

# ESTIMATION OF PRECIPITATION AND ACCUMULATION FOR THE IAGP AREA FROM RAWINSONDE DATA

(Abstract only)

by

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## ABSTRACT

Routine upper-air observations for the year 1972 are used to construct the atmospheric water vapor budget between the coast and the line joining the highest points of the terrain between the meridians 55°E and 110°E. This gives seasonal and annual values of precipitation for an area of  $2.4 \times 10^6$  km<sup>2</sup>. Annual accumulation amounts are then estimated for the whole budget region. By assuming that the accumulation poleward of the 2 000 m elevation contour equals the 1972 precipitation, the annual areally-averaged precipitation (and thus the accumulation) is computed for the coastal slopes below 2 000 m.

Rigorous analysis of the rawinsonde data from five coastal stations and one on the plateau is a feature of this study. A special attempt is made to resolve the key boundary-layer properties. A systematic and important bias in the record due to missed observations during storms is demonstrated. The use of estimates for these missing values, which are obtained from multilinear regression equations, increases the computed annual poleward water-vapor transport at two stations by more than 30%.

Regions of net water-vapor inflow to and outflow from the continent were found to be organized in the same fashion as the mean circulation in the lower troposphere: the budget region is under the influence of a cyclonic vortex centered offshore. There was a poleward-directed, integrated (surface to 300 mbar) eddy flux of water vapor at all points along the coast. 43% of the annual precipitation fell during the period June to August due to a particularly stormy sequence mainly at one station.

The annual accumulation between the coast and the crest of the terrain is estimated with an uncertainty of 17%, and for the coastal slopes with an uncertainty of 39%. Comparison of the multiannually averaged accumulation derived from glaciological measurements with the computed values for a single year shows agreement within the limits of error.

In conclusion, the water-vapor budget approach produces accumulation values similar to the glaciological measurements. This approach offers a viable alternative method for monitoring the seasonal and annual accumulation over large parts of East Antarctica.

# CONTROL EXERTED BY SEA-ICE EXTENT OVER OXYGEN ISOTOPE RATIOS IN COASTAL ANTARCTIC PRECIPITATION

(Abstract only)

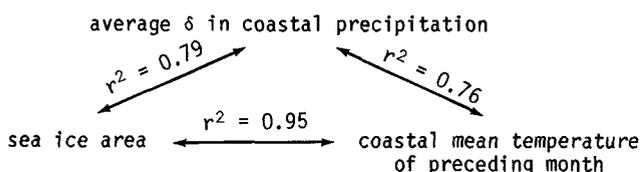
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## ABSTRACT

The observations of the stable oxygen isotope composition  $\delta$  of precipitation at the coastal Syowa station for 1974, which are reported and analyzed by Kato (1977, 1978), are reassessed on a monthly time scale. The relationship between oxygen isotope ratio and temperature is examined in detail. The mean temperature of the preceding month, rather than the temperature at the time of sample collection, has the best association with monthly averaged  $\delta$ . This one-month lagged relationship suggests the strong influence of sea ice which is related to the average temperature in the same fashion. Linear regression analyses, using monthly variations of Antarctic sea-ice extent for 1974, as reported by Zwally and others (1979), reveal the following interrelationships which provide good support for the contention that sea-ice extent is a dominant factor for  $\delta$  values in coastal Antarctic precipitation:



For August 1974 the  $\delta$  values are persistently less than those predicted by sea-ice area. Over the Southern Ocean, the zonal circulation in August was weak in comparison to the 1972-79 average. It is hypothesized that this anomalous circulation resulted in the source region of moisture precipitated at Syowa being located substantially farther north.

This paper will be published in full elsewhere.

## REFERENCES

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- Zwally H J, Parkinson C, Carsey F, Gloersen P, Campbell W J, Ramsey R O 1979 Antarctic sea ice variations 1973-75. In Kreins E R (ed) *Fourth National Aeronautics and Space Administration Weather and Climate Program science review. The proceedings of a review held 1979*. Greenbelt, MD, Goddard Space Flight Center, 1979: 335-340 (NASA Conference Publication 2076)