

RADON MEASUREMENTS IN THE SOUTH INDIAN OCEAN DURING THE THIRD INDIAN ANTARCTIC EXPEDITION OF 1983—84.

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IN this article the authors report the radon measurements carried out during the Third Indian Antarctic expedition in the south Indian Ocean between 25°S , 56°E and 68°S , 12°E . The measurements were carried out from 6th to 26th December 1983. In all, about 18 individual measurements were taken during the period. The path of the expedition ship, Fin Polaris, and the levels of activity in picocuries per cubic meter (1 picocurie = 0.037 Bq) are shown in figure 1.

The technique of measurements used was the collection of air particulates on Hollingsworth and Vose H-70 filters (12.5 cm diameter) using blowers drawing air at 600 litres per minute. The flow rate was continuously monitored by a rotameter in the suction circuit. The samples, after collection, were counted in 12.5 cm dia ZnS scintillators having a counting efficiency of 40%. Two readings were taken one immediately after collection, and the other after 4 hrs. From these, the radon activity can be calculated assuming radioactive equilibrium between the radon and its decay products by methods already described¹. The assumption of equilibrium is valid over the oceans². The counting error of individual values is of the order of $\pm 25\%$.

The consistently low values up to 0.1 pCi/m^3 should be noted. If the outlier values of 0.7 pCi/m^3 on 18/12/1983 and 0.9 pCi/m^3 very near the Antarctica mainland are omitted, the average value is around 0.2 pCi/m^3 which is less than the value of 0.3 pCi/m^3 reported for Antarctica^{2,3}. The extremely low values can be explained as being due to the long length of the air masses to reach the positions of Fin Polaris. However the extremely low values of 0.1 pCi/m^3 from 20°S can only be explained as due to the shift to south east trades below equator and to westerly winds pole wards of 40°S . This wind configuration is consistent with the wind system prevailing during this period as given by meteorological charts⁴. Such a wind system would involve travel of three to four thousand kilometer from land.

These extremely low values have to be considered in calculating the budget of radon in the atmosphere and the possible levels of pure maritime air. These are

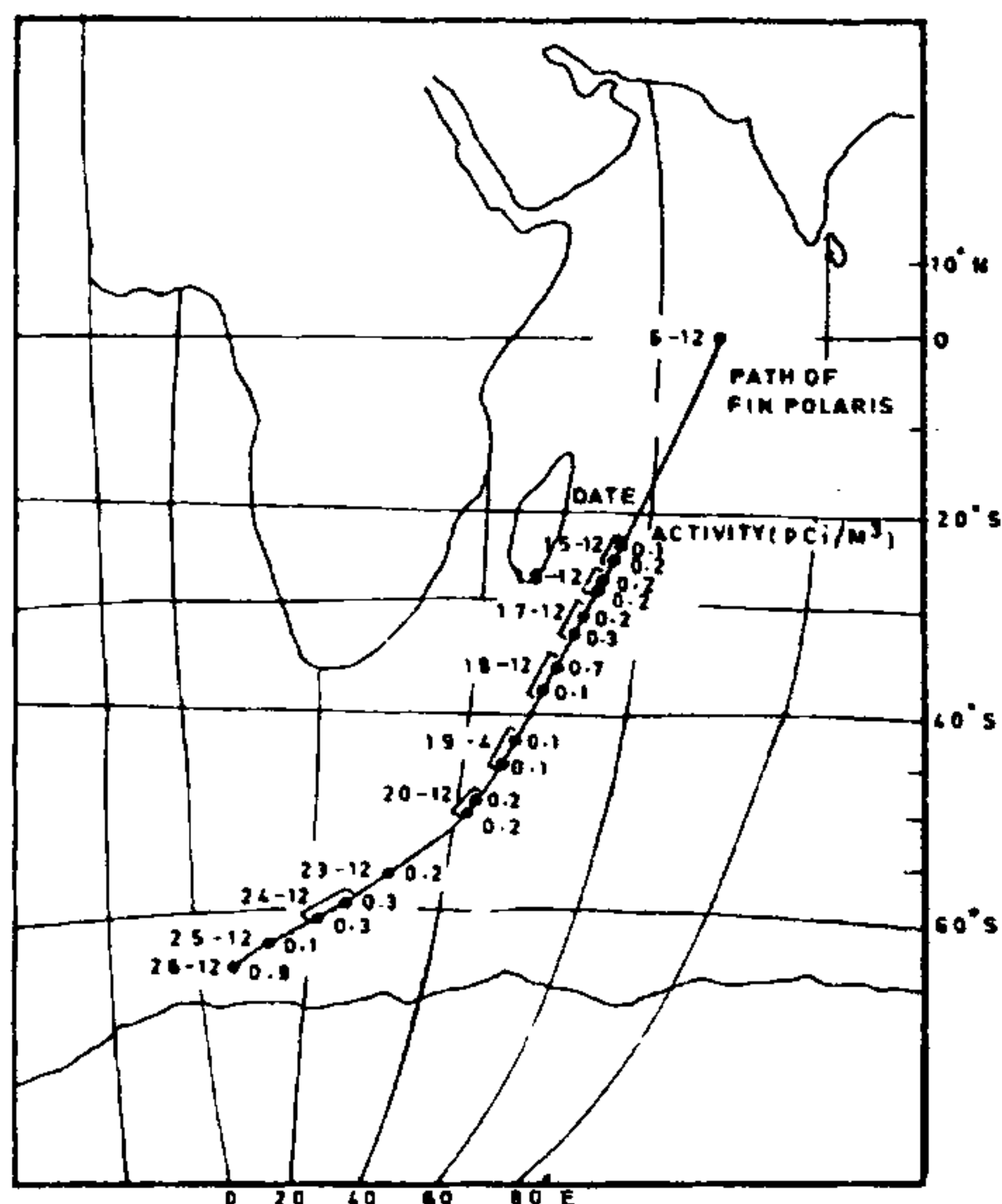


Figure 1. Measurement of radon in the southern Indian ocean during the third Indian Antarctic Expedition of 1983–84 winter.

useful in calculating residence times and the continental component in maritime air due to its mixing.

20 December 1985.

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