

## Gulf Stream and Kuroshio are synchronized

\*Tsubasa Kohyama<sup>1</sup>, Hiroaki Miura<sup>1</sup>, Shoichiro Kido<sup>1</sup>

1. Department of Earth and Planetary Science, The University of Tokyo

The Gulf Stream and the Kuroshio transport heat from the tropics to the extratropics, and their temperature variations affect densely-populated areas in the northern hemisphere through extreme weather and fisheries production. The two warm ocean currents are separated by the North American continent, and thus, they cannot exchange heat by the oceanic circulation within a few years.

In this presentation, however, we show that sea surface temperatures (SST) of the two warm currents are synchronized for interannual to decadal time scales. This synchronization, which we refer to as the Boundary Current Synchronization (BCS), is associated with the meridional migrations of the atmospheric jet stream. The singular value decomposition (SVD) analysis between SST and zonal wind shows that, from the conventional viewpoint, BCS is explained as the covariability shared by the Pacific Decadal Oscillation and the Northern Annular Mode. Nevertheless, the SVD time series exhibit high correlations with the zonal-mean meridional SST difference between subtropics and midlatitudes, which supports the notion that BCS may be understood better as the annular mode of the upper ocean.

We also discuss some implications for extreme weather and climate change. The regression map of 2-meter temperature on the BCS index exhibits a similar pattern to the temperature pattern in July 2018, which implies an essential relationship between BCS and the abnormally hot summer. BCS also connects two apparently unrelated global warming responses: the western boundary currents warm faster than the global mean, and that the atmospheric jet stream shifts poleward.

Keywords: Atmosphere-Ocean interactions, Kuroshio, Gulf Stream, Atmospheric jet stream

