In this issue

Antarctic ice core reveals volcanic history and environmental change

Antarctica, the cleanest region on the Earth's surface, is the vital link in global climate system. In order to understand the environmental variability in Antarctica, it is essential to recognize the response of Antarctic environment towards the past changes. Ice cores obtained from drilling into the ice sheets of this remote continent provide one of the best available natural archives of highly resolved (annual to seasonal) and long term records of not only temperature and precipitation, but also on the atmospheric composition and circulation.

As part of its scientific expeditions to Antarctica, India has initiated a major multi-institutional research programme for drilling and analysis of shallow to medium depth ice cores from East Antarctica with the help of discreet use of the proxy environmental records. Results from this major initiative are reported by Thamban *et al.* (**page 1200**) which discuss the history and fate of natural aerosols in Antarctica, especially the stratosphere-bound sulphate aerosols that have direct relevance to the global climate change. The high-resolution glacio-chemical analysis of the core reveals the existence of several outstanding sulphate peaks during the past five centuries that are attributed to the well-documented past volcanic events reported from both northern and southern hemisphere. The study demonstrates the inter-hemispheric stratospheric transport of sulphate aerosols during major volcanic explosions. The study also proposes the importance of sea-salt aerosols as scavengers of acidic aerosol species, especially in the coastal Antarctic regions.

Rotational diffusion of proteins

Rotational diffusion of proteins is easily accessible by several experimental techniques and as a result their values are available for a large number of proteins. The size and shape dependencies of rotational diffusion, however, have long remained an ill-understood problem in biophysical chemistry. If one blindly inserts crystallographic radius of the protein into the Debye–Stokes–Einstein relation, one finds too high a value of the rotational diffusion, larger often by a factor of 2–3. In order to circumvent the difficulty, one uses an enhanced protein radius – the increase over the crystallographic radius is attributed to the presence of a rigid hydration layer. The study presented by Mukherjee and Bagchi (**page 1208**) shows that the problem can be solved at a more fundamental level by two non-trivial generalizations. First, one must use the proper shape of the protein and then solve the Navier–Stokes equation for the Stokes friction. Second, one must calculate the addition friction due to the polar groups and charges on the protein surface. The latter calculation is highly non-trivial because water molecules themselves are highly polar. This was accomplished by using a generalized dielectric continuum model. It was shown that final numbers are in good agreement with known results. The study also addresses the size dependence of rotational diffusion.

Evidence of ancient sea surges at the Mamallapuram coast

Instrumental data on earthquakes and tsunamis are available only for a few tens of years. Historical data may exist at the most, for a couple of thousand of years in countries such as China and Japan, but only for a few hundreds of years for most regions. From this reference frame that allows only small snap shots on the history of natural calamities, how do we identify events far beyond the historical times? Fortunately, earthquakes and tsunamis sometimes write their own histories, which get preserved in the geological records. Along the coasts of the subduction zones of Alaska, Cascadia, Chile and Japan, geologists have succeeded in deciphering such records, leading to estimation of their average recurrence periods. While all of these may not survive the competing forces of nature, some do get preserved. Rajendran *et al.* (**page 1242**) present evidence for two tsunamis that affected the Indian coast about 1000 and 1500 years ago, preserved within the ruins of the archeological site at Mamallapuram. Excavations exposed tsunami sands, preserved within the destroyed settlements, the first reported geological evidence of past tsunamis affecting this region. The results of this study have implications for regional tsunami hazard assessment.