



exactEarth's Satellite Tracking Technology and Fishing Applications

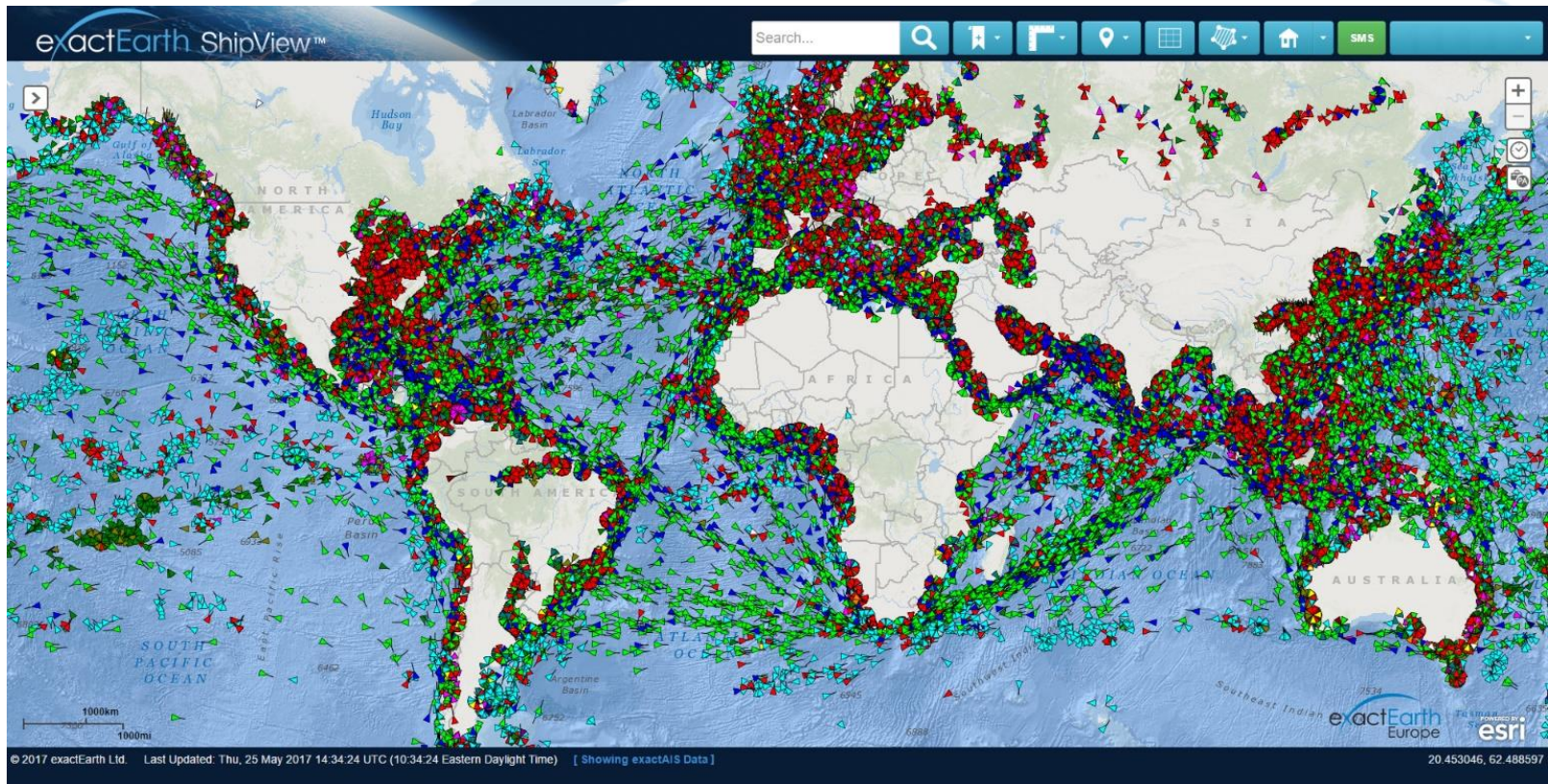
**Earth Observations for Tuna Fisheries Management Workshop
December 2020**

Richard Proud



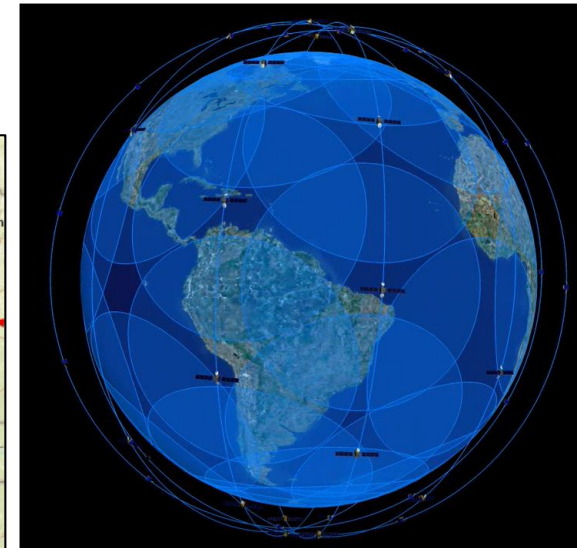
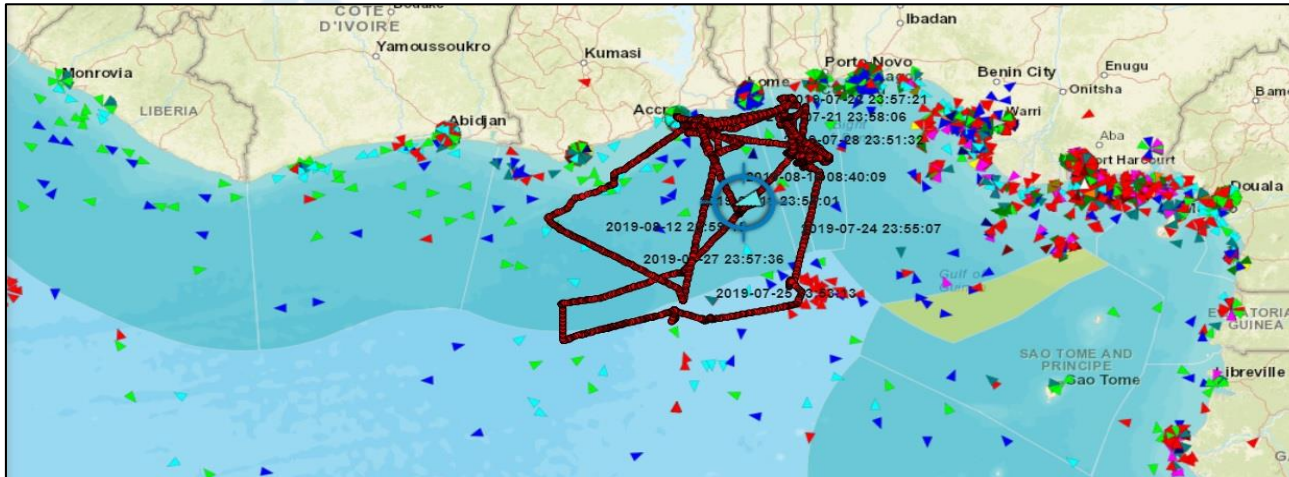
Introduction to exactEarth

- exactEarth Ltd, founded in 2009 and with its headquarters in Canada, operates a constellation of **58 AIS satellites**, providing **real time** access to **global** AIS data from AIS-equipped vessels, wherever they are operating in the world.



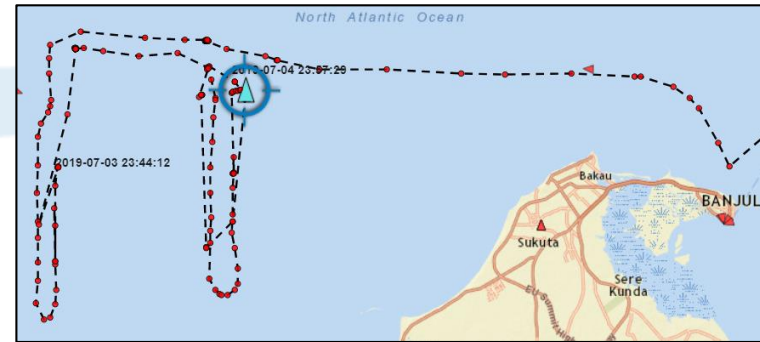
Introduction to 'Automatic Identification System' (AIS)

- **AIS** is a VHF radio-based safety system (i.e. collision avoidance), but also provides real-time tracking information from AIS-equipped vessels.
- AIS is an international standard and is mandated by the IMO for all ships over 300 GTs in international waters
- AIS-equipped vessels carry an AIS transceiver that transmits **a set of standard messages** providing information on location, speed, course, etc. These are **detected by neighbouring vessels** and **coastal and satellite receivers**
- terrestrial AIS (T-AIS) requires coastal receivers to detect AIS-equipped boats (nominally within a ~30 nautical mile range)
- **satellite AIS** (S-AIS) however, provides **global tracking**, without the need for coastal AIS infrastructure
- exactEarth provides its S-AIS data to end users within **one minute of transmission** and a satellite is generally overhead at **any location in the world every few minutes**



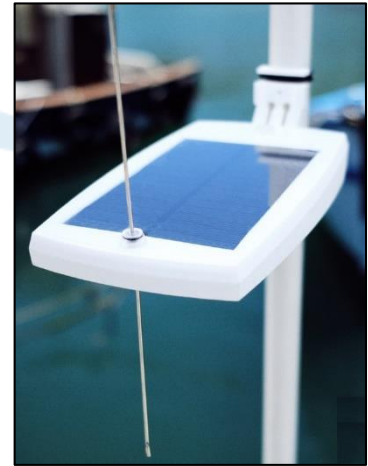
Benefits of Using S-AIS for Small-Scale Fisheries

- i. provides **real-time tracking** information to end users, with boat positions being reported many times an hour – supports **legal activity** and **fisheries management**
- ii. supports **safety of life**, both through transponder SOS functionality and collision avoidance. Anecdotal evidence from West and East Africa confirms that **bigger boats will avoid small fishing boats equipped with AIS**
- iii. provides a **very cost-effective** system compared to a full satellite-based industrial VMS – AIS transponders are generally **cheaper to procure than typical VMS terminals**, and the **airtime charges for AIS can be considerably less** than satellite-based VMS.

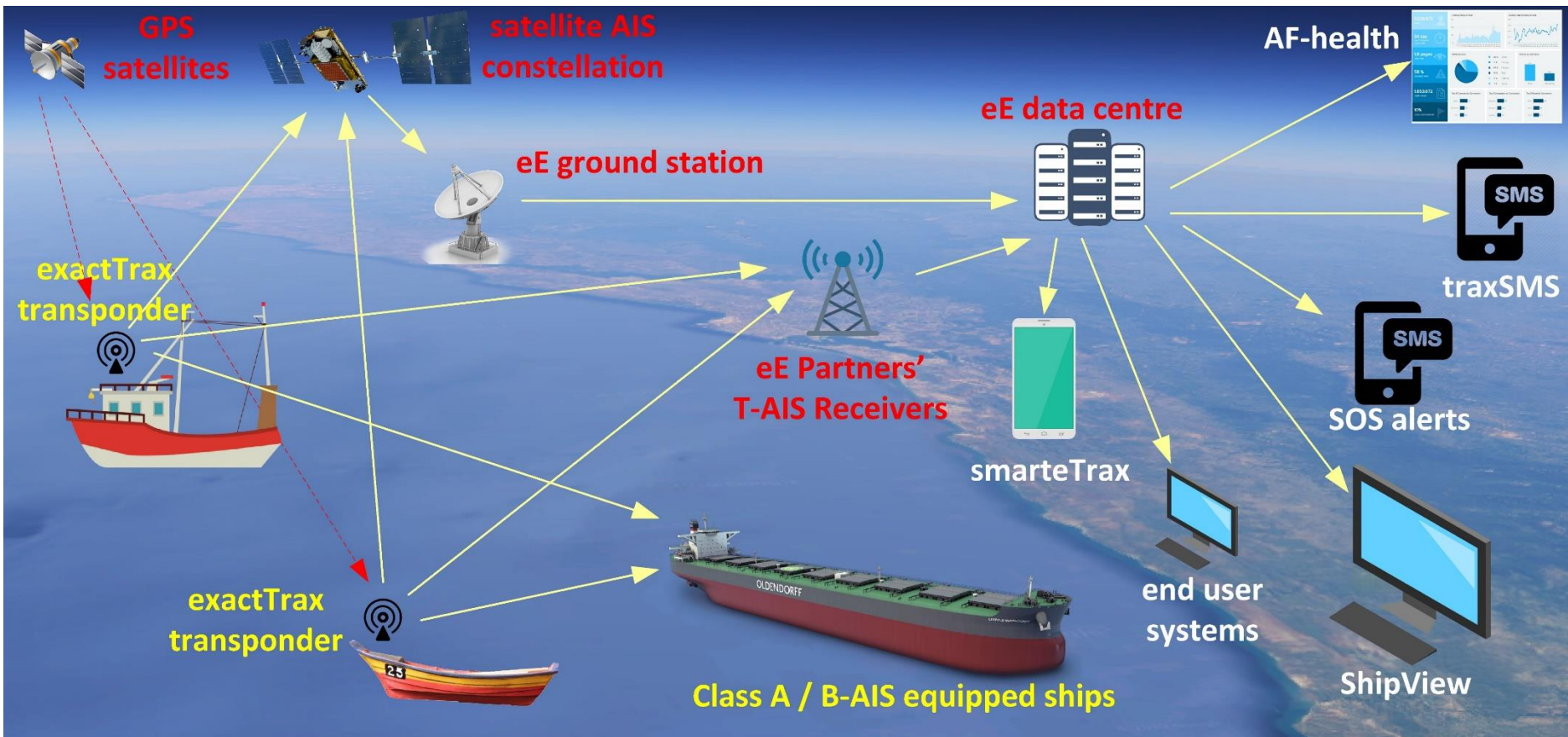


exactTrax for Small-Scale Fishing Boats

- Full 'Class A' AIS transceivers are expensive, and require integration with a ship's bridge systems
- 'Class B' AIS transceivers are simpler and cheaper, but also require some integration and on-board power; they also transmit at less power than Class A devices, such that they can be harder to detect by satellite AIS
- exactEarth has therefore partnered with several AIS manufacturers to develop '**exactTrax**'
- exactTrax is a combination of **low-cost battery / solar-powered AIS transponders** (extremely **easy to deploy on any boat**, from non-powered pirogues to semi-industrial / industrial vessels), and sophisticated signal transmission technologies (**supports high satellite detection rates** of low power transmission devices)



End to End & Simple to Use Service



Example Deployments

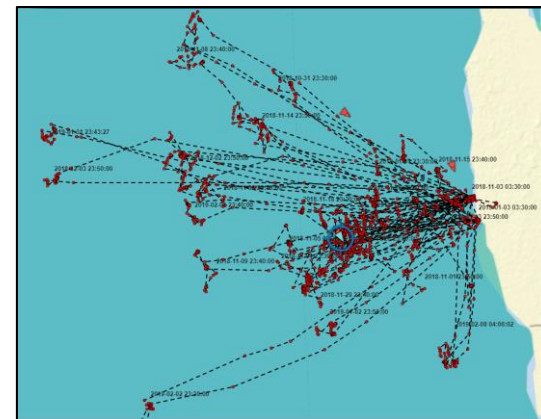
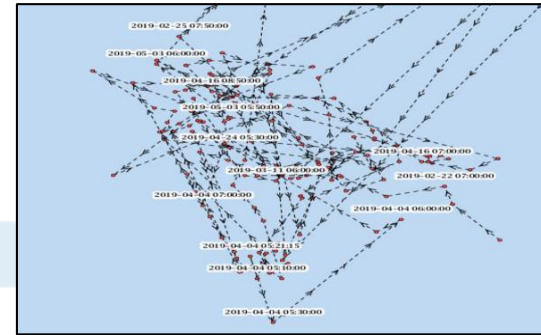
- exactTrax is **operational** in **South Africa** (all small-scale fishing boats) and **Tristan da Cunha** (rock lobster boats) and has been operational in **Ghana** and **the Gambia** (semi-industrial fleets).
- a UK government funded project is underway to deploy it operationally in **Madagascar** in 2021 (all motorised fishing boats)
- exactTrax has been evaluated positively in **Sierra Leone & Liberia** (via WB funding)
- recently successful trials, via UK government funding, have also been held in **Senegal**, the **Seychelles**, **Zanzibar**, **Mauritius**, **Mozambique**, and **Namibia** – funding is being sought to move these to operational deployments.
- a trial under SWIOFish-1 is due to start in the **Comoros** & eE is working in **Indonesia** with a local partner to trial the service there



Detection Rates

- Satellite AIS / exactTrax **detection rates are very high in most areas of the world** – with several (~10) real-time position reports an hour / every hour
- Example QoS from Mauritania:

Mean position report count per hour	15.4
Median position report count per hour	15.0
Mean interval between position reports (minutes)	3.9
% of positions received within 5 minutes of the previous position	77.4%
% of positions received within 15 minutes of the previous position	97.6%

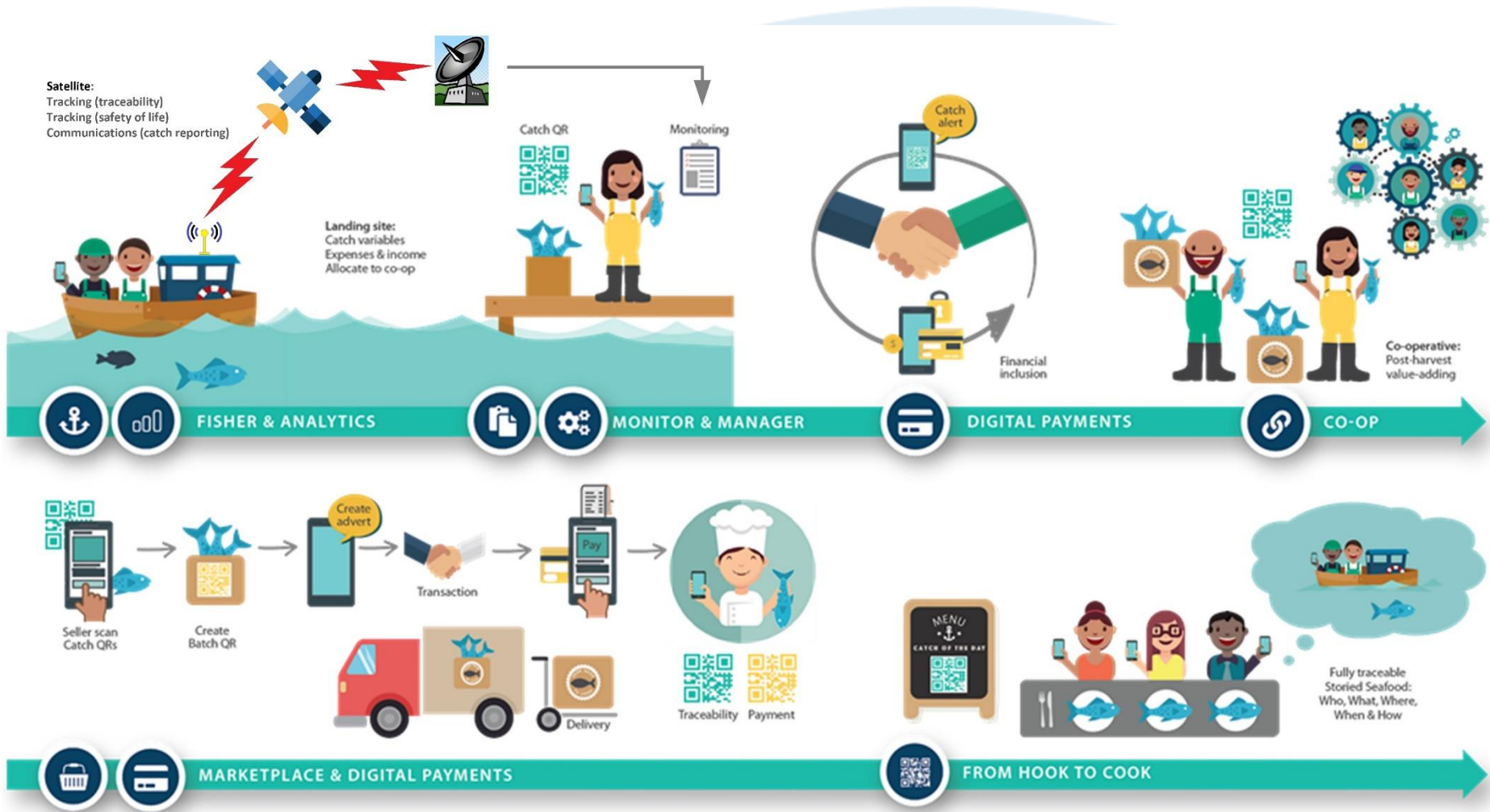


Catch Reporting / Traceability



- exactTrax can already provide catch location information, and we are now working on adding in **catch-reporting** – an exactTrax device, via a Smartphone app, will be able to upload a fisher's catch reports over eE's satellite network
- Related to this, and with funding from the UK Government (Innovate UK), we have started the 'Market Evolution for Small-scale fisheries in Africa' (MESA) project.
- Working with small fisher communities in Mauritius, MESA is in partnership with Stone Three Communications, ABALOBI, SoCha Ltd and the 'Fédération des Pêcheurs Artisans de l'Océan Indien' (FPAOI). MESA will:
 - assess the need for an integrated traceability, tracking, safety at sea and digital seafood 'marketplace' platform, with the goal of enhancing fishers' financial inclusion
 - demonstrate possible economic, social, gender, capacity and environmental benefits that could be achieved through future implementations of a digital seafood 'marketplace' platform in the diverse communities of small-scale fishers in Mauritius and elsewhere

Abalobi's 'Hook to Cook' Concept



AIS and VMS

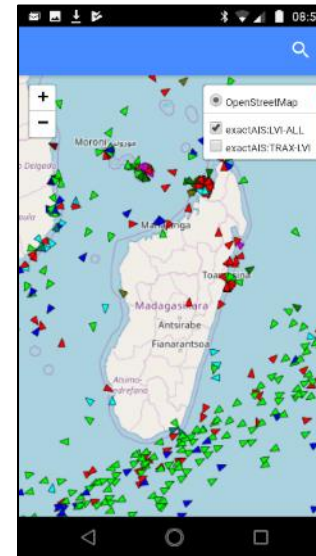
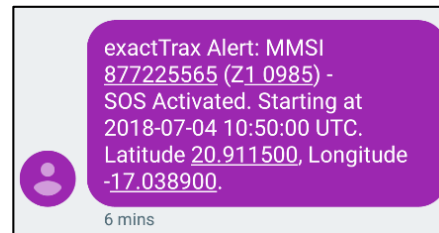
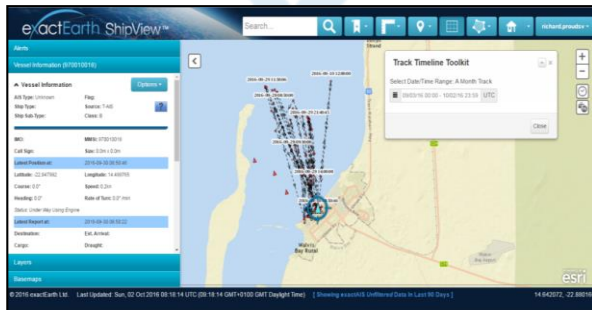
- S-AIS / exactTrax does not provide full VMS functionality as found on industrial fishing vessels, e.g.:
 - it does not support polling (S-AIS is receive only) *
 - nominally AIS data is not 'private' - other AIS-equipped boats can see another boat's AIS transmissions / position **
 - as a VHF-based system, detection of every AIS transmission is not as guaranteed as it would be with most satellite-based VMS (e.g. using Iridium or Inmarsat)
- However:
 - exactTrax can be **much more cost effective (both for terminals and air-time)** than a full typical satellite-based industrial VMS
 - exactTrax **detection rates are extremely good** in Latin America, Oceania, Africa and Asia
 - exactTrax transponders **can be deployed on any boat**, which is not the case for an industrial VMS terminal – i.e. very practical for use on small-scale and smaller industrial fishing boats
 - exactTrax supports **safety of life 'out of the box'**, which VMS does not
 - for selected devices, exactTrax provides **real-time transponder diagnostics**, allowing end users to check device health and usage (i.e. device on-off)
 - exactTrax devices are **tamper-proof** and, if required, can be fixed permanently to a host boat

* exactEarth is working on a hybrid device that would support two-way messaging

** exactTrax transponders can be configured to only transmit on non-AIS frequencies

Other exactTrax Service Elements

- data access via '**ShipView**' (web data viewer) or via direct **NMEA data stream / OGC web feature server** into 3rd party data systems
- **SOS service** – visual alerts in ShipView and optional SMS / email alerts
- **smarteTrax** – Android and Apple smartphone app for data viewing
- **traxSMS** – SMS service for retrieving latest vessel position information



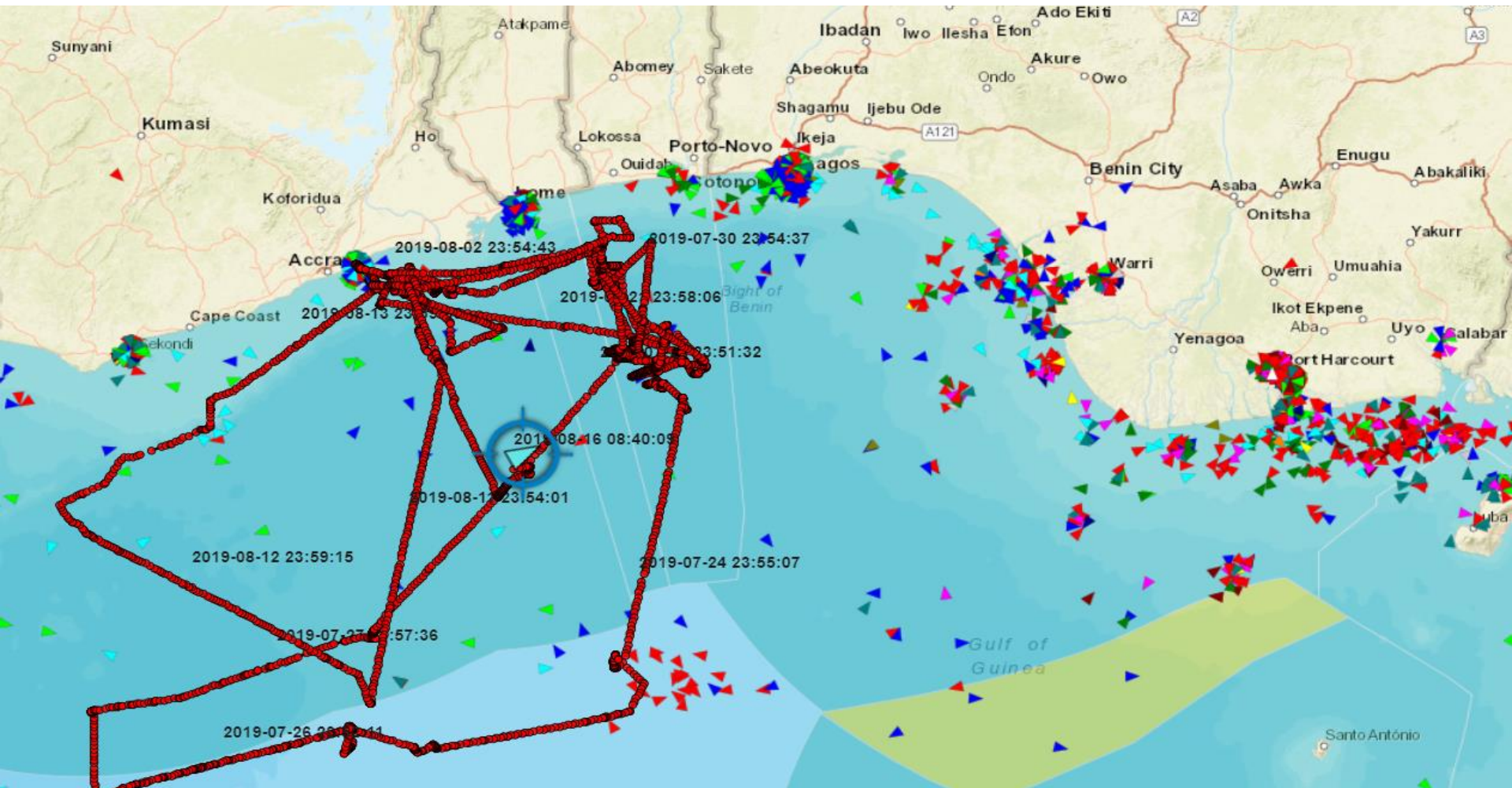
Summary

- exactTrax benefits:
 - tried and tested in Africa, SE Asia, Latin America and Oceania; currently operational in Africa
 - airtime charges very inexpensive and excellent QoS in most areas of the world
 - wide range of transponders/transceivers available – most are solar powered - all easy to deploy on any type of boat (even very simple artisanal fishing boats)
 - based on an international maritime standard, so supports safety of life 'out of the box'
 - will support catch reporting / catch traceability
 - very low data latency (generally < 1 minute), i.e. real time tracking
 - wide range of data access services:
 - data can be viewed / downloaded via exactEarth's real-time data display 'ShipView' application and viewed on exactEarth's 'smarteTrax' smartphone app
 - data available via a variety of services to end users for integration into third-party systems

Thank You

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