

From Russia with love: air pollution

One would naturally tend to assume that the Arctic has clean air. As long ago as 1956, however, weather reconnaissance flights started reporting layers of reddish haze in the atmosphere over the northern polar regions, particularly during the winter months.

For the past five years, Glenn Shaw and members of the meteorology group at the Geophysical Institute have been involved in studying this phenomenon, called "Arctic Haze." It has been found that the component particles making up the aerosols passing over Alaska differ widely, depending on the direction of air flow. Although the main components of arctic haze are always compounds of sulfur, presumably derived from the burning of fossil fuels, other trace elements that have been identified bear a more direct relationship to the source region.

When air enters from the Gulf of Alaska, it is usually relatively clean and bears traces of sodium and chlorine, components of sea water. When it enters from over northwestern Canada, it is similarly clean, but the characteristic trace elements are aluminum and silicon, indicative of wind-blown natural dust. During these "clean" times, the visibility in Alaska is good. For instance, Mt. McKinley can be seen easily from Fairbanks.

However, when the air flow enters Alaska from over the Arctic Ocean, the air becomes hazy; chemical analysis of the tiny suspended particles shows them to contain heavy metals such as iron, titanium, chromium and nickel. Because most haze episodes occur during the winter when the Arctic Ocean is frozen over, it is unlikely that it can be a contributor, and a man-made source is implied.

Shaw and co-workers examined three strong outbursts of arctic haze which occurred during the late winter between February and April, 1982. Although arctic weather information is sparse, there was enough global meteorological information to attempt tracing the winds backward in time to try and determine the geographical source of the arctic

pollution.

The trajectories obtained indicated a probable point of origin in the central or northern Soviet Union. Although there are many potential pollution sources in this large area, one that may turn out to be an important contributor to haze episodes in Alaska is a large Siberian ore smelting complex at Noril'sk, near the

mouth of the Yenisey River at 70 degrees north latitude (nearly as far north as Pt. Barrow).

LANDSAT satellite images made during August, 1981, show 25-mile long plumes emanating from smelters processing rich nickel and copper sulfide ores. The pollution products from large industrial sources in central USSR and

Siberia would reach Alaska after about one week.

It is being learned that air pollution in the Arctic is becoming a potentially serious problem. Acid rain, which results from the sulfur gases in arctic haze, has already caused large-scale ecological damage in Canada and Scandinavia.

America is striving to "clean up its act" when it comes to all

sorts of pollution. Soviet air pollution in the American Arctic should now be a matter of serious concern to all Alaskans and Canadians. This points out, again, the vital need for international agreement specifying maximum amounts of industrial pollution injected into the atmosphere.

—Larry Gedney and
Glenn Shaw