U-series ages of the latest silification event in regolith of the Yilgarn Craton, Western Australia

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There are several geologically distinct silicfication events that are regionally recognized in the regolith of the Yilgarn Craton, Western Australia. The latest event that affected large areas in the northern part of the craton is the silification of river valley calcretes.

^{230}Th-^{234}U-^{238}U ages from two samples of on opaline silica veins which cross cut the calcrete matrix have been investigated by Sensitive High Resolution Ion Microprobe (SHRIMP).

The first sample from Yalgoo comprises a network of 1 – 5 mm opal vein. A 3 mm thick vein was analysed from the centre to the edges and records discontinuous age range that defines at least 3 periods of deposition. Analyses from the centre of the vein yeild a weighted average age of 129 ± 23 kyr, close to the contact a weighted average age of 90.4 ± 8.9 kyr and analyses from the most outer parts of the vein gave a weighted average age of 62 ± 13 kyr.

A similar pattern of ages is seen in the Nangcarrong Spring sample. The oldest opal in this sample records a weighted average age of 91.0 ± 9.1kyr. A separate system of veins yeilds younger ages with a weighted average age of 65.6 ± 6.7 kyr and 43.7 ± 6.7 kyr from the vein centre to the vein-wall contact of the 3 mm vein, respectively.

Ages decrease systematically from the centers of the veins to the contacts in both samples showing that they developed by antitaxial growth. The vein, originally a fissure, became filled with crystalline material from a silica solution at the same time as it is progressively opened forming the vein.

These two samples show 4 periods of rapid deposition over a ~85 kyr period and in between these periods there was no or very little deposition of opal. Three main factors can influence opal deposition from the ground water; silica dissolution-precipitation kinetics, groundwater evaporation rate and the supply of silica. The variation in the observed opal growth may be correlated to regional palaeoclimatic changes, specifically fluctuations in rainfall and temperature.

Sediment tracing in the Ganga River System

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A detail study of the chemical and isotopic (Sr & Nd isotopes) composition of sediments of the Ganga River System has been initiated to trace their sources and determine the spatial variabilty in the erosion rates in its various sub-basins.

Sediments have been collected from the Ganga at its origin, Bhagirathi, in the Higher Himalaya to the Farakka dam in the plains, near Indo-Bengladesh boundary and from almost all its tributaries in the Himalaya and plains (Fig.1). Silicate fraction of the sediments were analysed for their Sr concentration and ^{87}Sr/^{86}Sr. ^{87}Sr/^{86}Sr vary from 0.74739 to 0.84279 with Sr in the range of 37 to 119 μg g^{-1}. The sediments of the Bhagirathi at the source itself has ^{87}Sr/^{86}Sr, 0.78785 even though they are derived from the Higher Himalaya. The ratios remain nearly invariant downstream. The ^{87}Sr/^{86}Sr of the Ganga at Rishikesh (foothills of the Himalaya) is ~0.78652, which is nearly the same as that of the Bhagirathi indicating the later's dominant role in the sediment budget of the Ganga at the foothills of the Himalaya. In the Gangetic plain the Ganga receives six major tributaries (Gomti, Yamuna, Ghaghara, Son, Gandak and Kosi) of which the Gandak and Kosi have been analysed. The downstream

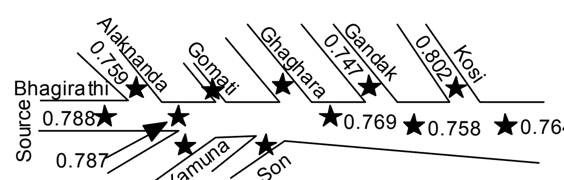

Fig. 1: Variation in ^{87}Sr/^{86}Sr of sediments of the Ganga and its tributaries from source to the mouth

variation in ^{87}Sr/^{86}Sr of the Ganga shows that it decreases from 0.78652 at the foothills to 0.75772 at Barauni which marginally increases to 0.76354 at Rajmahal (just before Farakka dam) due to the confluence of the Kosi with ^{87}Sr/^{86}Sr 0.80183.

Preliminary results of material balance calculation using Sr and ^{87}Sr/^{86}Sr of the sediments show that the Gandak is the dominant supplier of sediments to the Ganga at its outflow. Surprisingly, the contribution of Kosi to the sedimentary budget of the Ganga seems low compared to its water discharge, possibly due to its large fan in the plain.