exactEarth’s Satellite Tracking Technology and Fishing Applications

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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

GPS satellites → satellite AIS constellation → eE ground station → eE data centre → eE Partners’ T-AIS Receivers → smarteTrax → end user systems → ShipView

exactTrax transponder

Class A / B-AIS equipped ships

AF-health → traxSMS → SOS alerts
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:

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<table>
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<tr>
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<tbody>
<tr>
<td>Mean position report count per hour</td>
<td>15.4</td>
</tr>
<tr>
<td>Median position report count per hour</td>
<td>15.0</td>
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<tr>
<td>Mean interval between position reports (minutes)</td>
<td>3.9</td>
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<td>% of positions received within 5 minutes of the previous position</td>
<td>77.4%</td>
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<td>% of positions received within 15 minutes of the previous position</td>
<td>97.6%</td>
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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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