Estimation of atmospheric nitrogen deposition over the Kuroshio region in the Autumn of 2015

*Yoko Iwamoto^{1,3}, Kazuki Kamezaki², Shohei Hattori², Mako Hirota¹, Shuei Kaizuka¹, Kazuhiko Takeda¹, Kazuhiko Miura³, Mitsuo Uematsu^{4,5}

1. Hiroshima University, 2. Tokyo Institute of Technology, 3. Tokyo University of Science, 4. Atmosphere and Ocean Research Institute, the University of Tokyo, 5. Center of Environment Science in Saitama

The Kuroshio has its origin in the subtropical water of high water temperature and oligotrophy, and it is considered to form the ecosystem with high productivity by taking in nutrients from continental shelf and coastal area in the transport process. However, there are many unclear points on the supply mechanism of nutrients to the Kuroshio region. Since the Kuroshio Current is located on the leeward side of the East Asian coastal area, which is a hot spot for air pollutants, the supply of nitrogen components, which are nutrients for marine phytoplankton, through the atmosphere cannot be ignored. In addition, it is predicted that the marine ecosystem in the western North Pacific including the Kuroshio region changes with the increase in the atmospheric emission of anthropogenic nitrogen in the East Asia. The purpose of this study is to clarify the impact of atmospheric nitrogen deposition on the ecosystem in the Kuroshio region from the east coast of Taiwan to the Kanto offshore, Japan.

Atmospheric observations were carried out on the academic research ship Hakuho Maru KH -15-4 cruise. Atmospheric aerosol were collected using a filter pack method and a high volume air sampler during the cruise. These samples were analyzed for water-soluble ions by ion chromatography.

As a result of backward trajectory analysis, it was found that the beginning of the voyage was affected by the oceanic atmosphere, while the other periods were affected by air masses along the coast of East Asia or via the Japanese Islands. Nitrate concentrations in atmospheric aerosols were $1.2 \pm 0.8 \ \mu g \ m^{-3}$, similar to those reported in previous studies of $1.8 \pm 1.2 \ \mu g \ m^{-3}$ in the East China Sea, an order of magnitude higher than $0.17 \pm 0.09 \ \mu g \ m^{-3}$ in the western North Pacific. We will discuss about the dry deposition of atmospheric nitrogen and its impact on primary production.

Keywords: Aerosol, Nitrogen deposition flux, Kuroshio