
Press Releases



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JAMSTEC

Ocean Circulation Likely to Decrease Japanese Eels

Overview

A research team led by Drs. Yu-Lin Chang and Yasumasa Miyazawa at the Japan Agency for Marine-Earth Science and Technology (JAMSTEC: president, Asahiko Taira) examined potential impacts of ocean circulation on decreasing Japanese eel (*Anguilla japonica*) catches in the western North Pacific, focusing on possible effects of changing winds. Their simulation results found that changes in ocean circulation during the past two decades affected the trend of glass eel catches in Japan and Taiwan with decreases of about 5% per year. This study project was carried out in collaboration with Nihon University.

Japanese eels spawn in an area of the western North Pacific, upstream where the North Equatorial Current (NEC) meets the western boundary and the northward Kuroshio. In recent years, Japanese eel catches have been declining possibly due to both anthropogenic and ocean-atmosphere factors ([figure 1](#)); however, the reason has yet to be identified.

To investigate impacts of ocean current changes on the Japanese eel, the scientists applied the data-assimilative ocean circulation model, the Japan Coastal Ocean Predictability Experiment 2 (JCOPE2) for reanalysis of data during a period from 1993 to 2013. Based on a three-dimensional particle-tracking method, they then simulated dispersal of virtual larvae (v-larvae) including their swimming behaviors and movements resulting from transport by ocean currents after being released in the NEC spawning area.

The results showed that the amount of v-larvae arriving to the south of Japan was decreasing overall ([figure 2](#)) despite inter-annual fluctuations. Also, dispersion of v-larvae towards East Asia decreased in the last two decades especially for the western Taiwan and Japan regions, while transport patterns varied among years. In recent years, more v-larvae tended to enter the southern areas due to the weakening of the NEC and strengthening of subsurface southward flow near the spawning area, rather than entering the Kuroshio and moving towards East Asia as they used to do in the 1990s ([figure 3](#)).

Dr. Miyazawa says, "Our findings suggest a significant impact of ocean circulation on a downward trend of glass eel catches. However, the actual eel larvae migration still remains uncertain. We need to further explore including other factors such as biological factors and changes in demographic dynamics with more sophisticated numerical modelling approaches."

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 Title: Potential impact of ocean circulation on the declining Japanese eel catches
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<https://www.nature.com/articles/s41598-018-23820-6>

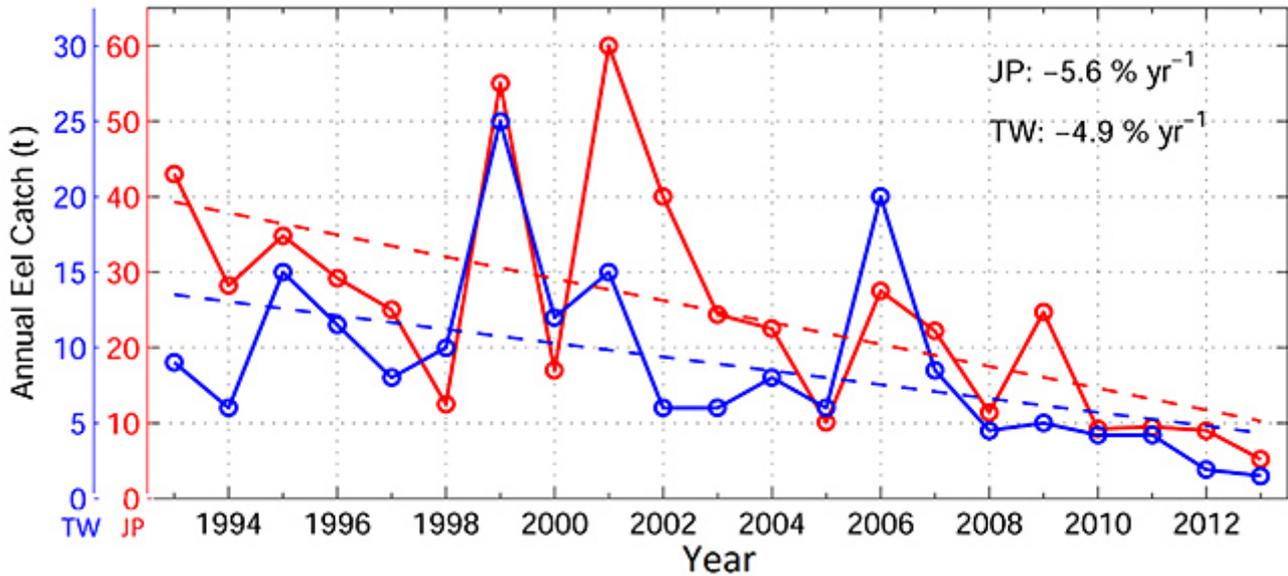


Figure. 1. Trends of Japanese glass eel catches (in solid lines): Japan (red) and Taiwan (blue). Dashed lines indicate long-term trends.

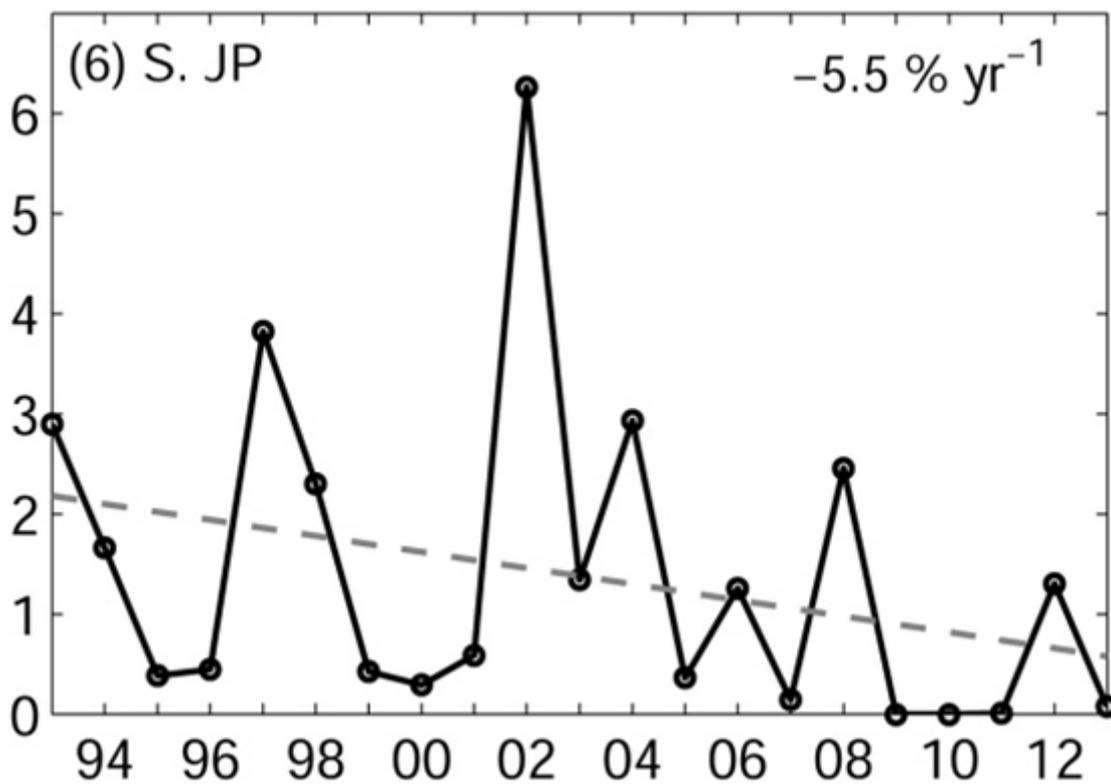


Figure 2. Result of Japanese eel visitation to the south of Japan. On average between 1993-2013, it shows a downward trend by 5.5% per year.

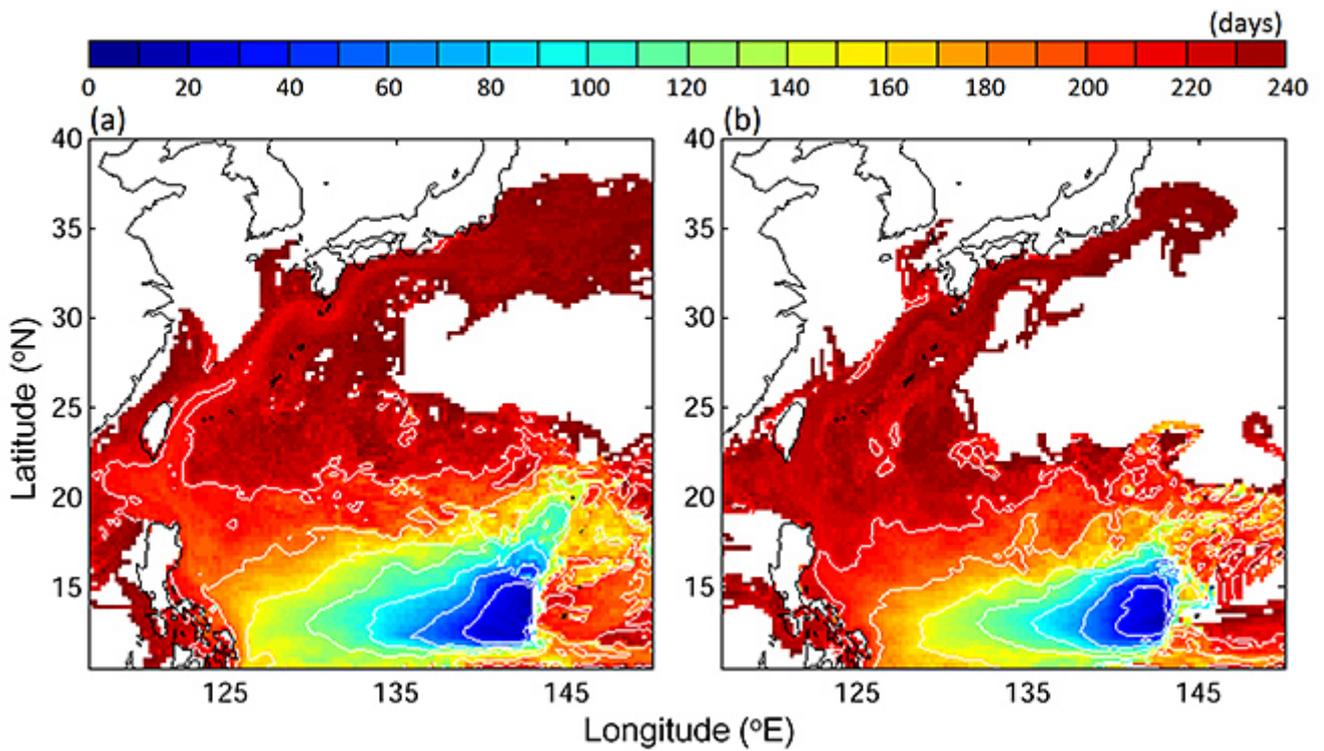
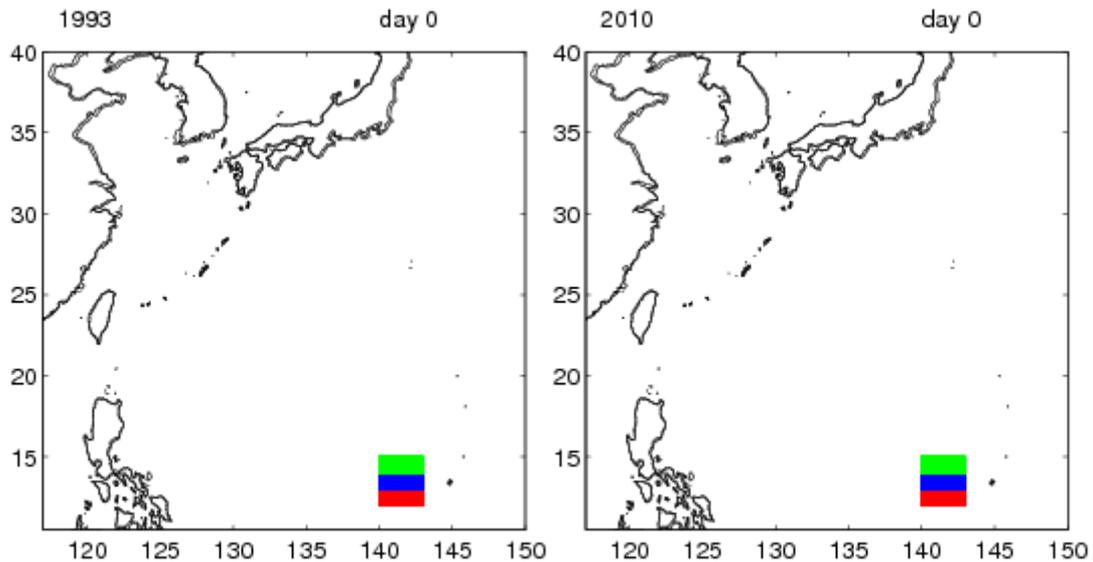


Figure 3. Mean ages (days) of all v-larvae crossing a given grid for the (a) years 1993–1997, and (b) years 2009–2013 of v-larvae released in the spawning area.



Animation for v-larvae distribution on 1993 (left) and 2010 (right), time interval of 5 days. Different colors show v-larvae originated from the southern (red), middle (blue), and northern (green) spawning area.

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