

Climatic Hotspot2 project in Japan

*Masami Nonaka¹

1. Application Laboratory, Research Institute for Value-Added Information Generation, Japan Agency for Marine-Earth Science and Technology

Frequency of extreme rainfalls and snowfalls has been increasing these years, and those events severely affect human lives and properties. It has been considered that tropical ocean and atmosphere variability such as El Niño and Indian Ocean Dipole mode, as well as the warming climate, remotely influences mid-latitude extreme weather/climate, while the mid-latitude ocean is passive to atmospheric variability. Current operational seasonal climate predictions are conducted based on this climate “assumption.”

Recent high-resolution ocean/atmospheric data analyses, however, have revealed that mid-latitude ocean also influences atmospheric circulations and their variability. Rediscovering strong warm current (e.g., the Kuroshio and the Gulf Stream) and associated strong ocean frontal zones as “*climate hotspot*”, we have elucidated mechanisms of ocean-atmosphere interactions and established a new paradigm of active roles of mid-latitude oceans in the climate system, replacing the conventional “assumption.”

The research progress has prompted a new crucial task: application of such new knowledge to predictions of extreme rainfalls/snowfalls and climate variability. For the new task, we have started a new research project called “*Climatic Hotspot2*” with more than 60 collaborators. In this project, I) we will further our understandings of mid-latitude ocean-atmosphere interaction processes that span multiple spatio-temporal scales and interplay among them through tight collaborations of latest observational and numerical modeling tools. Also, based on the improved understandings, II) we will investigate predictability of extreme weather (such as typhoons and bomb cyclones), of persistent atmospheric circulation anomalies that induce those extremes, projection of climate changes, and active roles of mid-latitude oceans in those phenomena. The purposes of the project are then deepening of the previously established paradigm and showing its scientific and societal importance and validity.

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