Contribution of slab-fluid in arc magmas beneath adjacent Japan arcs

HITOMI NAKAMURA[1]* AND HIKARU IWAMORI[2]

[1]Geological Survey of Japan, AIST, Tsukuba 305-8567, Japan (*correspondence: hitomi-nakamura@aist.go.jp)
[2]University of Tokyo, Tokyo 113-0033, Japan (hikaru@eps.s.u-tokyo.ac.jp)

Water is the most important material in magmatism at the convergent margins for its unique functions, e.g., decreasing mantle viscosity and melting temperature. Identifying the amount of water and its variation is the key to quantifying processes in the mantle wedge and provides a better understanding of volatile recycling processes. Here we show the distribution of 'slab-fluid' which dehydrates from the subducting slab and metasomatizes the overlying mantle wedge in the adjacent Japan arcs.

We find that the amount of slab-fluid added to mantle wedge has a spatial variation with reference to the depth of theWadati-Benioff zone, and the proportion of subducted materials in the Pacific plate which contribute to generate a slab-fluid is different in each arc. The contribution of sediment involved in the slab-fluid is dominant in Northeast Japan Arc compared to Izu-Bonin and Central Japan Arcs.

This could be attributed to fractures well-developed along the surface of subducting Pacific slab, which may trap and transport sediments smoothly into the deeper mantle. Tectonic and mechanical structure of subducting plate may control the proportion of sediment in slab-fluid. These results suggest that dehydration of the subducting materials is controlled not only by the thermal conditions of mantle wedge and slab but also by the tectonic and mechanical features of the subducting slab.

Intensification of seasonal oxygen-deficient zone over the western Indian shelf

S.W.A. NAQVI[1,2]*, H. NAIK[1], A.K. PRATIHARY[1], G. NARVENKAR[1], R. ROY[1], B.R. THORAT[1], S. KURIAN[1], M. GAUNS[1] AND P.V. NARVEKAR[1]

[1]National Institute of Oceanography, Dona Paula, Goa 403 004, India (*correspondence: naqvi@nio.org)
[2]Max-Planck Institute for Marine Microbiology, Celsiusstr. 1, D-25389 Bremen, Germany (wnaqvi@mpi-bremen.de)

During the Southwest Monsoon, when the surface current flows equatorward, upwelling brings oxygen-poor, nutrient-rich subsurface waters to the western Indian continental shelf. A thin (~5-10 m thick) fresher-water lens, formed due to intense rainfall in the coastal zone, generally caps the upwelled water, and the resultant strong stratification combines with a high oxygen demand to create the world's largest coastal oxygen-deficient zone (ODZ; $O_2 < 0.5$ mL L^{-1}; area ~200,000 km^2). This ODZ appears to be more intense now than it was three decades ago: Complete exhaustion of nitrate through denitrification followed by sulphate reduction now occur during late summer, but there is no indication of prevalence of sulphidic conditions in the historical data sets. A trend of ongoing intensification is not seen in the data collected during the last 10 years at a coastal time-series station off Goa. These data show considerable inter-annual variability with the most severe anoxia having occurred in 2001, which made a profound negative impact on local fisheries (especially demersal fish catch). Sedimentary records of several proxies suggest that productivity over the past few decades has been the highest ever in the last seven centuries, consistent with the inferred intensification of the coastal ODZ.