



Sedimentology and arsenic pollution in the Bengal Basin: insight into arsenic occurrence and subsurface geology.

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The Bengal delta system is a geologically recent feature overlying a deeply incised palaeo-surface formed during the Last Glacial Maximum. This surface is a series of terraces and valleys created by river incision (Goodbred & Kuehl 2003). The terraces were weathered, forming a thin, indurated laterite deposit (Goodbred & Kuehl 2000) at depths greater than 50 m. McArthur et al. (2008) define this as a palaeosol and have identified it at depths greater than 30 m though out Bangladesh and West Bengal. It has been observed that arsenic concentrations at these sites are lower than the rest of the delta.

It has been assumed that the surface morphology at sites where there is a palaeosol are similar and can therefore be characterised by remote sensing, in the form of Google Earth images.

Sites were selected in Bangladesh and West Bengal, from work by McArthur et al. (2011); Hoque et al. (2012), where groundwater chemistry and sedimentology data are available making it possible to determine if the subsurface is a palaeo-channel or palaeo-interfluvium. Arsenic concentration data have been inputted into Google Earth and the palaeo-channels marked where the arsenic concentration is greater than 10 $\mu\text{g/L}$, and palaeo-interfluviums where arsenic concentration is less than 10 $\mu\text{g/L}$.

The surface morphologies in these domains have been examined for similarities, and it was shown that avulsion scars and abandoned river channels are found where arsenic concentrations are greater than 10 $\mu\text{g/L}$. Conversely the surrounding areas that are devoid of channel scars have arsenic concentrations less than 10 $\mu\text{g/L}$.

Using the correlation between avulsion features being representative of palaeo-channels and high arsenic concentrations, sites were selected that had a similar surface morphology to the type localities. A comparison of these images and arsenic concentrations showed that the postulate is valid for over 80 percent of cases. Where this is not valid, this could indicate that the subsurface is more complex than previously thought.

References

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