

Community Interactions

Unidata at Alaska

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In October 1990, the Atmospheric Science Group at the University of Alaska, Fairbanks installed Unidata's Scientific Data Management (SDM) system on our Sun computers. We acquire our data via a four-meter satellite antenna on the roof of the Geophysical Institute. However, the target satellite (C-Band Spacenet 3) is above the Caribbean Sea—a bare 3.6 degrees above the Fairbanks horizon. (The angle surprised UCAR President Richard Anthes, who, during a visit to the Geophysical Institute, commented: "I've seen many Unidata satellite dishes at UCAR universities, but this is the first I've seen facing the horizon.")

Alaska is outside the domain of the intense coverage of the regional fine-mesh forecasting model for the lower-48 contiguous states. Therefore the gridded upper-air weather data for Alaska must be retrieved from the NMC global analysis and prediction in the Global Product Set (See Fig. 1, page 9). Despite this fact, knowing the real-time weather data (wind, temperature, pressure, humidity, ...) in the troposphere and stratosphere offers new areas of research. Weather predictions, although they are not perfectly

accurate, add a further dimension to research opportunities when the data are stored on computer disk. In the following we describe research activities with Unidata in Alaska.

The Alaska Climate Research Center at the Geophysical Institute is the primary organization that implemented Unidata. With the real-time weather data, we are now able to assess various weather extremum specific in Alaska, such as the cold spell, heavy snow, Chinook, flood, arctic front, and blocking high. Daily weather analyses of mobile synoptic systems of high-low pressures on the computerized graphic screen will be a useful laboratory material in meteorology classes. The graphic weather charts and/or GOES imagery will be displayed within the campus by the Unidata Campus Weather Display (UCWD) system over the computer networks. These graphic products could be available to the public as a public service by the Geophysical Institute. Currently we produce daily updates of temperature time series with a three-day prediction at the Fairbanks region. We also present

upper-air wind vectors over the Alaska region.

The Poker Flat Research Range is the only rocket range operated by a university. Its upgrade project calls for a Climate Change Observatory near the Optical Laboratory. Monitoring trace gases and aerosols in high latitudes is given a priority for global change studies. Daily back trajectory analysis (see Fig. 3, page 9) computed with Unidata provides important information on arctic haze and trace gases monitoring effort. The back trajectories tell us where the air we breath today originally came from. Based on the same technique, we constructed a forward trajectory analysis-prediction scheme for forest fire smoke during summer. The model would predict where the fire smoke will spread. Moreover, vertical cross sections of wind field in the troposphere and stratosphere over Poker Flat becomes basic information for arctic ozone hole observations by Nagoya University, as well as for conventional upper-atmosphere rocket observations.

Alaska Volcano Observatory is the main user of Unidata at present,

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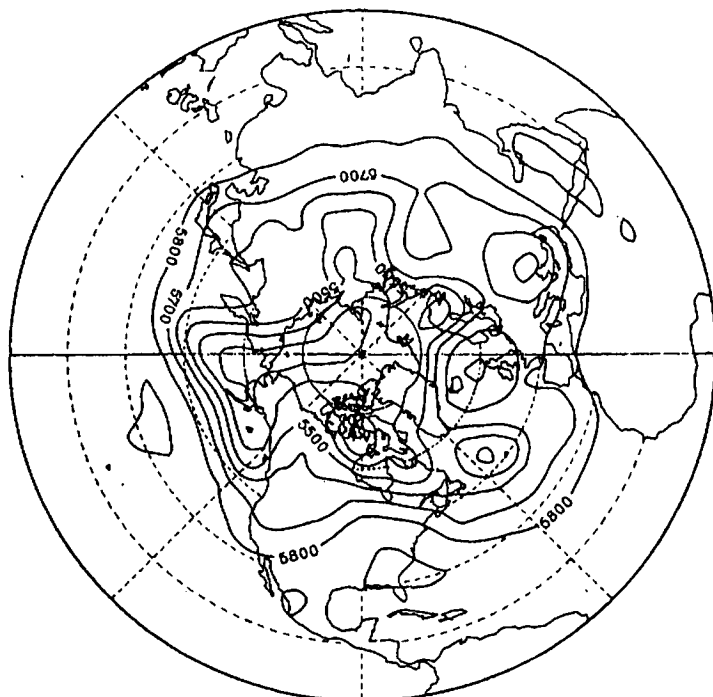


Figure 1: 500 mb Height NMC Analysis Field by Unidata.
Date: 91-MAY-29 Time: 0:00 UTC

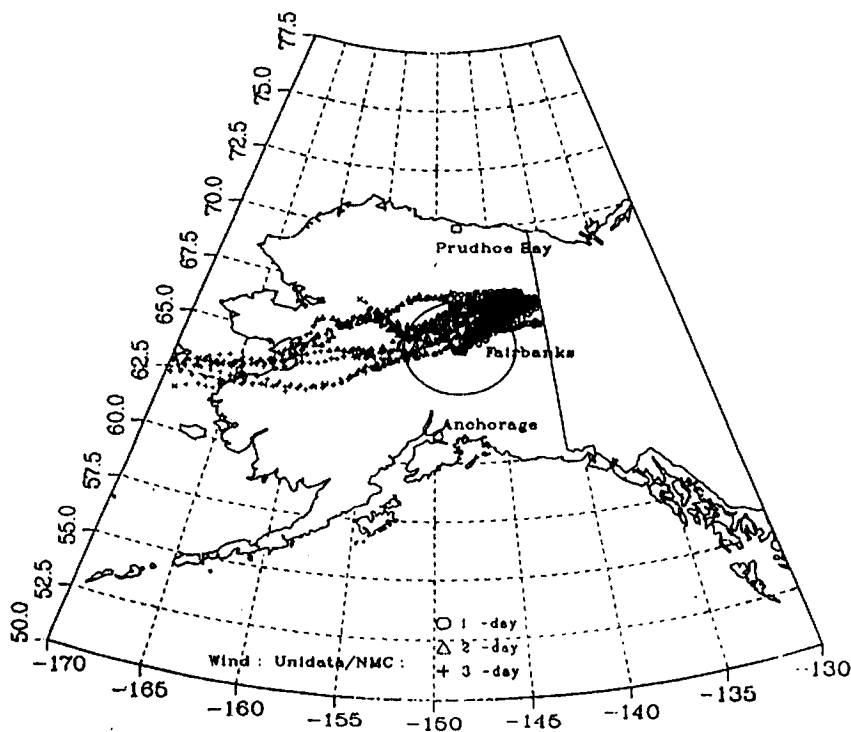


Figure 2: Back Trajectory Analysis, ESTER DOME (716-2000m)
Date: 12-APR-91 Time: 12:0 UTC

because of the recent eruption of Redoubt Volcano and the near-fatal engine trouble of a KLM B-747. When eruptions occur, answering where the plume is and where it will go is the urgent problem in public safety and flight operations for the cloud-rich Cook Inlet Volcanos. A volcanic plume prediction model has been developed as an interdisciplinary project by the Alaska Volcano Observatory, atmospheric science, and satellite data processing groups at the Geophysical Institute.

Alaska SAR Facility supports a sea ice monitoring project by JPL in the context of global change research. The precise measurements of sea ice will be compared with surface and low-level wind to determine the wind-driven stress and sea-ice drift. Unidata offers the first guess field of surface wind over the Arctic Ocean immediately after the satellite passage. A project is proposed to establish a comprehensive climate database for arctic research, combining the SAR data and NMC data available from Unidata.

Unidata's basic objectives are to support university research and education activities. The University of Alaska may be the final frontiers of this national program in atmospheric sciences. The Unidata Program Center has paid special attention to Alaska activities and has devoted considerable time and effort to implementing Unidata products there. Because the Arctic is rich in research topics, we expect this new resource will be well used as researchers become aware of its potential.

