

**Direct observations of tidal mixing and studies on ocean/climate variability
synchronized with 18.6-year period nodal tidal cycle**

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【Outline of survey】

The goals of this project are to directly observe strong tidal mixing in the North Pacific subarctic regions, to elucidate the impact on ocean circulation, material circulation and biological productivity and to evaluate the influence of the 18.6-year period nodal tidal cycle on the ocean and climate. To achieve these, we will 1) perform observations of turbulence, currents, nutrients and planktons in the oceanic areas as Kuril, Okhotsk Sea, Kamchatka, Aleutian, Bering Sea and the Kuroshio Extension, where strong tidal mixing is expected to occur, and try to quantify the tidal mixing with combining models and theories, 2) examine historical observational data and study on the relation with 18.6-year period nodal tidal cycle. By developing 3) ocean and 4) climate numerical models with tidal mixing observed in the North Pacific subarctic regions, impacts of tidal mixing and 18.6-year cycle on the ocean circulation, ecosystem and climate are evaluated.

【Expected results】

In the North Pacific ocean and atmosphere, bi-decadal variability is known to be dominated on the inter-decadal time-scales; however, causes remain to be a mystery. The hypothesis of the present project that “18.6-year period tidal cycle regulates the bi-decadal variability in the ocean/climate” is a possible candidate to resolve the mystery. If the hypothesis can be evidenced, predictability could be greatly improved because the tidal cycle is accurately predictable. Observational data obtained in this project as directly measured ocean turbulence data down to intermediate and deep oceans in association with physical, chemical and biological studies will greatly contribute to understanding of ocean thermohaline circulation, material circulation and marine ecosystem.

【References by the principal investigator】

- **I. Yasuda**, S. Osafune and H. Tatebe, 2006: Possible explanation linking 18.6-year period nodal tidal cycle with bi-decadal variations of ocean and climate in the North Pacific. *Geophys. Res. Letters*, 33, L08606, doi:10.1029/2005GL025237.
- S. Osafune, and **I. Yasuda**, 2006: Bidecadal variability in the intermediate waters of the northwestern subarctic Pacific and the Okhotsk Sea in relation to 18.6-year period nodal tidal cycle. *J. Geophys. Res.*, 111, C05007, doi:10.1029/2005JC003277.

【Term of project】 FY2008—2012

【Budget allocation】

163,700,000 yen (direct cost)

【Homepage address】

<http://lmr.ori.u-tokyo.ac.jp/feog/FODeng.html>