

551.553.21:551.594.14

PROPOSAL FOR RADIOMETRIC STUDIES
OF INDIAN SUMMER MONSOONS

Several aspects of the summer monsoons have been extensively studied by the Indian meteorologists in the past (*cf.* Symposium on Meteorological Results of the International Indian Ocean Expedition 1965). It is felt that a study of still another aspect, *i.e.*, of natural radioactivity of the monsoons might contribute significantly towards a better understanding of this spectacular but complex phenomenon. The possibility of using the short lived decay products of radon and the short lived nuclides produced by cosmic rays for cloud studies has already been successfully explored (Bhandari and Rama 1963; Bhandari *et al.* 1966) but not yet exploited.

Here, a proposal is made for a comprehensive study based on investigations with natural radio-nuclides; in particular, for tracing the flow of water bearing layer of the monsoon with the help of measurements on radon, thoron and their decay products.

Radon, a member of U^{238} series, is a noble radioactive gas with a half life of 91 hours. Thoron, a member of Th^{232} series, is also a radioactive noble gas but with a half life of only 54 seconds. Their existence in the atmosphere owes to the fact that they are able to escape from the soil and surface rocks which always contain small quantities of uranium, thorium and their progeny. There is no significant escape of these gases from the oceans. This fact makes radon and decay products of radon and thoron particularly suited for the study of some aspects of the Indian summer monsoons. The project aims at measuring the vertical profiles of these nuclides over the ocean and the sub-continent. However, to start with, the measurements even in the surface air may turn out to be quite useful. For example, it seems possible to decide from radon measurements whether the summer monsoons arise mainly from the Arabian Sea or involve a major influx of air and water vapour from the Indian ocean south of the equator. If the current is mainly westerly, the low level air should be coming from the north African continent and consequently should be rich in radon. On the other hand if it originates in the southern hemisphere, it should be very poor in radon both because of lower input (since land area is small) and long period of traverse over the ocean which should result in almost complete decay of radon.

For a preliminary study, it is proposed to set up a few surface stations on the western coast and

sample for radon during pre-monsoon, post monsoon and monsoon periods. During the month of July or August, when monsoon is well established, radon measurements should be made aboard a ship from Aden to Bombay and from south of the equator to Cochin. The measurement techniques are quite simple, particularly if only the decay products are measured in air or in rain water.

A comprehensive study can be taken up only when vertical profiles are also measured, they

are expected to yield information on vertical Austausch, interaction between the monsoon current and the overlying easterlies, and the nature of circulation prevalent during the monsoon period.

RAMA

*Tata Institute of Fundamental Research,
Bombay
April 5, 1966*

REFERENCES

Bhandari, N. and Rama

1963 *J. geophys. Res.*, **68**, pp. 3823-3826.

Bhandari, N., Bhat, S. G., Kharkar, D. P.,
Krishna Swamy, S., Lal, D. and
Tamhane, A. S.

1966 Paper under publication (in *Tellus*).
