

RADIOCARBON DATING IN THE ARCTIC REGION

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The Landnám of Iceland is usually dated too early by the  $^{14}\text{C}$  dating method, at least to judge from the tradition according to the *Landnámabók*. Various sources of error are considered. One, the use of driftwood, can be excluded in many cases, since birch is often selected for dating purposes. Second, the settlers may have brought wood with them. A third obvious source of uncertainty is the age of a tree before felling. It is difficult to explain the seemingly too early results by secular global variations of  $^{14}\text{C}$  content. A regional low level of  $^{14}\text{C}$  may result from volcanic activity or the small size of the land areas in the Arctic region.

The release of old  $\text{CO}_2$  by volcanoes during eruptions is proven, as is a continuous local supply emitted by hot springs. The activity of the atmosphere was measured by means of numerous samples, the majority from Iceland — mostly collected in 1978. Some plant samples were obtained in 1980 in connection with the YMER-80 Expedition.

The measurements so far completed indicate that the decrease of the activity from 1978 to 1980 is equal to about 4% of the standard. The excess activity over Iceland is close to, although probably slightly less than that over Sweden, whereas that over Svalbard seems to be some 2% lower. The reduced activity earlier observed on Svalbard (Olsson and Karlén, 1965; Stenberg and Olsson, 1967; Olsson and Klasson, 1970) from 1962 to 1964 was attributed to diffusion from lower latitudes where the mixture occurs between the stratosphere and troposphere.

Early studies of tree-ring dated wood do not include geographic variations. The results presented by Robinson (1982) from samples from Hawaii and sites close to the coast of California, however, reveal an increase of  $^{14}\text{C}$  with elevation. Robinson's findings and our present results, together with some earlier measurements, suggest that the putative island effect (Olsson, 1979), as a permanent phenomenon, must be further considered.

Measurements of  $^{14}\text{C}$  activity of deep water from the Arctic Ocean, collected in 1980, indicate a deficiency, compared with the standard, of less than 8%.

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