Erosion distribution in the Eastern Himalaya traced by Sr-Nd isotopic compositions of river sediments

SUNIL K. SINGH AND CHRISTIAN FRANCE-LANORD

CRPG-CNRS, BP 20, Vandœuvre les Nancy, France (sunil@crpg.cnrs-nancy.fr)

Sediments of the Brahmaputra were collected from the Himalayan front to Bangladesh along with most of the important tributaries. Chemical and Sr and Nd isotopic compositions of the sediments are used to trace sediment provenance and possible differential erosion pattern in eastern Himalaya. Overall sediments display a large range of $^{87}Sr/^{86}Sr$ (0.705 to 0.825) and ε_{Nd} (-20.5 to -6.9). Nevertheless, sediments of the main Brahmaputra show almost constant isotopic signatures all along its course even though the Eastern and the Himalayan tributaries are having very contrasting signatures. $^{87}Sr/^{86}Sr$ and ε_{Nd} of the Himalayan tributaries are increasing and decreasing respectively from east to west showing the increase in the Lesser Himalayan proportion towards west. The contrasting isotopic signatures of the eastern tributaries are due to the presence of the Transhimalayan plutonic belt in their drainage.

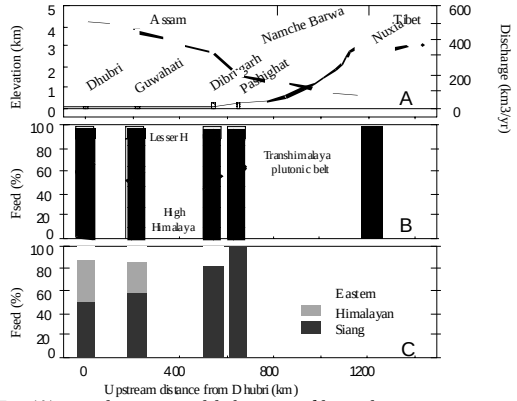

Fig: (A) river elevation and discharge profiles; sediment fractions : (B) in term of geology (C) in term of basin

Mass balance calculations based on these data along with the few data available for the Tsangpo in Tibet and in Namche Barwa region (Eastern Syntaxis) show that the Brahmaputra drainage is marked with differential erosion. About half of the sediments are derived from the syntaxis region (Fig) which comprises of only one tenth of the total basin area and one fifth of the mountainous area. Intense erosion in the eastern syntaxis basin can be explained by the higher precipitation over this region coupled with the high incision potential of the Tsangpo river due to its very high water discharge prior to the Syntaxis.

Geochemical evolution of seawater intruding into a coastal aquifer

O. SIVAN[1,2], Y. YECHIELI[2], B. HERUT[3] AND B. LAZAR[1]

[1]Institute of Earth Sciences, Hebrew University, Jerusalem 91904, Israel. sivan@vms.huji.ac.il;boaz.lazar@huji.ac.il

[2]Geological Survey of Israel, Jerusalem 95501, Israel. yechieli@mail.gsi.gov.il

[3]Israel Oceanographic and Limnological Research, National Institute of Oceanography, Haifa 31080, Israel. barak@ocean.org.il

The dynamics of seawater intrusion into a coast is commonly estimated by a rise in salinity and/or by theoretical hydrological models. Estimations using radioactive isotopes are reported only in several preliminary works. These studies however did not consider the effect of various geochemical processes on the apparent age of the water. Here we estimate the time scale for seawater intrusion into a coastal aquifer and the operating geochemical processes by using ^{3}H, ^{14}C in the dissolved inorganic carbon (DIC) and changes in the major ions composition of the waters.

Saline and brackish groundwaters were sampled from wells in the Israeli coastal aquifer. The substantial tritium and dissolved oxygen contents in the saline groundwaters suggest that Mediterranean Sea water penetrated inland to a distance of at least 100-200 meter only very recently (< 40 years). $^{14}C_{DIC}$ activities in the saline area (40-90 pmc) were achieved from diagenetic processes in this zone and not from aging. The high concentrations of alkalinity, DIC, Ca^{2+} and Sr^{2+} and the mass balance of $\_^{13}C_{DIC}$ indicate that the main diagenetic processes in this zone were oxidation of dead organic carbon and cations exchange. Most of the groundwaters at the fresh-saline water interface represent conservative mixing between the saline groundwater and the top fresh groundwater of the aquifer. In some cases there is an additional ion exchange in the mixing zone.