In this issue

Retrieving near-surface rain rate from microwave sounder SAPHIR

Balaji *et al*. (**page 587**) explored the possibility of retrieval of near-surface rain rate from microwave sounder data of the SAPHIR instrument of Megha-Tropiques mission of India's space programme. Several *ab initio* vertical profiles generated from the community numerical weather model Weather Research and Forecasting (WRF), suitably matched up with Tropical Rainfall Measuring Mission (TRMM) Microwave Imager (TMI) and Precipitation Radar (PR) were used to simulate the brightness temperatures corresponding to SAPHIR frequencies using an in-house polarized radiative transfer code, for a diverse set of 14 cyclones. An artificial neural network was then constructed and trained to accomplish the retrievals. The near-surface rain rates thus retrieved were compared with TMI–PR combined rain product of TRMM for two cyclones namely *Neelam* and *Phailin* and the agreement was quite good. An inter-comparison between rain rates from MADRAS and SAPHIR was also done and this too was found to be satisfactory. The results are very promising and open up vistas for rainfall retrievals directly from the SAPHIR instrument, which is primarily designed to retrieve the vertical structure of relative humidity in the atmosphere.

Terracentric nuclear fission georeactor

December, 1938: Nuclear fission, the splitting of uranium atoms, was discovered in Nazi Germany. With the clouds of war gathering over Europe, efforts were focused on nuclear weapon potential, and after the war on nuclear power production. The possibility of nuclear fission chain reactions occurring in nature was broached by few. In 1993, twenty-one years after the discovery of the fossil remains of a natural nuclear reactor in a uranium mine in Western Africa, J. Marvin Herndon published the feasibility of a nuclear fission reactor at Earth's center, now called the georeactor, as the energy source for the geomagnetic field. Herndon reviews (**page 528**) the discoveries that led to that advance and to the subsequent step-by-step understanding that fulfilled the necessary conditions and evidence for its existence. First only imagined as an energy source, he later realized its potential as the mechanism for the production of the Earth's magnetic field by dynamo action, and as the heat source for 'hotspots' such as underlies Hawaii and Iceland, evidenced by its helium fission fragments trapped in volcanic lava. While generally self-regulated, massive Earth trauma or super-intense solar outbursts can in principle interrupt georeactor operation causing geomagnetic reversals. Because georeactor mass is less than one ten-millionth that of the core, reversals can occur quickly, in as little time as a matter of months. Herndon concludes his review by considering the perspectives, what can be done to further verify its existence, and to learn when it will have consumed all of its uranium fuel thus bringing to an end our protective geomagnetic field.

Chloritization in Paleoproterozoic granite ore

Chlorites is one of the common silicate mineral groups that occurs in various geological environment such as terrestrial and deep seafloor hydrothermal fields, geothermal system, various igneous rocks, sedimentary facies and along with metamorphic assemblages. It is a phyllosilicates or sheet silicates mineral, form parallel sheets of silicate tetrahedral with a 2 : 1 sandwich structure. Chlorites can be classified into various types based on chemistry and substitution mechanism in different silicate lattice or crystallographic sites such as clinochlore, suidote, chamosite or daphnite, amesite and pennantite are common. All these varieties are considered as chlorite group of minerals which displays a wide range of chemical compositions and reflect diverse physicochemical conditions of formation. Geochemical process responsible for the formation of chlorites is known as chloritization. Its long-term stability in various geological environments strongly depends on physicochemical factors like temperature, pressure, oxidation state and activities of metals. Therefore, chlorites present an interesting potential for thermobarometric estimates for geological processes and hydrothermal activities. The use of geological thermodynamic and mineral fluid equilibria modelling is an improvement to the empirical thermometer, since it accounts for the variation of the rock mineralogy and the potential influence of additional thermophysical parameters that is fluid composition and redox conditions. Chlorites is an important constituents mineral of oceanic basalts. Therefore, chloritization of oceanic basalts plays dominant role during seafloor hydrothermal alterations, which directly influences geochemical and geophysical properties of oceanic crust. The important physical and chemical consequences of chloritization are related to the structure and tectonics of the oceanic crust and the chemical budgets of the oceans. Chloritization is one of the most important indicators of hydrothermal environment not only on the terrestrial and oceanic crust on the Earth but also on the Marian surface similar to that of serpentinization. See **page 565**.