CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)

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Project Number

S0609

Project Title

And a Cloud Is Born! The Effects of Atmospheric Conditions on Cloud Type

Abstract

Objectives/Goals

The objective is to investigate the effects of upper-air weather conditions, such as temperature, dewpoint temperature, relative humidity, and barometric pressure, on cloud type and stage.

Methods/Materials

Manual observations of cloud type were taken over Monterey, CA every day for a total of 28 recordings, and observations over Oakland, CA were taken by means of a cloud classification chart from the Internet for a total of 25 readings. Skew-T/Log-P diagrams from the Internet were used to probe the upper-air weather conditions over Monterey and text data was utilized to view the conditions over Oakland. The values of three distinct tropospheric layers were used from the data: 900 mb, 500 mb, and 300 mb.

Results

Every type of cloud was viewed except for cumulus clouds. The clouds viewed with consistent high air pressure were cirrus and cirrostratus, and those with low pressure were were cirrocumulus and stratocumulus. Stratus and stratocumulus were the wettest 900 mb cloud types, although all clouds were seen with a wet humidity reading at their formation level. Stratus and stratocumulus had 900 mb dewpoint readings of 4 and 5 degrees C, respectively, while many of the other types had a reading below 0 degrees C. Stratus and stratocumulus both had an average 900 mb temperature below that of any other type.

Conclusions/Discussion

Due to the diverse nature of clouds, an enormous variety of patterns were found between cloud type and upper-air conditions. Most of the conclusions agreed with the hypothesis, but many were unexpected. For example, stratocumulus was found with low barometric pressure, low temperature, high relative humidity, and warm dewpoint temperatures. These are many of the elements of atmospheric instability, which would explain why stratocumulus clouds are associated with developing stormy weather. This project brings up many areas of further research, including the need for an updated, more precise cloud classification system. This study also helps us expand our knowledge of how clouds foreshadow stormy or fair weather and displays the complexity and variety the atmosphere constantly offers to forecasters.

Summary Statement

This project explores what effects upper-air atmospheric conditions have on cloud type and stage.

Help Received

Dr. Phil Durkee helped by offering possible accessable data options available for this project online and by briefly reviewing some results.