

## Predictability of interannual-to-decadal variability in eddy activity in the Kuroshio Extension

\*Masami Nonaka<sup>1</sup>, Hideharu Sasaki<sup>1</sup>, Bunmei Taguchi<sup>2</sup>, Niklas Schneider<sup>3</sup>

1. Application Laboratory, Japan Agency for Marine-Earth Science and Technology, 2. University of Toyama, 3. IPRC, University of Toyama

Eddies in the Kuroshio Extension have been shown to affect sea surface temperature, the atmosphere aloft, subsurface ocean, and also marine ecosystem. It is therefore important to explore variability and also predictability of the eddy activity in the region to improve our understanding of ocean-atmosphere variability over the North Pacific region. While interannual-to-decadal variability in the eddy activity in the Kuroshio Extension could be partly driven by atmospheric variability over the central/eastern North Pacific, it has also intrinsic variability that is independent from the atmospheric forcing and thus unpredictable. To examine predictability of the variability in eddy activities under realistic conditions, we analyze a ten-member ensemble, of fifty-year integration of an eddy-resolving OGCM driven by time-varying JRA55 reanalysis data. Focusing on interannual-to-decadal variability by the 13-month running mean, eddy activity in the downstream Kuroshio Extension region (32-38N, 153-165E) shows rather limited ensemble spread and uncertainty, and ensemble mean has significant correlation with the observation (correlation coefficient  $r=0.58$ ). Also, the eddy activity variability highly correlates with the local current speed variability that propagates westward from the central North Pacific. With the propagation, the time series of area averaged current speed in the central North Pacific correlates with the eddy activities in the KE downstream region in four years later ( $r = 0.59$ ), indicating predictability of the eddy activities. The four-year lagged correlation is also found in the observation. In contrast, in the upstream Kuroshio Extension region (32-38N, 141-153E), the ensemble spread is large and the ensemble mean does not correlate to the observation at all. While possibly model dependent, the result implies that the observed eddy activity in the upstream Kuroshio Extension may have a significant intrinsic component on the interannual time scale.

Keywords: eddy activity, predictability, Kuroshio Extension