North Pacific Fisheries Commission

NPFC-2020-SC05-OP02

Concept note – a research collaboration proposal between FAO-NPFC-GFW on the use of AIS data technology to improve monitoring of high sea fisheries

Problem statement summary:

- fisheries face Issues of sustainability, enhancing their management require better evidence-base, for example risk management approach requires more timely corrective actions relying on near-to-real-time monitoring systems
- AIS offer opportunities for near-to-real-time monitoring, higher time space resolution analyses, and is already well established in the high seas; in other areas and more coastal fleet segments, use of AIS is expected to grow;
- AIS and other Remote Sensing technology offer new opportunities for fisheries data analytics when combined with other data services such as vessel registries, fish stock or fishery status registries, fish tags, and environmental monitoring; it can transform the way we observe, analyse, interpret and eventually manage and monitor fisheries and the environment.

With such prospects, some research questions of interest are:

- What improvements can be achieved by using AIS data in supporting assessments and fishery management?
- What share of the world's vessels, fisheries, and catch are covered by AIS-systems and how does this evolve over time with improvements in AIS use, AIS reception and algorithm performance?
- With the understanding that many institutions face difficulties to benefit from technology innovations and process/analyse an increasing amount of data, what should FAO and other international organizations offer to facilitate access to information processed from such technologies?

Background:

FAO published in 2019 the Global Atlas of AIS-based fishing activity[1] in partnership with Global Fishing Watch, AZTI and Seychelles Fishing Authority. This Atlas, which has assessed the potential and limitations of the Automatic Identification System (AIS) to monitor the world fishing fleet's

[1] In conclusion of "Global Atlas of AIS-based fishing activity", http://www.fao.org/3/ca7012en/CA7012EN.pdf

2nd Floor Hakuyo Hall
Tokyo University of Marine Science and Technology
4-5-7 Konan, Minato-ku, Tokyo
108-8477 JAPAN

TEL +81-3-5479-8717
FAX +81-3-5479-8718
Email secretariat@npfc.int
Web www.npfc.int

fishing activity, has concluded that the AIS technology can start to be considered for estimates of fishing effort in the High Seas. This paper states that "In optimal conditions where AIS use and reception are good, and where vessel registries with gear type exist, AIS algorithm can perform well for gears such as longline or trawl and provide good estimates of fishing effort". Several reviewers from RFBs/RFMOs expressed interest in how AIS can improve sustainable fisheries. Assembling AIS, vessel registries, VMS, and logbook data could noticeably improve the estimates of effort and CPUEs in fish stock assessment studies that are currently approximated using VMS data because of a lower polling frequency (such as trawling fishing hours). AIS can also supplement other specific sources of information for fisheries management such as VMS acting as a useful (and more widely available) source of information which can provide a broader picture of vessel activity in and beyond the area, including for cross-jurisdictions assessments.

The Atlas also indicates that rapid progress is being made in the expansion of AIS use by fleets and pinpoints that current bottlenecks in the exploitation of emitted AIS data (satellite or coastal receiver coverage) are likely to reduce in the next few years. Likewise, pilots are already on-going regarding Small scale vessels with a primary focus on safety of fishers. With such prospects combined with the expected benefits for sustainable fisheries of finer grained and near-real time information, few strategic considerations arise:

- High Seas areas where AIS can be proposed to provide interesting "research labs" to respond to RFMOs possible interest in the use of AIS;
- Being relatively data rich areas, High Seas under RFMOs governance offer opportunities for researching how and to which extent, in which fishery context, and with which confidence intervals could AIS, combined with other data sources, improve estimates of CPUEs; and from there could provide near-to-real time indications of catches by fisheries.
- In areas where AIS use and reception is good but where fisheries are more complex, AIS still lacks the capacity to distinguish between certain gears, such as between trawls and dredges, purse seines and Danish seines, and pelagic trawls from bottom trawls, and support for differentiating fishing activities by multi-gear fishing vessels is needed. With research efforts and integration of more data sources these issues are expected to be progressively resolved.

<u>Recent developments</u>:

Following the development of the "Global Atlas of AIS-based fishing activity", FAO followed-up with GFW to assess interest to enter in a research and development collaboration for use of AIS based aggregated statistical products, with the overarching objective to contribute to sustainable fisheries.

An immediate output of the collaboration envisaged between FAO and GFW will focus on the generation of AIS derived products such as a dynamic web-based Atlas of fishing vessel activity

including maps and related data services. This Atlas will make these accessible to the public as aggregated anonymized estimates, with indicators of reliability, coverage, and completeness. The basic data services will generate maps of fishing vessel activity by FAO area, geartype, and year. As well as number of active vessels by flagstate, geartype, fishing area and year.

Beyond these basic services, this FAO-GFW collaboration would extend to other partners in particular interested Regional Fishery Bodies, on a project basis and with a research and development objective. The overall goal will be to support Fisheries management with fishing vessel activity analysis, and to address research topics regarding progress that can be achieved in monitoring and analysis by using high frequency/resolution data transmitted in real time. The focus will be on the high seas fleets because of a critical mass of data availability including for AIS, however the findings of proposed research topics can be of potential interest to small-scale fisheries where use of similar technology is emerging.

Proposal:

More specifically, the projects with such research collaboration could pursue a range of objectives:

- Identify gaps in fishing activity monitoring by comparing e.g. vessel registries, AIS, and VMS;
- Improve AIS-based classification of fishing activity by gear and related aggregated statistics estimates, and provide these as data services to RFBs and countries for the monitoring of fisheries;
- Provide refined measurements of fishing effort, and improve the estimates of effort and CPUEs;
- Address the feasibility of producing near-to-real-time indications of aggregated catch;
- Contribute to ecosystem assessments including by-catch assessments and impacts on MPA's and biodiversity;
- Contribute to the monitoring and predictions of the effects of climate change

Considering the above, the collaboration through FIRMS, and the on-going EU H2020 Blue Cloud project, a research project could be identified with NPFC based on areas of common interest and the combined use of a set of data sources collated and analysed in a secured and confidential e-infrastructure environment. These potentially include:

- The GFW-AIS database accessible through a FAO-GFW agreement;
- A range of published vessel registries;
- The NPFC catch and effort database;
- NPFC anonymised VMS and logbook data;
- The Global Record of Stocks and Fisheries (GRSF) in the NPFC context;
- The FIRMS tuna atlas;

- FIGIS's geospatial database including FAO species distribution maps, FAO statistical areas, RFBs competence areas, etc.;
- Other databases available through the iMarine-BlueCloud platform such as OBIS, AquaMaps, EMODnet bathymetry and biology, Copernicus Marine Environment Monitoring Service, Copernicus Climate Change Service (C3S) projections of Essential Ocean Variables, national jurisdiction boundaries, etc.

Any envisaged project will include a data sharing agreement with relevant clauses for the secure and confidential use of shared data.

Note: in this project and in general, FAO will not promote AIS for MCS purpose

Timing and resources:

The project will be based on in-kind resources from FAO, GFW and NPFC for the supervision and the provision of legacy data, complemented with the computing infrastructure and the financial resources of the Blue Cloud project (and any additional project) to support specific consultancy needs.