

Offshore tsunami currents found in navigating ship records

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We investigated ship navigation records known as Automatic Identification System (AIS) data near the source region of the 2011 Tohoku, Japan, tsunami. The AIS data of 16 ships in the offshore navigation could be compiled during about 40 minutes after the tsunami generation. Most of the AIS data showed notable deviation of the ship heading from the course over ground during the tsunami passage. There were good agreements in terms of amplitude/phase between the ship velocity and the simulated tsunami velocity in the direction normal to the ship heading. An equation of motion due to wave drag and inertia forces was examined for offshore movable floating body. Then, we explain that the ship movement in the direction normal to the heading immediately respond to the tsunami current, and relative velocity between the ship and the tsunami current asymptotically become zero. This indicates the movement velocity of navigating ships in the direction normal to the heading derived from AIS data will work as an offshore tsunami current meter.