Ice Nuclei Concentrations at Mt Washington During Thirteen Years

by

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Since January 1948 when the senior author initiated routine 3 hourly observations of ice nuclei concentrations at the Mt. Washington Observatory (6344 ft. M.S.L.) in the State of New Hampshire USA., more than 36,500 observations have been made. The data now available constitutes the most extensive record in time of routine observations of ice nuclei concentrations in existence.

All of the measurements were made with the mixing chamber technique as developed by Schaefer. The 100 liter cold chamber was lined with black velvet to eliminate contamination by fragmentation nuclei. After introducing an air sample from outside the Observatory a period of two minutes elapsed before a cloud was formed in the chamber. Most observations were made at a temperature of -18 to -20 °C. During recent years a considerable number of runs were made at warmer temperatures (-10 & -15°)

An extensive analysis of the data is now underway All of the local weather parameters ~~[illegible]~~ have been put on punch cards by the U.S. Weather Bureau and the special nuclei information is now being added. A series of correlations will be run to determine whether a preliminary indication of a small positive ~~[illegible]~~ relationship with the so called "Bowen Peaks" is ~~[illegible]~~ can be supported by a more rigorous analysis

The presence of ice nuclei storms of high concentrations which characterized the data prior to 1954 has been found to be nearly absent during the later period of 1954-1961 These high count periods sometimes

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Since January 1948 when the senior author initiated routine 3 hourly observations of ice nuclei concentrations at the Mt Washington Observatory (6344 ft M.S.L.) in the State of New Hampshire, U.S.A., more than 36,500 observations have been made. This data constitutes the most extensive record of successive routine observations of ice nuclei concentrations in existence. (INSERT) An extensive analysis of this material is now underway. With the data being put on punch cards supplied by the U.S. Weather Bureau, a detailed series of correlations will be run to determine

whether a preliminary indication of a small positive correlation with the so-called "Bowen Peaks" is a reality.

The presence of ice nuclei storms which characterized the data prior to 1954 has been found to be nearly absent during the period 1954-1960.

Concentrations up to 1000 per liter occurred during these storms from 1948 to 1954. These high count periods lasted for several days.

Although there was a tendency for these high concentrations to occur more frequently during the winter months some outstanding "storms" occurred during the summer months.

Case studies generally showed that these unusually high counts were found in air which had a trajectory from the arid southwestern United States. In a number of instances the air was found to be associated with severe dust storms in the desert regions.

In one outstanding example an ice nuclei storm accompanied a vast cloud of smoke from a forest fire more than a thousand miles distant which took 24 hours to pass the station. The ice nucleus concentrations increased by five orders of magnitude as the smoke engulfed the mountain and then dropped to the previous low levels as the smoke passed eastward.

Much of the preliminary analysis of the Mt Washington ice nuclei data shows a fairly high relationship to probable terrestrial sources of such particles. Under most conditions the air passing the summit of the mountain is of continental origin. This could mask possible correlations with the Bowen Peaks since those correlations which have been established thus far in the southern hemisphere and other locations show total concentrations, even on high level days, considerably lower

than the values found at Mt Washington much of the time

Further studies of the data will be made using a # 1620 Computer. Various relationships with atmospheric phenomena will be run in the near future. This should establish whether northeastern America is a likely area to study the "Bowen Peaks" and should show other relationships with synoptic and mesoscale weather phenomena. (ends)

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