

G E O P H Y S I C S

Preliminary Report on  
Meteorological Observations in Surtsey 1967

by

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Observations of temperature, wind and general weather conditions were begun on April 1st and continued until September. They were far from continuous, however, and averages can not be based on them, but they may serve as a basis for comparison between weather conditions on Surtsey and on Stórhöfði, and to make some inference regarding the climate of Surtsey.

On June 30th the following instruments were installed:

1. Automatic Registering Station, which registered wind direction and speed, temperature and rainfall. The station was installed on the western part of the island south of Bónði. The station was operative through July.
2. Thermo - Hygrograph was installed in a special shelter above the hut. It was operative until September 20th.
3. Soil thermograph was installed near the hut. Measuring elements were at 5 and 20 cm depths. It was operated until September 20th.
4. Barograph was installed in the hut. It was intended that it should register explosions from the eruption, but it did not fulfil this purpose, since the eruption stopped before the installation. The barograph was not well suited for this purpose anyway, since it had an effective damping device.

Preliminary survey of the observation material shows that the general climate of Surtsey is very similar to Stórhöfði. The mean temperature difference amounts to  $0.9^{\circ}\text{C}$  in April and  $0.5 - 0.6^{\circ}\text{C}$  in June and July, which is roughly what could be expected from difference in elevation of the two stations; the temperature being generally warmer in Surtsey.

Using observations on Surtsey and Stórhöfði the mean temperature

for the spring and summer months of 1967 is as follows in Surtsey:

April	3.1 <sup>o</sup> C
May	6.0 "
June	8.3 "
July	9.8 "
August	10.3 "
September	9.1 "

The main characteristics of the air temperature is the small daily amplitude, 3 - 4<sup>o</sup>C being a characteristic amplitude on sunny days, and 1 - 2<sup>o</sup>C on overcast days. This is clearly caused by the proximity of the sea.

Precipitation values at Surtsey suffer from the same shortcomings as other observations, they are not continuous, except for July, when the automatic station was operating. The station had the inherent defect, however, of collecting blowing sand and registering that as precipitation. During July it was not difficult to distinguish the lithometeor from the hydrometeors, but it might prove troublesome on other occasions.

In July the automatic station registered a total rainfall of 43.0 millimeters. In the same month Stórhöfði registered a rainfall of 54.9 mm. With few exceptions the various intervals of observations in April through June in Surtsey showed the same general tendency, i.e. considerably less precipitation in Surtsey than on Stórhöfði, most of the Surtsey values ranging from 60 to 80% of the corresponding values at Stórhöfði. This general trend was reversed, however, on a small minority of the individual values.

The precipitation at Stórhöfði in 1967 is as follows:

<u>Month</u>	<u>mm.</u>
April	106.2
May	44.7
June	149.8
July	54.9
August	84.3
September	97.4

During July, when the automatic station was in operation, the mean wind speed was measured 4.1 m/sec. at two meters above the ground. The corresponding figure at Stórhöfði is 6.9 m/sec. at 9 meters above the ground.

If it is assumed that the wind speed at 2 meters has to be increased by 25% to get a figure comparable to the speed at 9 meters, the wind speed at Surtsey would be 5.1 m/sec. which is only slightly higher than the wind observed in the same month at some stations on the south coast of Iceland (Mýrar 4.6, Eyrarbakki 4.8 m/sec.).

In marked contrast with the air temperature the soil thermometers show a very pronounced daily amplitude, a 10-12°C difference being typical on a sunny day in July at 5 cm depth and 2.5 - 3.0°C at 20 cm depth. The corresponding figures on a cloudy day are 4°C and 1°C or less. The mean temperature of the soil in July is considerably higher than of the air, the mean temperature at 5 cm depth is 14.2°C but 12.7°C at 20 cm.

The corresponding figures at Reykjavik are 11.2°C and 9.9°C, in a plot without vegetation. The vertical temperature gradient is therefore greater at Surtsey than at Reykjavik, and one may therefore assume that the volcanic heat in Surtsey is quite insignificant at the spot where the soil measurements were made.

Soil temperature and its daily amplitude decreases slowly in August and early September. When the observations were discontinued late in September, the mean temperature at 5 cm depth was close to 9°C and the daily range 1 to 2 degrees. At 20 cm depth the corresponding figures were 8°C and 1/2°C.

Although the above findings are based on discontinuous observations, it seems clear that the general climatic conditions in Surtsey do not deviate much from those of Stórhöfði, and deviation can be inferred from well known principles. (Precipitation is a possible exception to this). The microclimate of the island seems to be quite different, however, especially the temperature conditions over the sand where new vegetation is most likely to appear.

In the future it is therefore intended to continue some observations of the general climate, but to place increased emphasis on microclimatic observations.

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