



AUTHOR Donald R. Nichols

AFFILIATION U.S. Geological Survey

ADDRESS Denver, Colorado 80225

TELEPHONE ( 303 ) 236-1599

TITLE: Volcanic Hazards in the Copper River Basin, Alaska

### ABSTRACT

The andesitic volcanoes of the Wrangell Mountains are among the largest in the world and have produced eruptive products at a rate about five times greater than that of any other volcanoes in the modern circum-Pacific. Mount Wrangell is currently the only active volcano in the Wrangell Mountains, with solfataric fumaroles on the rim of its summit caldera. However, it and other eruptive centers in the western Wrangells have had a history of violent eruptions that have affected adjacent areas of the Copper River basin in Pleistocene time. Mount Wrangell has had at least one and possibly two caldera-forming events and has produced lava and debris flows that have traveled well into the lower part of the Copper River Basin. C. S. Benson and R. J. Motyka have presented evidence that Mount Wrangell has shown a major increase in heat flux during the past decade and have speculated that it was triggered by the 1964 Alaskan earthquake, citing reports of increased activity associated with the 1899 Yakutat earthquake sequence in support. Should the seismicity-volcanism relationship exist, additional activity might be anticipated in the event of another great earthquake in the region of the Yakataga gap.

A major eruption of Mount Wrangell would seriously affect human activity in the eastern Copper River basin and possibly as far as the Gulf of Alaska. Because the caldera is filled by 10 km<sup>3</sup> of snow and ice, a major eruption could cause severe flooding along the entire Copper River from its headwater area to Alaganik on the Copper River delta. The volume of such floods could exceed the capacity of the incised river valleys to contain them, and broad, low-lying areas adjacent to these valleys could be inundated. Once snow and ice levels dropped below the caldera rim, floods and debris flows probably would continue to flow off the mountain via the low bedrock lip at the head of Long Glacier, carrying massive amounts of rock and ice debris, and possibly forming a debris dam at the head of Woods Canyon.

Because extensive andesitic lava flows were produced from past eruptions, they should be expected in the future. If future flows are comparable to, or greater than, the ancestral flow that lies at an altitude of 610 m within 9.5 km of Chitina, they could dam both the Copper and Chitina Rivers at the head of Woods Canyon. This would inundate existing communities and facilities, perhaps as far upstream as McCarthy in the Chitina valley and Chistochina on the Copper River, and would threaten the Trans-Alaska Pipeline.

