

## Preliminary Report on the Alaskan Earthquake of April 7, 1958

T. NEIL DAVIS

*Abstract*—The Alaskan earthquake of 05h 30m April 7, 1958 (150° WMT) is the largest (Richter scale 7.0–7.5) of a series of shocks centered in an area near Huslia, Alaska. Severe breakage of lake and river ice and many ground cracks and mud flows occurred in the region of the field epicenter. A preliminary isoseismal map is presented.

The major Alaskan earthquake of 05h 30m April 7, 1958, 150° West Meridian Time, was felt sufficiently strong in Fairbanks to awaken many persons. The shock, of Richter magnitude 7.0 to 7.5, disaligned magnetic instruments of the U. S. Coast and Geodetic Survey Observatory at College, and was recorded on magnetic instruments at various field stations in Alaska. The intensity of the preliminary waves was sufficient to obscure the arrival of the secondary waves on the seismic equipment at the U. S. Coast and Geodetic Observatory at College. Through the use of S-P times of aftershocks, data from Sitka and other more distant stations it was possible to establish the epicenter as being about 250 mi northwest of Fairbanks.

On April 10, the author was flown to the area and was able to establish the field epicenter at a point near Huslia, Alaska, in the Koyukuk River basin. The position of the field epicenter is 155° 30'W, 65° 45'N. Severe lake-ice cracking, ground cracks, sinks, and extensive mud flows occurred in a zone approximately three miles wide by 35 miles long (Fig. 1) extending from the village of Huslia on the Koyukuk River in a northeasterly direction (azimuth 75° true) to a second point on the Koyukuk River. The southern part of the general area suffering the most severe surface effects consists of Quaternary alluvium and the northern part intersects a Tertiary volcanic ridge known as Bear Mountain.

At the time of the earthquake there was about two feet of snow on the ground and all lakes and rivers were frozen to a depth of approximately three feet. These conditions aided greatly in locating the area most affected by the shock.

The only nearby inhabitants of the region live in Huslia, a village of 150 people. The residents reported the duration of strong shaking to be approximately one minute, with horizontal motion SW-NE most noticeable. The shocks or preliminary earth noises at about 05h 30m 150° WMT awakened every adult in the village and caused

some terror, particularly among the children. A moderate foreshock was felt by the villagers a week prior to the main shock at 05h 50m on March 31, 1958, 150° WMT and many aftershocks were also reported.

Actual monetary damage in Huslia was slight because most of the homes are of log construction and have no foundations. The only concrete found in the village was in piers underneath the one-story plywood school building. These were chipped by the main shock and some boards around the foundation of this building were knocked loose. Logs shook loose from window casings on two of the buildings and many of the houses received minor damage to roof structure. Case goods and other heavy objects moved for a distance of as much as twelve inches in the direction away from the epicenter.

Severe cracking of the river ice necessitated relocation of the river airstrip to a point where less cracking had occurred. Movement of the river ice created a pressure ridge of broken ice six feet in height along the southeast shore. Earth lurches on this bank left cracks in the soil up to forty inches wide and at least 20 ft deep.

Numerous earth lurches border small sloughs and ponds near Huslia. This area also contains a number of small mud flows and several sinks, some of which are 20 ft across and six feet deep. However, the most extensive damage is in an area between 10 and 30 mi northeast of Huslia. Many of the lakes in this region have large cracks in the ice with mud and vegetation ejected through them. Some lakes show severe shattering of the ice and in others no ice is visible. In these latter lakes, mud or muddy water appears to cover the ice completely. A few of the frozen streams had water or mud flowing in them after the shock.

The most striking result of the earthquake is the great volume of mud appearing on the surface at the field epicenter. Several of the larger mud flows cover an average area of one-quarter to one-half square mile with a mud depth of up to several

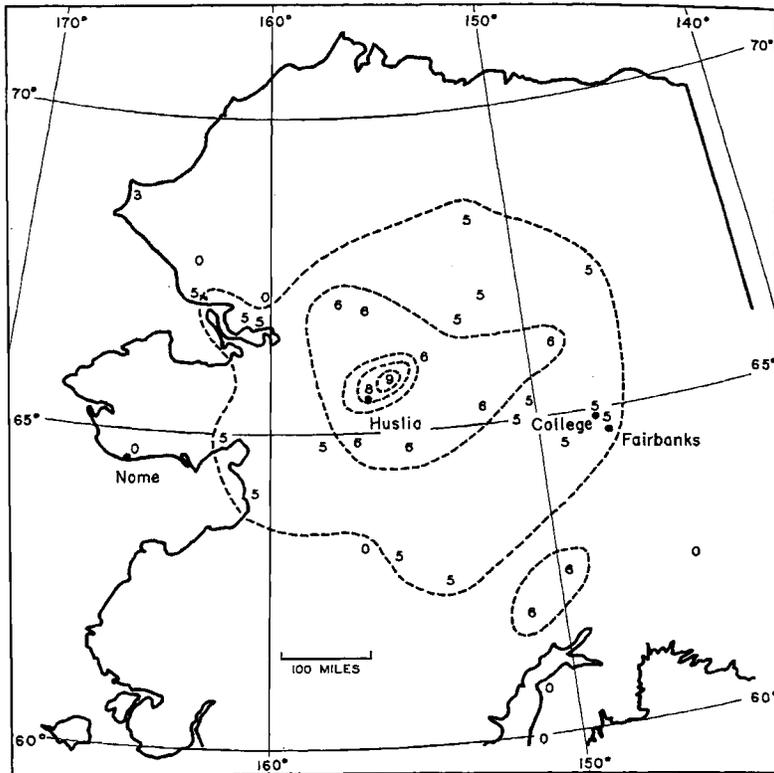


FIG. 1 - Preliminary isoseismal map of the earthquake of April 7, 1958

feet. One of the larger flows created a fanlike formation about 1000 ft long beyond which the mud flowed down a streambed for several miles. There are about ten flows of this size and hundreds of smaller ones. Associated with many of the flows are sinks located within a few hundred feet of the mud sources. The largest sink observed is 106 ft by 74 ft with a maximum depth of 13 ft.

As a part of the investigation of the earthquake a number of simplified questionnaires based on the U. S. Coast and Geodetic Survey earthquake questionnaire were sent to residents in Alaska. The response has been very good and a large amount of information is being obtained from the questionnaires and from voluntary letters. It is difficult to evaluate these data on the standard intensity scales because of the lack of a variety of construction near to the epicenter. Preliminary results indicate that the area over which the main shock was felt with an intensity of V or greater on the Modified Mercalli scale is in excess of 100,000 sq

mi. As the shock occurred at a time when most people were asleep, the criterion of whether or not people were awakened was heavily used. The value V was assigned to a location if many or all persons were awakened by the shock. VI was assigned if most or all were awakened and if heavy objects were moved. At Huslia sand and mud ejection was the primary reason for the assignment of VIII. Preliminary intensity assignments at locations are shown on the accompanying map.

Subsequent to the earthquake vertical aerial photographs were taken which show the detail of the mud flows and ice cracking. One field party has visited the area and a second is planned. The results of these investigations will be published in a later paper.

*Geophysical Institute, University of Alaska, College, Alaska*

(Communicated manuscript received May 8, 1958, and as revised, June 16, 1958; open for formal discussion until March 1, 1959.)