Simultaneous observations of ionospheric scintillations at VHF and GHz frequencies over Kolhapur

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Ionospheric scintillations at VHF and GHz frequencies are recorded simultaneously for a few days in April 1993 at Kolhapur (lat. 16°42' N; long. 74°14' E). A brief description of the findings of these simultaneous scintillation observations is given.

IN October 1988, the scintillation experiment was installed with the help of the Indian Institute of Geomagnetism, Bombay at the Department of Physics, Shivaji University, Kolhapur. This experiment forms a part of the satellite scintillation (SS) network under the AICPITS programme sponsored by the Department of Science and Technology (DST), Government of India. The radio beacon of 244 MHz from the geostationary satellite FLEETSAT situated at 73°E over the equator is used for the daily recording of ionospheric scintillations, at Kolhapur.

The location of Kolhapur happens to be just outside the boundary of equatorial electrojet but within the equatorial anomaly region. Hence, it was considered desirable to look for scintillation effects, if any, in case of INSAT-1D transmissions at 2.6 GHz simultaneously with FLEETSAT scintillation observations at least for a few days on trial basis. (INSAT-1D is stationed at 83°E over the equator.) Figures 1 *a* and 1 *b* show amplitude scintillations recorded at VHF and GHz frequencies respectively on 5 April 1993. The findings of simultaneous scintillation observations of FLEETSAT and INSAT-1D made during April 1993 are enumerated below.

(i) It appears that like VHF scintillation, GHz scintillation is predominantly a night-time activity that can be correlated with the presence of spread-*F* echoes from the ionosphere over Kolhapur. The close association of spread-*F* conditions (generated by the Rayleigh-Taylor instability mechanism after sunset) and night-time scintillation has been studied by many researchers[1-9] in the past.

(ii) The difference in the onset timings of GHz and VHF scintillation (which are within a few minutes of each other) may be attributed to their difference in longitude over the equator.

(iii) The mean scintillation index (S_0) values for GHz scintillation lie between 10 and 30 and S_0 was as high as 56 on 5 April 1993 at 2300 hours. For VHF scintillation, the S_0 values were between 60 and 70, the highest being 78 on 10 April 1993 between 2038 and 0042 hours and

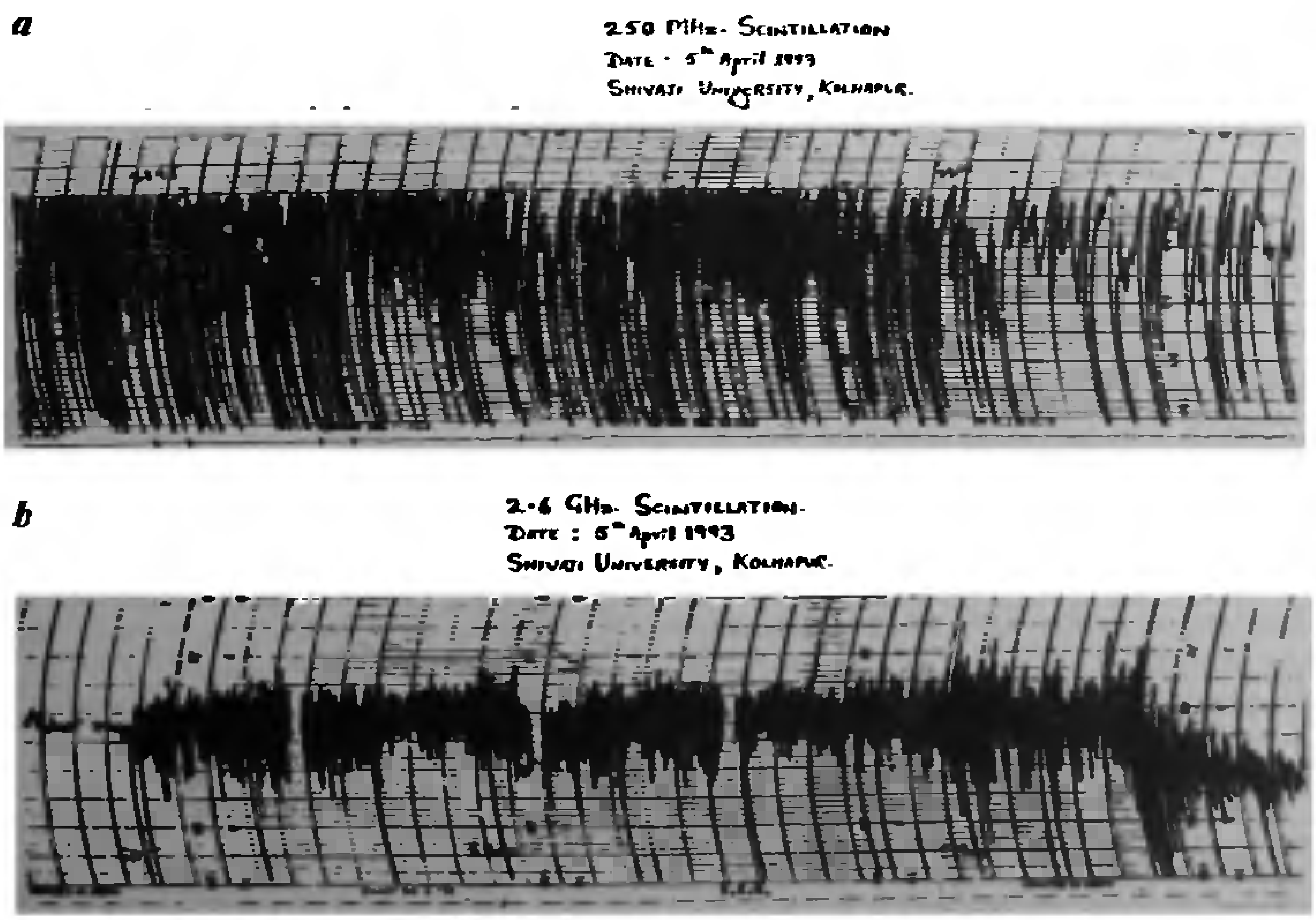

Figure 1.

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the lowest being 20 on 6 April 1993 in the early morning hours between 0442 and 0459.

(iv) It was observed that the fading rate of scintillation is lower than that of GHz scintillation. The average value of VHF scintillation rate was 37 fades/min and that of GHz scintillation, 42 fades/min. On 17 April 1993, the lowest fading rate for VHF and GHz scintillation was 26 fades/min and 28 fades/min respectively. The highest value of VHF scintillation rate recorded was 48 fades/min and that of GHz scintillation, 52 fades/min.

It is clear that the fading rates at VHF and GHz scintillation are of similar magnitude within 10%. This implies that the electron density irregularities in the ionosphere causing scintillations at VHF and GHz are the same and they are drifting with the same velocity.

The exceptionally high values of mean scintillation index at GHz frequencies indicate that the refractive irregularities with scale sizes very much greater than the Fresnel scale[10, 11] are responsible for the observed strong and intense GHz scintillations at Kolhapur.

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Magma mixing in plutonic environment: Geochemical and isotopic evidence from the Closepet Batholith, Southern India

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The Closepet Batholith in southern India contains two groups of magmatic intrusions: (i) mantle-derived quartz monzonites and monzogranites (SiO_2-poor clinopyroxene bearing and porphyritic facies) display a narrow range of initial $^{87}Sr/^{86}Sr$ ratios (0.7017–0.7029 at 2.5 Ga) and ε Nd (–0.9 to –4.7 at 2.5 Ga). (ii) crustal-derived granites (SiO_2-rich equigranular grey and pink granites) show wide range of initial $^{87}Sr/^{86}Sr$ ratios (0.7028–0.7366 at 2.5 Ga) and ε Nd (–2.7 to –8.91 at 2.5 Ga). Field data and single zircon $^{207}Pb/^{206}Pb$ ages demonstrate that the two groups are broadly contemporanous and mechanically mixed. This observation is supported by geochemical and isotopic data that show well-defined mixing trends in both Harker binary diagrams and I_{Sr} vs ε Nd plots. The continuous chemical variation in the two magmatic bodies is interpreted in terms of interaction and mixing of two unrelated end-members derived from different source regions (enriched mantle vs Peninsular gneisses). The proposed model involves intrusion of mantle-derived magmas into anatectic zone in the mid-continental crust: where they supply additional heat and fluids and promote large-scale melting of surrounding crust. During this event occurred mixing between mantle derived magma and anatectic melts.

GRANITIC rocks are major components of continental crust occurring throughout the whole Earth history. The origin of stable and permanent crust is inextricably linked to granitoid genesis[1]. Hence knowledge about granitoid genesis is fundamental to our understanding of

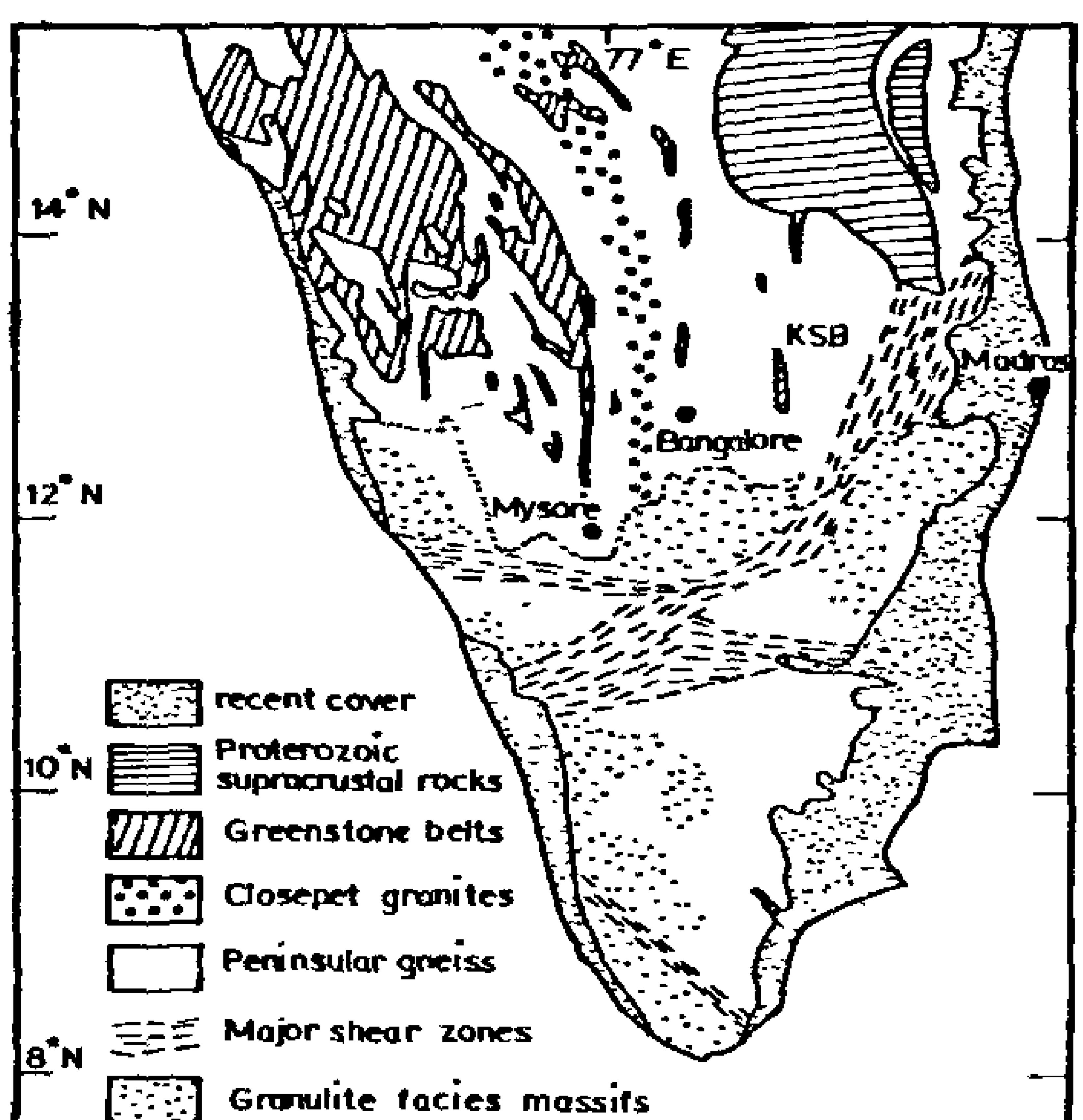

Figure 1. Geological sketch map of southern India (after Friend and Nutman[11]).

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