Geodynamic, thermal and subsurface structure below the K-T- boundary impact site, offshore Mumbai, India

OM PRAKASH PANDEY AND G. PARTHASARATHY

National Geophysical Research Institite (CSIR) Hyderabad-500606, India (om_pandey@rediffmail.com)

65 Ma old Deccan volcanic province, covering a large part of western India and its adjoining offshore region, forms one of the largest flood basaltic eruption on the continental surface of the earth. Due to its temporal coincidence, it has been linked to the K-T boundary mass extinction (including demise of dinosaurs) and an asteroidal impact near offshore Mumbai [1, 2] . The K-T impact has now been confirmed through the experimental findings of Ir anomalies and high pressure-temperature fullerene in the inter-trappean sediments at Anjar, Kutch [3]. However, very little is known about the subsurface thermo-geodynamic response to this impact. Present study indicates that compared to many large impact crators (like chicxulub K-T structure), the structural uplift caused by this K-T impact is much wider in diameter of about 400 km. Below this region, moho and asthenosphere lie at an extremely shallow depth of about 20 km and 40 to 80 km, respectively consequent to subcrustal melting and uplifting. Average temperature gradients reach as high as 49°C/km in segments like northern and eastern parts of the Mumbai offshore, below which estimated heatflow from the mantle exceeds 60 mW/m^2, thereby enhancing the thermal maturation process in oil and gas rich Tertiary sediments. Based on thermal and geophysical characteristics, it is inferred that the underlying mantle is less viscous, fertile and buoyant which resulted into regional faulting, shortenting of crustal thickness , magmatic underplating, exhumation of high velocity mafic lower crustal layers, besides almost total erosion of grantic-gnessic crust. In the Heera block, granulitic crust is found to be just exposed at the basement depth level [4,5].

[1] Chatterjee S and Rudra DK, (1996), *Memoir Queensland Museum* **39**, 489-532;[2] Negi, J.G. *et al*., (1993), *Physics of earth and Planet Interiors* **76**, 189-197; [3] Parthasarathy G., *et al*., (2008), *Geochim Cosmochim Acta* **72**, 978-987; [4] Rathore SS *et al*., (2000), *J. Geol.Soc. India* **56**, 365-372. [5] Pandey,O.P *et al*. (2009) *J.Asian Earth Sciences*, **34**, 781-795.

Atmospheric organic particulate matter: Primary or secondary?

SPYROS N. PANDIS[1], NEIL M. DONAHUE[2]
AND ALLEN L. ROBINSON[3]

[1]Department of Chemical Engineering, University of Patras, Greece (spyros@chemeng.upatras.gr)
[2]Department of Chemical Engineering, Carnegie Mellon University, USA (neil.donahue@andrew.cmu.edu)
[3]Department of Mechanical Engineering, Carnegie Mellon University, USA (allen.robinson@andrew.cmu.edu)

Until recently, organic particulate material was simply classified as either primary or secondary with the primary component being treated as nonvolatile and inert. However, this oversimplified view fails to explain the highly oxygenated nature of ambient OA, the relatively small OA concentration gradients between urban areas and their surroundings, and the concentrations of OA during periods of high photochemical activity. A unifying framework for the description of all components based on their volatility distribution (the volatility basis set) can be used for the treatment of a wide range of processes affecting organic aerosol loadings and composition in the atmosphere. These processes include direct organic particle and vapor emissions, chemical production of organic PM from volatile precursors, chemical reactions (aging) in all phases, as well as deposition of both particles and vapors and chemical losses to volatile products. The combination of this new framework with the recent results of laboratory studies can resolve some of the discrepancies between OA observations and laboratory results. The mass balance of the organic material as a function of its volatility is investigated and used to frame the corresponding constraints on the system. Applications of this framework to the Eastern US, Mexico City, Europe, and in a global Chemical Transport Model are presented and compared to available observations.