

## Surface pollen investigation on the sea floor off the Japanese archipelago

# Masaaki Okuda[1]; Yui Kobayashi[2]; Makoto Okada[3]

[1] Nat. His. & Inst., Chiba; [2] Science and Engineering, Ibaraki Univ.; [3] Dept. Env. Sci., Ibaraki Univ.

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We present the initial report of surface pollen investigation on sea floors around the Japanese archipelago. This is a short summary of the Master thesis submitted on 2008 Feb to the Graduate School of Science and Engineering, Ibaraki University.

The advantage of marine pollen analysis is apparently that the pollen results collected can fully be used to paleoclimate reconstruction in long time scale, because the pre-MIS5 time control is assured by oxygen isotope. In particular, pollen-delta<sup>18</sup>O dual analysis is an effective tool to reconstruct lead-lags between terrestrial climate (e.g., Asian monsoon) and ice sheet variabilities around the North Atlantic. By contrast, marine pollen assemblages tend to suffer from dilution of the concentration and/or distortion of the composition, because these are distant from the pollen sources and are more subject to strong transport agents like ocean currents, of which the influence to pollen remains uncertain. These things make marine pollen analysis difficult in terms of (a) collection of the sufficient amount of pollen grains and (b) extraction of paleoclimate information from the pollen data obtained. This is one of the reasons why the marine pollen analysis around Japan is highly restricted in number.

In order to reduce these problems, surface pollen investigations on sea floors around Japan are being performed by a corroboration of Ibaraki University (Graduate School of Science and Engineering) and the Natural History Museum and Institute, Chiba (Department of Ecology and Environmental Science). The surface materials are collected from the top horizons of 60 marine cores drilled in the NW Pacific ocean and the Okhotsk, Bering and Japan seas. These core materials were collected by voyages of GH, KH, KR, MR, etc, now preserved in Kochi University, JAMSTEC, AIST and Ibaraki University. The sample size, collected from the top of each core, is 10-20 grams in dry weight. The sediment samples afterwards underwent (i) pollen analysis of orthodox style and (ii) pollen flux calculation by adding artificial microspheres, for drawing summarized surface diagrams for marine pollen assemblages.

Results show 3 geographic groups of (1) cold-current regions of the Okhotsk sea to the Pacific ocean off northeastern Japan; (2) the Kuroshio current region in the Pacific ocean off southwestern Japan and (3) distant ocean regions including extended Kuroshio regions and the Bering sea. Of the three groups, it is the first group that appears to meet the requirements on both the pollen extraction and paleoclimate interpretation. That is, the (1) cold-current region group has relatively high pollen concentration of 200-600 grains/gram, with pollen composition dominated by subarctic taxa such as *Betula* and *Picea*, well reflecting terrestrial vegetation (and climate) of the surrounding landmasses.

By contrast, the (2) Kuroshio region shows low pollen concentration despite its proximity to landmasses. Furthermore, the pollen composition is distorted by remaining subarctic taxa and abundant fern spores, poorly reflecting terrestrial vegetation (and climate) of the surrounding landmasses. This is explained by the rapid Kuroshio current transporting a lot of exotic sediment materials, which not only dilute the pollen assemblage but also distorts the pollen composition because of sorting effects. We note that the (3) distant ocean region is worse in both the pollen flux and pollen compositions. This means that the third group may not be suitable for pollen analysis aiming at paleoclimatological researches (note that this does not prohibit different research scopes aiming at e.g. marine core stratigraphy or paleo- ocean current reconstruction).