Oyashio origin having lower salinity than 33 pss. The 1998 time series gave the results of seasonal changes for dissolved inorganic carbon (DIC), alkalinity, nutrient and primary production from summer to winter. The seasonalities of DIC and nutrient were clear, decreasing in summer and increasing in autumn, however, alkalinity showed smaller change than 4 μM/kg during the observation. The summer (from early June to middle August) new production estimated from the DIC change was about 200 mgC/m^2/day. The primary production in July and August was about 300 mgC/m^2/day and then decreased in autumn and winter to about 100 mgC/m^2/day. The 1999 time series started from middle May survey, which encountered intensive phytoplankton blooming. High spatial variability was observed around station KNOT, which showed change of chlorophyll concentration from 0.5 to 13 μg/L. The primary production inside and outside the blooming showed change from 1700 to 300 mgC/m^2/day. The analyses of 1999 data are going on and more accurate estimation of spring-summer change in the carbon cycle will be revealed. The 2000 time series will start from January-February cruise by R/V Mirai, which will give true winter picture of the rough ocean in the western North Pacific.

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Characteristics of temporally-evolving Black Sea pelagic ecosystem and biogeochemistry

The Black Sea is an excellent example for addressing natural and human impact on a marine ecosystem. Its last two decades is identified as a temporally evolving, non-equilibrium ecosystem, transformed from a highly diverse "healthy" state of the 1960s to its present low biodiversity "eutrophic" state dominated by gelatinous carnivores. The available data indicate that evolution of the ecosystem can be described in 5 distinct phases. The first phase, up to mid-1970s, is an example of a typical healthy ecosystem with stable ecological balances. The period from mid-70s to 1988 identifies the second phase as the "Aurelia-dominated ecosystem". It is mainly controlled by the gelatinous carnivores Aurelia aurite, Pleurobrachia

pileus and opportunistic species Noctiluca scintillans. The Mnemiopsis-dominated ecosystem between 1989 and 1991 encompasses the third phase in which Mnemiopsis exerted main top-down controll on the ecosystem with respect to Aurelia and Noctiluca. A new equilibrium took place after 1992 in which both Aurelia and Mnemiopsis co-existed at proportional quantities. Individual contribution of each was, however, reduced considerably as compared with their peak phases. The ecosystem had positive indications of recovery in this era. The fifth phase signifies the current state after 1998 in which a new gelatinous carnivore species Beroe ovata, migrated from the Mediterranean, was acclimated to the Black Sea conditions and started consuming Mnemiopsis. This had positive impact on the ecosystem as indicated by local increases in the mesozooplankton biomass especially in coastal waters. On the basis of available data and numerical model simulations, major changes in the functioning of ecosystem as well as subsequent modifications took place in the vertical biogeochemical structure are identified in the present study. The analyses provide a more definitive understanding for the observed seasonal and long-term variations of the ecosystem in different phases of its evolution.

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Assessment of methane source strength in coastal wetlands and oceans of India

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