

Describing Offshore Support Vessel Activity by the use of AIS data



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Motivation

The Offshore Support Vessel (OSV) industry is a major source of employment along coastal communities. The total maritime industry in Norway employed 85 000 people and contributed to a value creation of NOK 142 billion in 2018, with ship owners making up the largest segment [1].

Despite the size and importance of the fleet, the sector is less analysed than e.g. the rig sector. Where other sectors publish their contracts on a fairly visible basis, this has not been true for the OSV sector. As such, the industry lacks a complete, consistent and bottom-up view on OSV vessel usage.

A data-drive approach to OSV usage could potentially decrease port congestion by forecasting the amount of vessels connected to each port, reduce emission by allowing operators to optimise their fleet usage and provide information on competitive vessel designs.

Objective

The objective of this master thesis is to develop a methodological framework for describing OSV activities by combining AIS data from vessels and mobile offshore drilling units with offshore infrastructures' geographical location.

Contributions

Mark J. Kaiser have in several papers studied the OSV activity in the Gulf of Mexico. In one of his most recent paper on the topic [2] OSV activity were identified solely by the use of AIS data.

The contribution of this thesis is to take use of Kaiser's concept and add offshore infrastructure data, to be able to more accurately identify OSV activities.

References

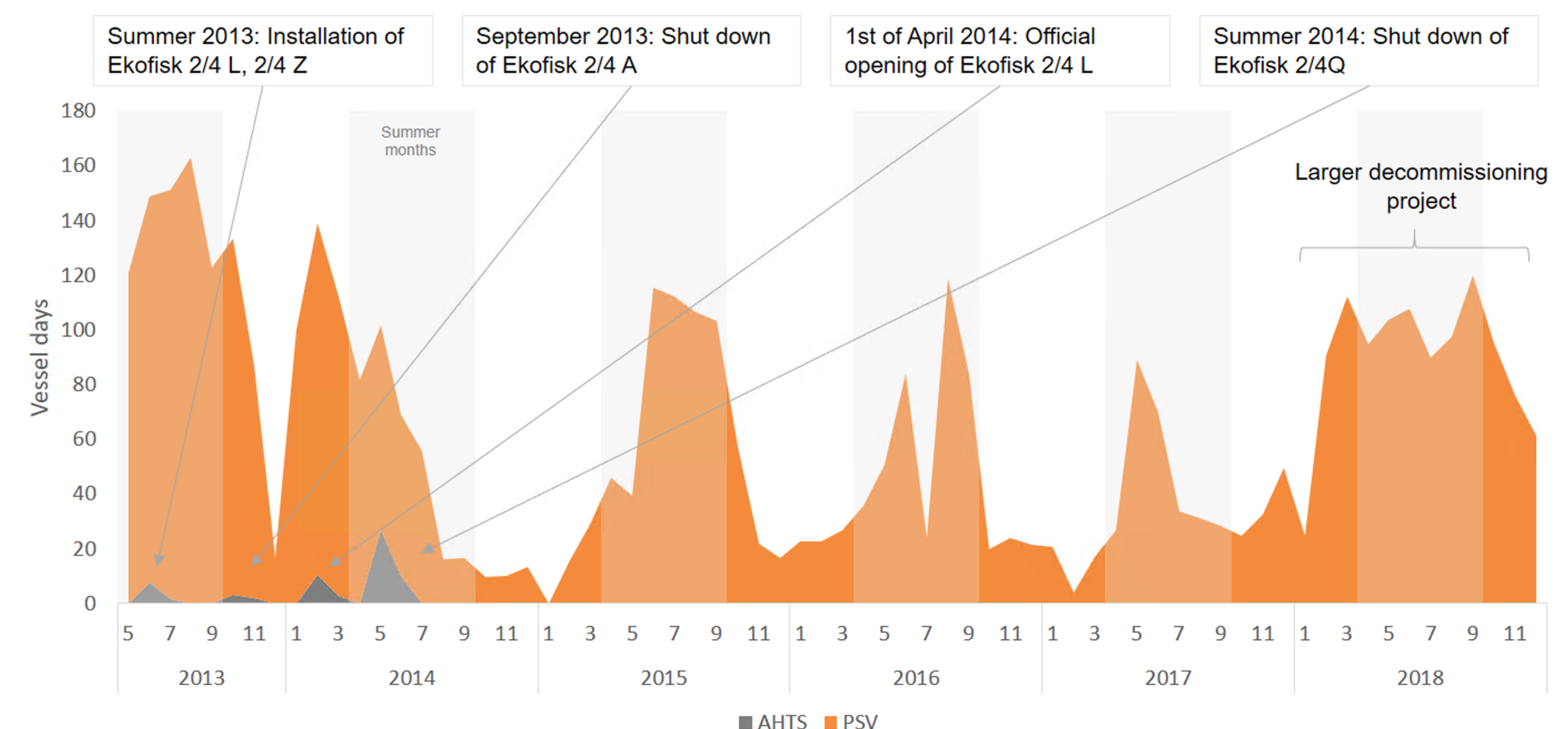
- [1] Norwegian Shipowners' Association: *Maritime Outlook Report 2019* (2019)
- [2] Kaiser, M. J., Narra, S.: *Application of ais data in service vessel activity description in the gulf of mexico*. Maritime Economics & Logistics 16 (4), (2014)
- [3] ConocoPhillips: *Ekofisk* <http://www.conocophillips.no/nm/vare-norske-operasjoner/ekofisk-omradet/ekofisk/>
- [4] Petro.no: *Heerema og AF Decom skal fjerne fire plattformer paa Ekofisk* (11/04/2017)

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Case Study: The Ekofisk Area

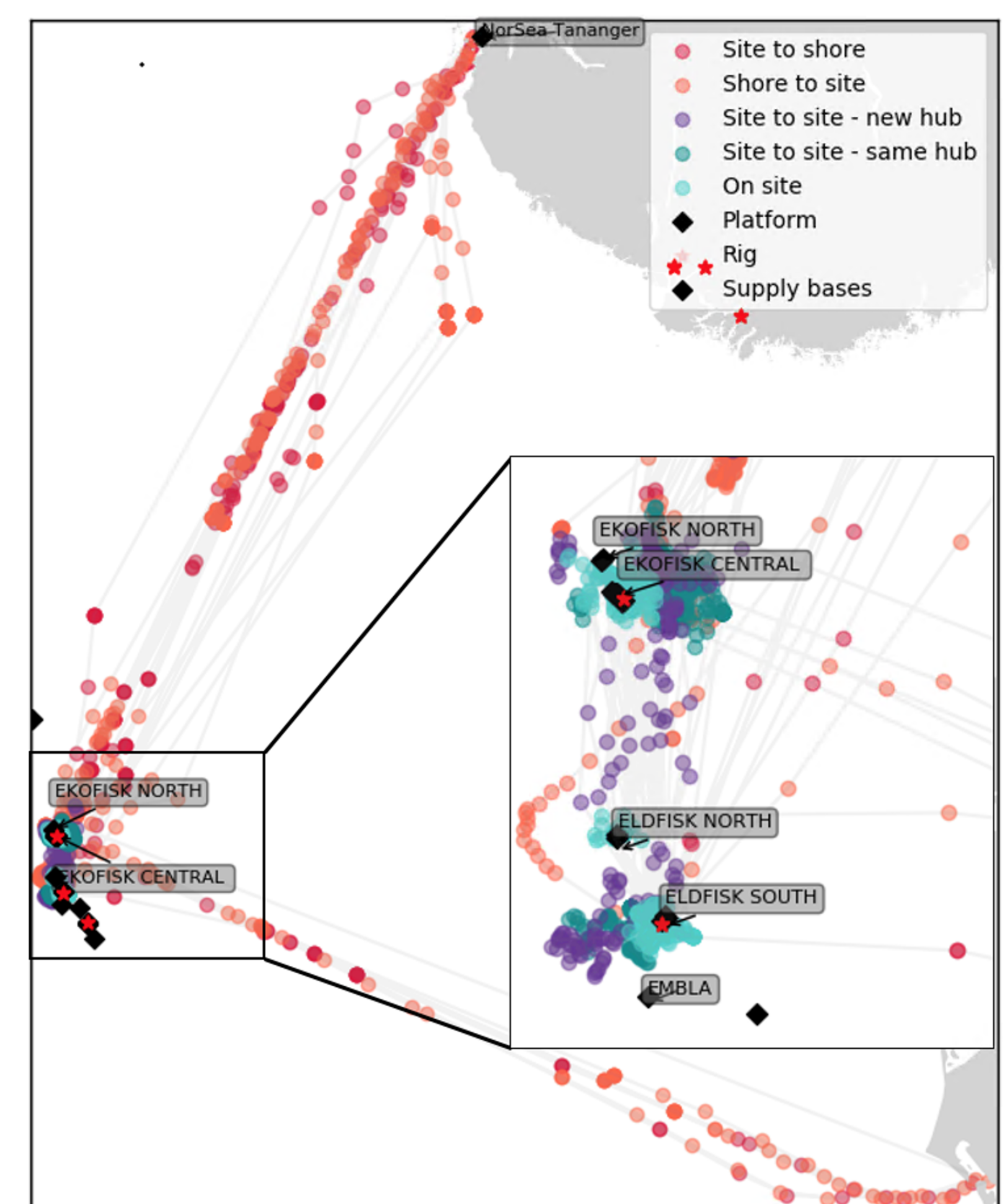
A case study focusing on the Ekofisk field has been conducted. The figure below shows the total vessel days spent on voyages with destination to the Ekofisk field for both PSVs and AHTS vessels. With most activity peaks being observed during the summer months the seasonality effect is clearly incorporated by the model. Larger projects and activities can be identified by the presence of AHTS vessels, which mostly are present on fields for installation or moving MODUs. All dates and activity information is found from ConocoPhillips [3]. Petro.no announced in 2017 that Heerema and AF Decom had won a contract for a large decommissioning project on the field lasting from 2017 to 2022, which may explain the increased activity levels in 2018.



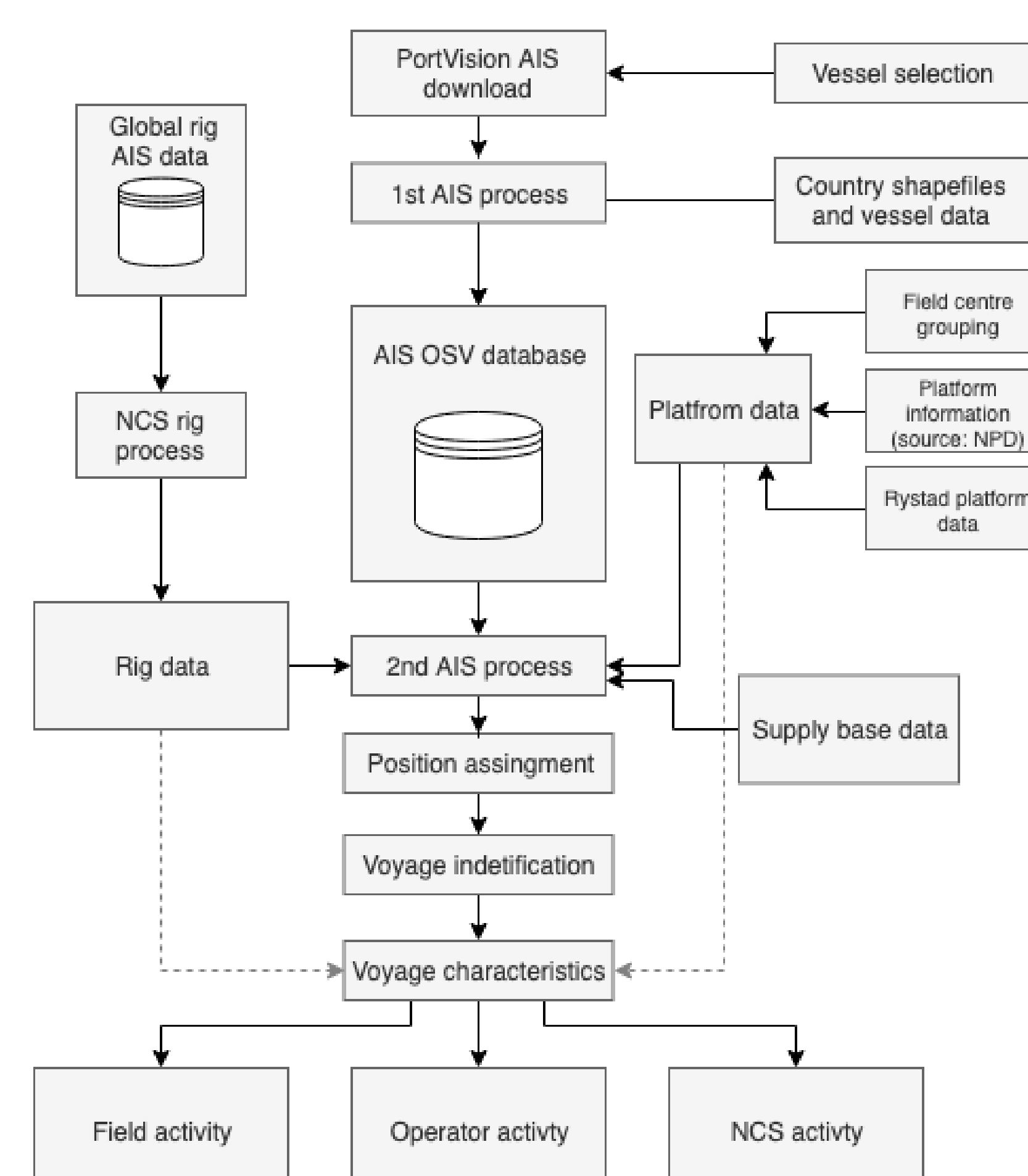
The figure to the right shows all voyages from March 2018 where Ekofisk has been identified as destination. The colour codes indicate the segment legs making up each voyage. Red marks indicate transit back and forth from site to shore, blue and green indicate activities on site, and all purple marks are indications of site to site sailing. As seen in the close up vessels also visit the Eldfisk field in the south during the Ekofisk voyages. As ConocoPhillips are operator on both of the fields, this could have been expected.

Conclusion

By combining AIS data with infrastructure data it seems possible to describe the OSV fleet's activities. In this study only infrastructure data from platforms and drilling rigs have been included. To obtain a complete view on vessel usage one should also include sub-sea infrastructure such as pipelines and well heads.



Model Description



The figure to the left shows the general methodological framework used to describe OSV activities. The model uses hourly AIS data provided by a subscription to PortVision. AIS data from a selected part of the OSV fleet is extracted. Infrastructure data is partly obtained by AIS data (rigs) and from Norwegian Petroleum Directorate (platforms). In addition Rystad Energy has provided data on supply bases. By the use of the infrastructures' longitude and latitude positions the distance to the nearest infrastructure is calculated for every AIS message. Messages identified within a 2 km range from an installation for more than 2 hours are defined as *On site*. These *On site* events are used to generate voyages for every vessel that further are used to describe the fleet's activity.