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Attention is drawn to "Comment on the Use of Asphalt Coatings to Increase Rainfall" by Wallace E. Howell and "Reply" by James F. Black and Barry L. Tarmy, appearing in J. of App. Met., Vol. 3, No. 5, October 1964, pp. 642-645 (Editor).

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18 February 1965

METEOROLOGICAL ACTIVITIES OF THE UNITED STATES IN THE ANTARCTIC

by M.J. Rubin

Mr. Morton J. Rubin, Assistant to the Director, Meteorological Research, U.S. Weather Bureau, described the overall U.S. activity as being on very broad lines covering many fields of geophysics and biology funded principally by the National Science Foundation. The meteorological program which now includes observations in connection with the IQSY is designed to provide data on the components of the heat, ice and water budgets of Antarctica.

During the IGY there were seven stations making observations, including Wilkes, Ellsworth and Little America V. At the present time, the principal meteorological programs are carried out at the South Pole and Byrd Station, with lesser programs at Eights and McMurdo. A new station, Palmer Station, is being established on Anvers Island in the region of the Antarctic Peninsula at the moment; its meteorological program will be minimal. It is expected that a temporary station will be established for two years on the high plateau of East Antarctica (80°S, 25°E), beginning in the 1965/1966 season, as part of the long traverse from the South Pole to the Roi Baudouin Base.

In addition to the standard surface and upper-air meteorological observations, the U.S. program includes observations of 1) the vertical distribution of net long wave radiation (radiometersonde), 2) vertical distribution of ozone (ozonesonde), 3) surface ozone concentration, 4) total ozone content in a vertical column of atmosphere, 5) total, reflected and normal incidence solar radiation at the surface, 6) carbon-dioxide content at the surface, 7) atmospheric nuclear radiation, 8) vertical gradient of atmospheric electricity potential near the ground, 9) near-surface-level temperature profiles, and 10) sub-surface temperature profiles. In the recent past an airborne program of albedo observations of sea ice and continential ice was carried out. Studies of energy exchange between sea, ice and atmosphere have been the principle aim of the Weather Bureau's portion of the overall U.S. program in meteorology.

Mr. Rubin presented several diagrams in explaining results obtained in the research program of the Polar Meteorology Branch of the Weather Bureau as follows:-

(i) The total annual sensible heat transfer between the air and sea or sea ice. In general this showed a transfer from the atmosphere to the sea between 45°S and 55°S over the South Atlantic and Indian Oceans, between about 50°S and 60°S over the Southeast Pacific Ocean, and between about 55°S and 60°S over the Ross Sea. At other latitudes over the same sections of these oceans the transfer was in the reverse direction.

(ii) The relation between albedo, and cloud undercast as obtained from an aircraft flight at 25,000 ft. testing instrumentation over northeast U.S.A. Albedo observations were obtained from up and down-facing Eppley radiometers. Such studies were carried out for two seasons in Antarctica where they will assist in estimating the albedo by seasons with varying amounts of ice and water. They will be useful in the interpretation of satellite observations, and in preparing a radiation climatology of the region.

(iii) Mean winter atmospheric cooling rates at the South Pole based on radiometersonde measurements. This showed cooling rates of 2 to 3°C/day just above the ice plateau, 1°C/day at 500 mb decreasing to about 0.2°C/day at about 200 mb, then increasing to about 1°C/day at 50 mb. A further diagram showed that the cooling above 200 mb tended to increase with decrease in latitude, at least to the latitude of Wilkes (66°S).

(iv) Calculated mean annual, mean October - March and mean April - September snow surface temperatures over Antarctica. The lowest temperatures for each period occur over Eastern Antarctica, the mean annual being below - 55°C and the others below - 45°C and - 65°C respectively.

(v) Two South Pole ozonesonde ascents (27.10.62 and 16.11.62), before and after the springtime warming. This showed a marked increase in ozone between 200 mb and 10 mb over this period. Between 100 and 50 mb the partial pressure of ozone increased from about 125 to 225 micro-millibars. Marked increases in ozone occur simultaneously with sudden stratospheric warmings.

(vi) Time sections of 10-day and 3-day mean 50-mb temperatures illustrated the general warming trend at that height from September to November, and the marked variations that occur in the trend in different years. Mr. Rubin explained these as being due to circulation changes and vertical motions.

In reply to a request for information regarding the atmospheric electricity measurements being made, Mr. Rubin said that observations are being made of the potential gradient a few metres above the ground. Observations were also being made by others at Antarctica. He mentioned that Wexler, Moreland and Weyant had suggested that the maximum surface ozone in winter was associated with winds from the continent to the sea and downward vertical motion carrying ozone from the stratosphere to the ground in winter. It had also been suggested that the ozone present might be due to electric discharges in the atmosphere during periods of blowing snow. These measurements are being made to test this theory.

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25 March 1965

STRATOSPHERIC MEASUREMENTS OF ION DENSITY AND ELECTRICAL CONDUCTIVITY

by G. Paltridge

Mr. G. Paltridge of the R.A.A.F. Academy, Point Cook, Victoria, stated that a knowledge of the altitude distribution of the electrical conductivity of the atmosphere is extremely important, as conductivity is the independent variable which determines the other electrical parameters such as the electric field, the air-earth potential, and the atmospheric space charge. The electrical conductivity (λ) in turn depends on the "small ion" density (n)