ISOSTASY IN INDIA

With the growth of pendulum stations from 118 in the year 1919, when Sir Sidney BURRARD, F.R.S. retired from the Survey of India, to 273 in 1932, and with the display of our numerous deflection observations in the form of the geoid, we have been able to say for practically the whole of India by what amount T (expressed in thickness of rock of ordinary surface density) the ideal state of HAYFORD's isostasy is not attained. We find, *apart from the Himalayan regions*, that T ranges from $+ 3,700$ to $- 6,700$ feet. We accordingly are compelled to deny the existence of HAYFORD isostasy in continental India. In the Himalayan regions, so far as they have been gravitationally explored, we find on the other hand that gravity anomalies are — on average, and to a less degree at individual stations — largely reduced by the HAYFORD concept.

My conclusions are (a) that departure from HAYFORD's concept by amounts of the order of $T = 1,000$ feet is the rule, not the exception, so far as India, excluding the Himalayas, is concerned; (b) that in widely extended regions of great topographical relief (several thousand feet in altitude) this same departure from HAYFORD's concept occurs (of order $T = 1,000$ feet), but in this case the larger residue of the topography is compensated, on average over considerable areas. *This does not imply compensation exactly according to* HAYFORD; but HAYFORD's concept gives a convenient basis for computation, which may properly be used failing any better general concept. (c) I accept HAYFORD as a standard from which anomalies may be reckoned. I would personally incline to make as standard the conception of compensation by a skin density (which would be infinite and have no physical reality) at some appropriate level. This skin density would be equivalent to a variety of real distributions which could be explored at leisure with a view to determining the most plausible, when associated with the anomalies. I am deterred from employing the skin density by the fact that the computation on the basis of HAYFORD's hypothesis has been made for a great number of gravity stations and is widely understood. It is desirable to make allowance for some form of compensation in mountain regions — at least in the case of the Himalayas and, I believe, in general; I also think the same need exists in the case of the oceans. In areas not much above sea-level there is little to compensate, and it is of little consequence whether any allowance is made or not. It would, however, be difficult and arbitrary to draw a dividing line between mountainous and non-mountainous regions, and it is wholly unlikely that there is any precise division. Hence it is simplest to accept HAYFORD's concept as the standard for both mountainous and non-mountainous regions, i.e. invariably.

I am accordingly using HAYFORD's concept for what it is worth. Wherever the anomalies reckoned therefrom are small, the concept has a full chance of recognition. But the anomalies are far larger and more irregular than as constantly claimed by the apostles of HAYFORD. However unpleasant, it appears to me a duty to point this out with a view to preventing as far as possible the application of the concept to an extent far beyond what the observational facts warrant. I do not want to be merely destructive but to check further building on insecure foundations.

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