The annual and inter-annual cycles of 15 year-long sinking particle flux in the Bering Sea and the central subarctic Pacific

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Long-term observation of sinking particle using sediment traps has been conducted in the Bering Sea (Station AB) and the central subarctic Pacific (Station SA) since last decades. Various spectrum analysis (Cross Spectrum Analysis: CSA and Singular Spectrum Analysis: SSA) upon time-series biogenic particle data-sets (Total mass, %Biogenic Opal, and %$CaCO_3$: 1990-2005; Total foraminifer flux and their faunal assemblages: 1990-1999) revealed annual (12 month-long) and inter-annual (more than 24 month-long) periodical trends underlie beneath them. Notably high coherencies their inter-annual variation versus Sea Surface Temperature (SST) recognized for most of them indicate that surface condition took significant roles (e.g. seasonal mixing with the intermediate water due to cooling of the surface water) for temporal variation of biological production in study region. This synchronous between biogenic particles and surface conditions appeared more notably at Station AB, located at the semi-closed hemipelagic ocean, than at Station SA at the pelagic open ocean. The annual periodic trends recognized among biogenic particle data exhibited their relevancy to long-term climatic oscillations over the Pacific (Arctic Oscillation: AO and Pacific Decadal Oscillation: PDO). Noteworthy 24 month-long periodicity confirmed for most of our data set showed significantly high coherencies versus the Arctic Oscillation Index. In addition, distinguishable high coherencies were recognized for %Biogenic opal and %$CaCO_3$ at Station SA versus PDO at lower frequency (less than 0.2 cycles/ year; more than 24 month-long cycle). The SSA filtered reconstructed components (SSA-RC) with more than 12-month frequency for time-series observations showed biological effect of this long-term oscillation at study stations. Most apparently, SSA-RC of %Opal and %$CaCO_3$ at station SA appeared to show significant correlation with the regime shift of the PDO (e.g. 1993, 1997). At the same time intervals, relative abundances of *G. qunqueloba* increased at Station SA. Since this taxon dominates in the Alaskan Gyre (Reynolds and Thunell, 1985) in the same subarctic regime, their trend is likely to exhibit the temporal variation of the effect strength of the Alaskan Stream to Station SA. This noteworthy trends observed at Station SA were attributed to the change in the surface current system, which is likely effected by the Pacific Decadal Oscillation.