Marine Management Organisation

Mapping UK shipping density and routes from AIS report note (1066)

Aim

This project has developed flexible data processing tools and associated geographic information system (GIS) procedures to decode and display automatic identification system (AIS) data from marine vessel traffic.

From this, UK shipping density maps and routes were derived to form a UK AIS dataset for 2011 and 2012.

The tools and routines created by this project are designed to decode and display AIS data supplied by the Maritime and Coastguard Agency (MCA) which has been collected by their network of UK receiving stations.

Through the use of common routines and methodology, future AIS processing and analysis can be conducted by UK administrations to a consistent and commonly agreed approach.

What is AIS?

AIS signals are broadly classified as ‘Class A’ and ‘Class B’.

AIS-A is carried by most commercial ships and passenger ships with a gross tonnage of 300 or more. AIS-B is carried by smaller vessels and is aimed at smaller commercial vessels, the fishing sector and recreational vessel users.

The most commonly used data from AIS messages is the position of a vessel which is combined with voyage information about the vessel’s trip.

Position reports are broadcast by a very high frequency (VHF) transmitter, between 2 to 10 seconds in frequency depending on vessel speed. For this project, MCA provided 12 UK-wide, 7-day periods of AIS-A and AIS-B data from 2011 and 2012. The data sets were sampled from the first 7 days of each month, commencing with January, at 2-month intervals.

AIS in marine planning

AIS data can be presented visually as transit lines to understand sea area use. Transit lines are ‘vessel tracks’ created from individual vessel point positions, which form a line when joined together. Transit lines are classified by vessel type based on the information from the AIS signal.

To represent sea area use, transit lines have been summarised as a scaled density grid. This project used a UK wide density grid of 2km to represent ‘weekly’ density.

Developing AIS tools and routes

To process MCA raw AIS messages from its encoded format into a geodatabase required the development of a number of processing tools and GIS processing methodologies.

A decoder and data thinning tool was developed that allowed the loading of bulk MCA AIS files in raw format which were then processed as discrete ‘packages’ of information.

Following this, stages of GIS transit line creation and data validation were carried out to produce the density grids and populated geodatabase.

The derived AIS data products from this project are available on request as a geodatabase – within the bounds of data protection rules and requirements of anonymisation – in line with the government’s principles on open data.

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UK vessel transits

Using the 2012 transit line information, it is possible to identify vessel traffic within each national sea area boundary.

National 'buffer' areas have been used around each country in the UK allowing the categorisation of vessels starting, or stopping a transit. The buffer includes an area extending outwards by 0.5 nautical miles from the shoreline, including any additional areas identified as anchorages and ship-to-ship transfer areas.

As a summary of UK vessel transits statistics:

- 72% pass through English national waters
- 20% pass through Scottish waters
- 6% through Welsh waters
- 2% in Northern Irish waters

Over the available 42-day dataset, around 11,800 vessels called at, or left UK ports, anchorages and ship-to-ship transfer areas.

This is a vessel transit split of:

- 69% in England
- 23% in Scotland
- 5% in Wales
- 3% in Northern Ireland

Further information

Please note that the 2011 and 2012 AIS data derived density grid products are available on request.

Please direct any correspondence to the Evidence Team by emailing evidence@marinemanagement.org.uk

The MMO has developed their Strategic Evidence Plan[1] outlining evidence required for the MMO operational functions, including marine planning.

[1] www.marinemanagement.org.uk/about/publications.htm