TOPICS

The Impact of the Great East Japan Earthquake Disaster on Ship Movements

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1. Introduction

The Great East Japan Earthquake Disaster of March 11th, 2011, caused immense damage to port and harbor facilities, particularly in the Pacific coast regions of eastern Japan. Moreover, the accidental release of radioactive substances following a fire at TEPCO's Fukushima No. 1 nuclear power plant had a major impact on the international cargo flow and ship calling of Japan. We therefore organized AIS data and LLI ship calling data to discover the impact of the disaster on ship movements.

Here, AIS data are data observed from signals (vessel name, positional information, etc.) transmitted by the Automatic Identification System, which ships above a certain scale are obliged to carry.

2. Impact on ship movements

Firstly, we used AIS data to glean general trends in the impact on ship movements. Fig. 1 shows year-on-year change in total monthly transits by ships through the three main bays (Tokyo Bay, Ise Bay and Osaka Bay), organized by ship type (January = 1.00). The year-on-year decline by pure car carriers after the disaster is particularly stark; this is thought to result from reduced production of finished vehicles owing to the disaster. A sharp decrease was seen even in general cargo ships in April. Tankers, on the other hand, increased from April onwards. This is thought to be because output by refineries in western Japan was increased to fill the gap caused by damage to refineries in Tokyo Bay and on the Pacific coast of Tohoku due to the disaster.

As well as this, we used ship calling data to ascertain in greater detail the state of damaged ports (from Hachinohe to Kagoshima) as compared to ports on the Japan Sea side (from the Japan Sea side of Tohoku to the Hokuriku region). Fig. 2 shows the aggregated ship calling frequency of full container ships, bulk carriers and general cargo ships by month, as well as trends in these.

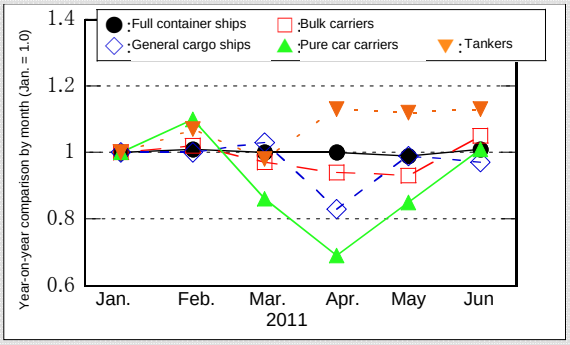

Figure 1. Year-on-year change in total monthly transits through the three main bays

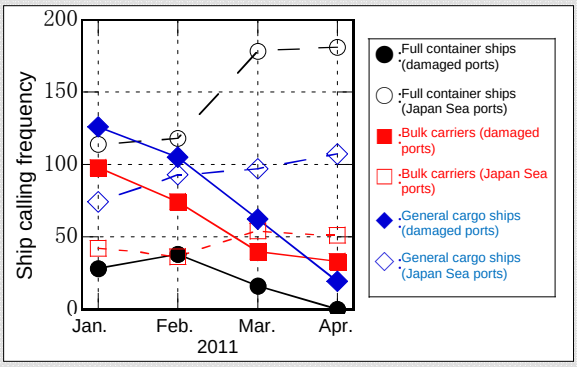

Figure 2. Trends in ship calling frequency

This study confirmed that, while the ship calling frequency in damaged ports decreased after the disaster, it increased in Japan Sea ports, particularly among full container ships, and that therefore the Japan Sea ports served as substitutes for the functions of damaged ports.

[Reference]
NILIM Technical Note No. 649
http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0649.htm