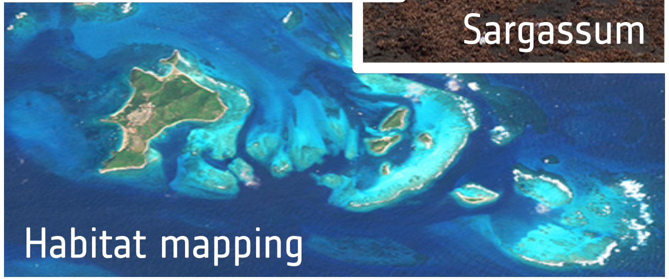
Where we are working



The Caribbean

- **Caribbean Oceans & Aquaculture Sustainability faciliTy (COAST)**
  - Recovery after extreme events (wind, waves, surges)
  - Nature-based solutions to climate risk reduction
  - Climate-smart fisheries and aquaculture
  - Sustainable management of resources
  - Sustainable tourism
- **Caribbean Regional Oceanscape Project (CROP)**
  - Strengthen capacity for ocean governance
  - Coastal and marine geospatial planning





West African priorities

- **West Africa Coastal Communities (WACA)**
  - Management of coastal areas
  - Reduce impact of natural hazards
    - Initial focus on erosion, flooding and pollution

    ⇒Shoreline mapping and change dynamcis

    ⇒Sediment transport and water quality

    => Coastal habitats: river deltas, lagoons, dune areas

- **West Africa Regional Fisheries Project [WARFP]**
  - Sustainable management of fish and aquatic resources
    - Strengthening governance, rebuild resource base

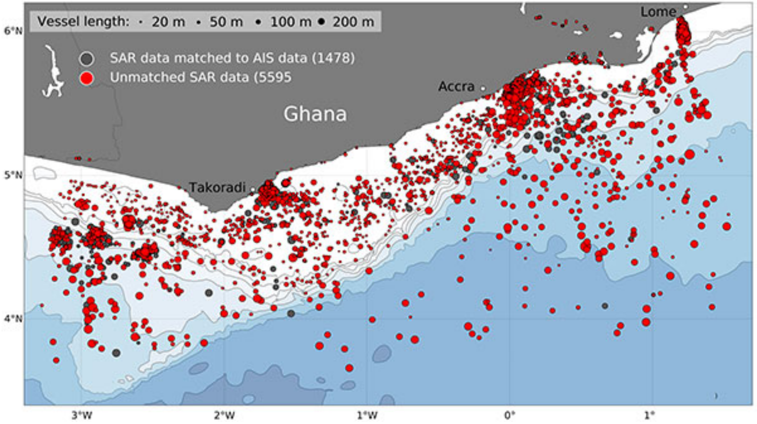
    => Monitoring of IUU fishing. Fishing zones, ocean fronts

Example 1:

Oil spill and IUU fishing (Ghana)

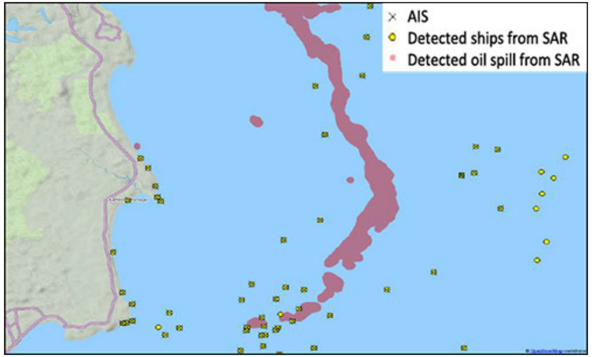
Fisheries monitoring

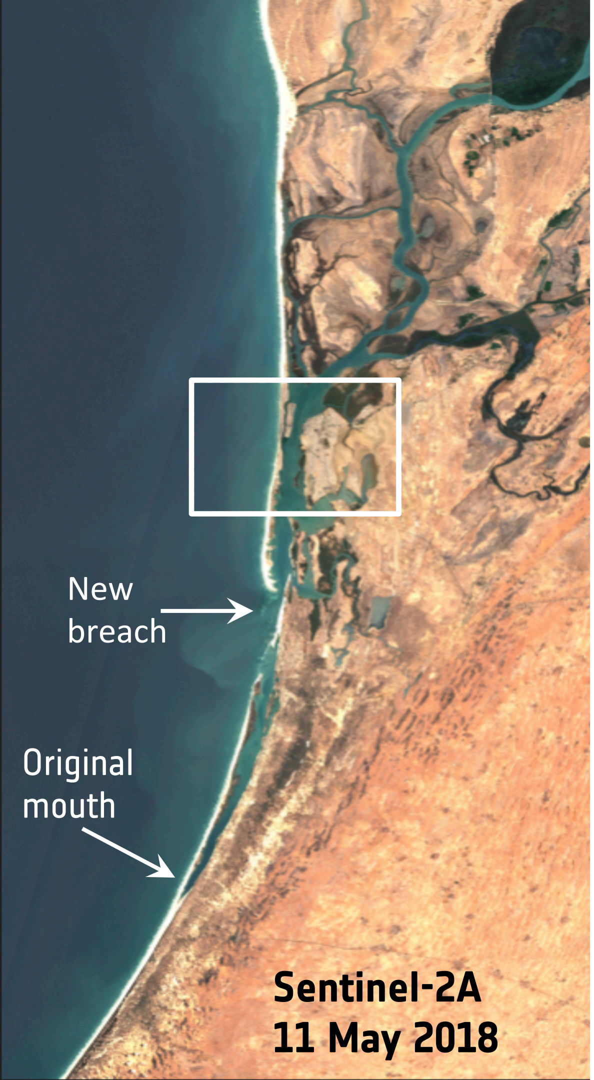
- Fast-delivery SAR data from Sentinel-1
  - 91% of registered vessels matched to sat detection
  - Satellite ship-size estimates match AIS distribution
  - Will extend service to other G.of Guinea states

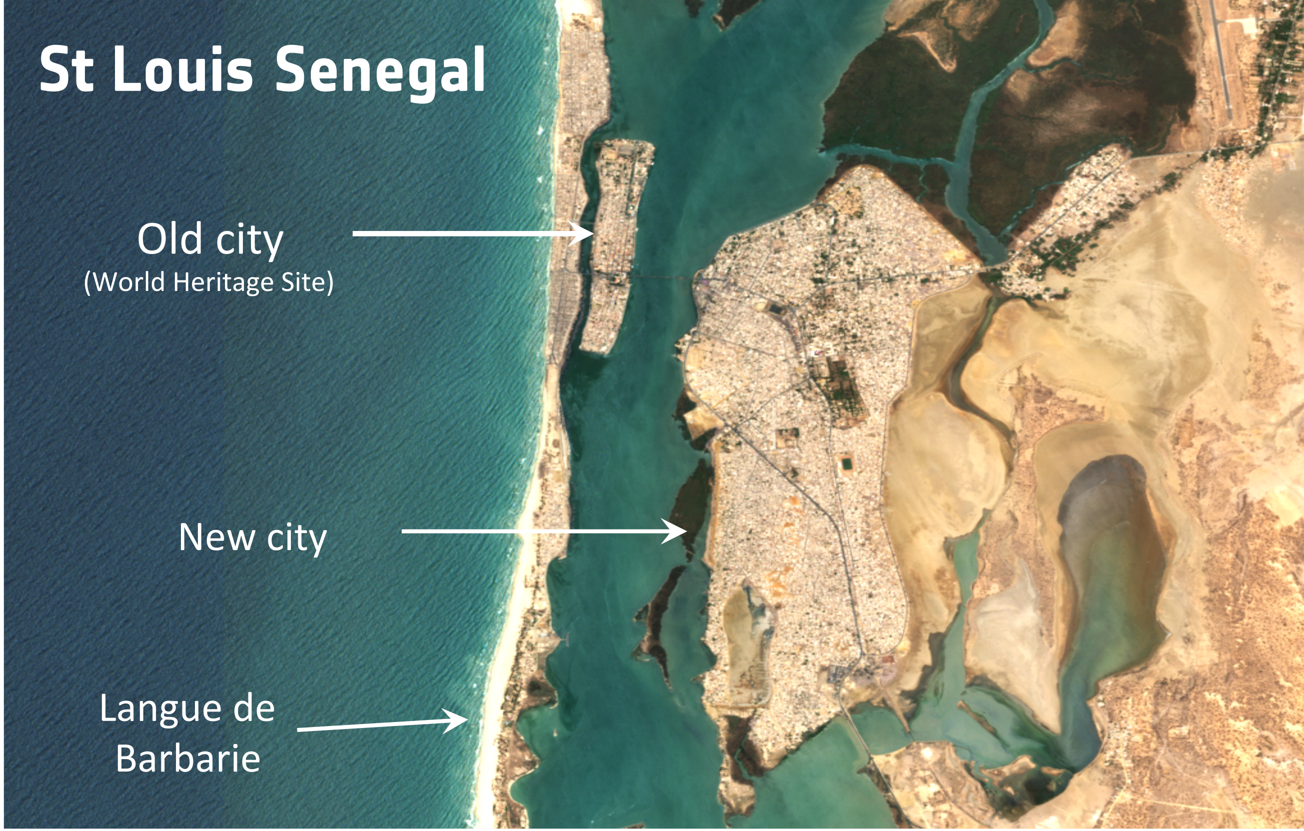


Oil spill monitoring

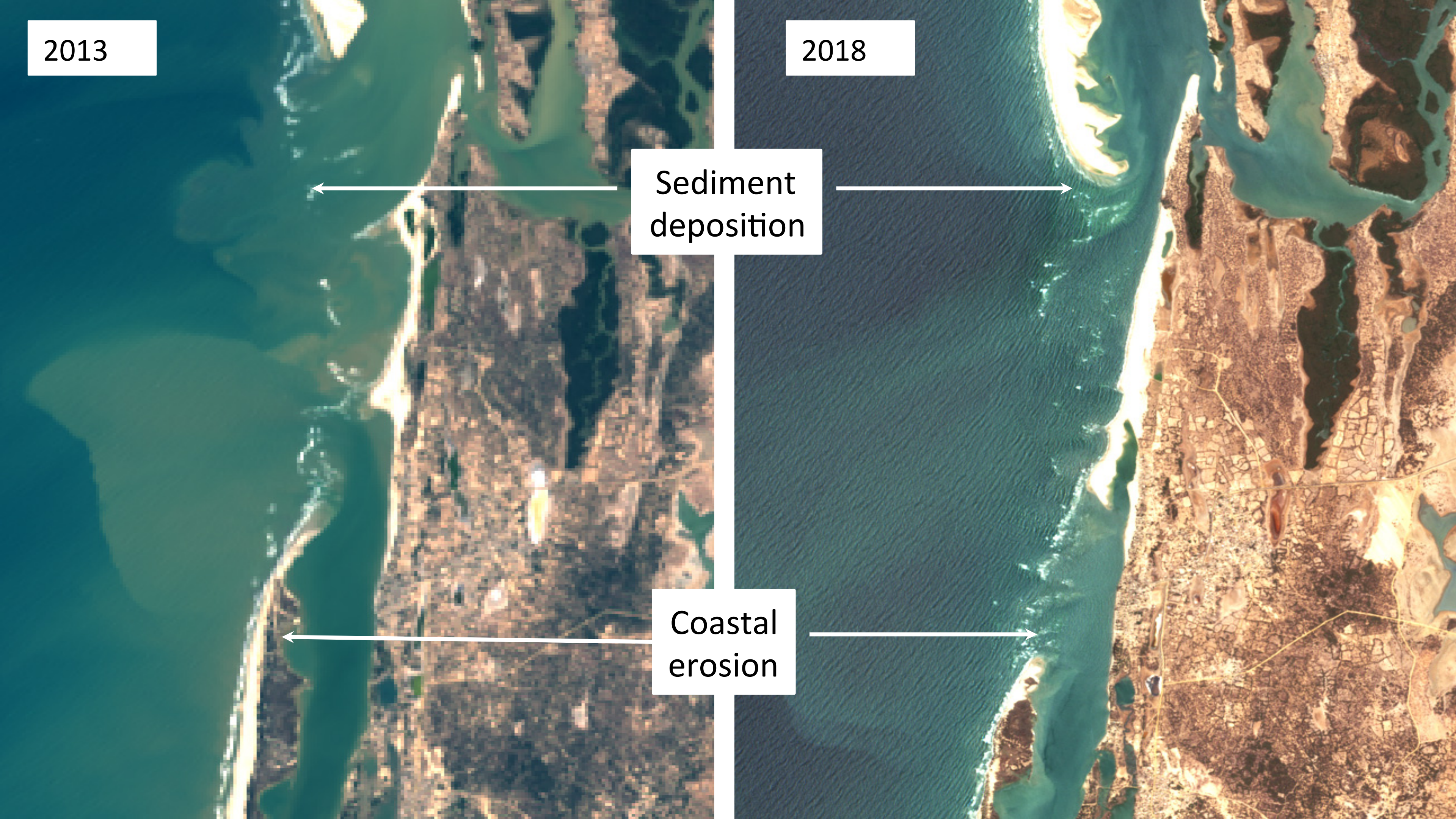
- Fast-delivery SAR data (Sentinel-1, COSMO SkyMed]
  - – Plans to include RadarSat to increase observation frequency
  - Machine learning classifier to eliminate 'false positives'
- Oil spill propagation estimates
  - – Plans under development using a local model







An artificial breach opened in Langue de Barbarie at the mouth of the Senegal river to relieve floods in 2003 has tripled the tidal range and placed the city of St Louis at greater risk from storms and sea level rise, but reduced the threat from river floods.


2013
2018
Sediment deposition
Coastal erosion

St Louis – open questions

- Is the transition to mainly maritime controls on flood-risk permanent?
  - Or will erosion and deposition eventually restore a regime where the main flood risk is due to rainy season river flow?
- What are the local effects sea level rise likely to be in future?
  - Monitoring using EO data + local in situ measurements
  - Numerical modelling to better understand local impacts of:
  - Essential for delivering longer term predictions

Conclusion: BE support needs environmental information from many different sources

- EO4SD-Marine will provide geo-referenced information
  - Geospatial data to support management of marine and coastal resources
    - Including information on variability and change
  - Advise stakeholders on using EO data for Blue Economy decision support
  - Work with IFIs + local stakeholders and experts to ensure continuity into the future
- Strong stakeholder interest in understanding dynamics behind changes
  - Broad range of spatial and temporal scales
  - Also requires in situ observations and model studies
- Combine monitoring with predictive capability of models

Recommendations

- For habitat mapping and change detection
  - Better synergy between the use of different sensor technologies to provide information at a range of temporal and spatial scales
  - More in situ observations and easier access to what is available
  - Synergy with model studies at different scales to understand dynamics and improve predictive capability
- For developing climate resilient coastal communities:
  - Information from global to shelf seas to (often very) local changes
  - How to build reilience to todays hazards so it leads to climate change resilience
- And ability to monitor plastics routinely – both detection and transport