

Space station tracks months-long voyages of ships at sea

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ISS is tracking vessels taking months-long trips across the global oceans, using the Columbus Vessel ID System. Hosted in ESA's Columbus research module, the system detects AIS transmissions

ESA's experimental ship detector on the International Space Station has pinpointed more than 60 000 ocean-going vessels so far. It has been able to follow the routes of individual ships for months at a time.

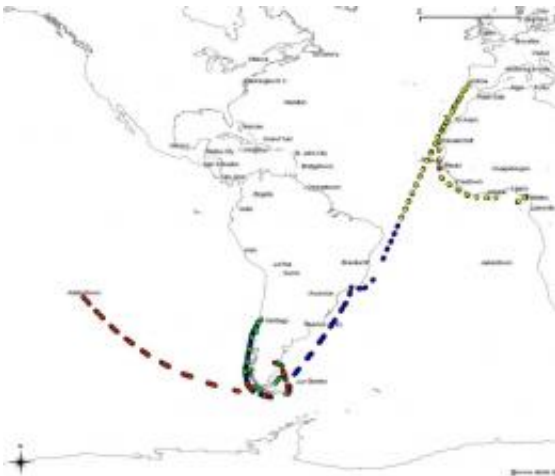
Hosted by Europe's Columbus research module on the International [Space Station](#) (ISS), and activated on 1 June, the tracking system picks up Automatic Identification System (AIS) signals, more usually

employed by port authorities and coastguards to keep tabs on local ship traffic.

All international vessels, passenger carriers and cargo [ships](#) above 300 tonnes are mandated to carry AIS VHF-radio transponders.

“AIS messages are designed to be used only on a local basis, with a range of 50 km or so to the horizon,” explained Torkild Eriksen of the Norwegian Defence Research Establishment (FFI), which built the NORAIS receiver in collaboration with Kongsberg Seatex.

“Instead, we are picking them up from 350 km in orbit, when they might have travelled up to 2000 km. Our receiver, therefore, had to be designed for extreme sensitivity to detect such weak signals.”



An example of ship tracking made possible using space-based AIS that is not possible using its ground-based equivalent. The track is colour coded in time, ranging through red, blue and yellow with increasing time. The ship in this example has been tracked for the entire duration of the first NORAIS operational period: red dots indicate ship position in June, green dots indicate ship position in July, blue dots indicate ship position in August and yellow dots indicate ship position in September. The one red dot off the coast of Africa is due to a clock reset on NORAIS. From the static AIS messages received, the

ship reported its destination as Comodoro Rivadavia in Argentina, then San Vicente, Quintero and Talcahuano in Chile, back to Comodoro Rivadavia, then back to Talcahuano and Quintero, onto Rio de Janeiro and Angra Dos Reis in Brazil, across to Sines in Portugal and then down to Qua Iboe in Nigeria, and this corresponds well to the track followed. Credits: ESA/FFI

This initiative, funded by ESA, is part of the trend of using the ISS as a platform to observe and monitor our planet. The Station's orbital inclination and altitude are different to those of most observation satellites, offering other ground patterns over about 95% of the population.

“Operating from space, we have been able to track ships for long periods as they cross the ocean,” explained Andreas-Nordomo Skauen of FFI. Nearly 30 million AIS messages were received in only four months from more than 60 000 different transmitters.

The results give an overview of the ship traffic beneath the Station's orbit, with coverage extending as far as polar latitudes.

A wide field of view

“Over the four-month period,” added Mr. Skauen, “we watched one ship travel from the western Pacific to Argentina then over to Europe and down to Africa, picking up its AIS signal from two to seven times per day, depending on latitude.

“So we can reveal exactly where a vessel has been in the marine environment, information that would be very useful to port, fisheries and marine authorities.”

From the Station's orbit, the NORAIS receiver has a maximum 4400 km-diameter field of view. Signal detection is easiest when vessels are far apart in open water. In the busiest stretches of water such as the English Channel, North [Sea](#) and Malacca Straits, AIS signals swamp each other, and vessels get lost in the crowd.

“This is not a problem, however, as these particular areas are already well covered by coastal base stations,” explained Mr. Eriksen. “This system's usefulness is its global reach.”

The Vessel ID System on Columbus has run on a largely automated basis with weekly instructions uploaded via Norway's national User Support Operations Centre, part of an ESA-wide network serving ISS experimenters.

“We surveyed both land and ocean, and will pass our findings to the International Telecommunications Union and International Maritime Organization as they consider introducing these new bands,” said Mr. Eriksen.

Provided by European Space Agency

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