

Wastl, M., Stötter, J. and Caseldine, C. (1999): Tephrochronology - a tool for correlating records of Holocene environmental and climatic change in the North Atlantic region. *GSAs with Programs*, 31(7), A-315.

Abstract

In Northern Iceland a Holocene tephrochronological record which comprises ca. 70 tephra layers for the period since ca. 9700 radiocarbon years BP has been established. Due to the location of this region outside the volcanically active zones of Iceland, these layers originate from volcanic events connected with tephra fallout covering a rather large area. Thus tephra layers from this sequence have been identified in Scandinavia, on the British Isles, in Northern Germany, in marine cores from the North Atlantic, and in the Greenland ice cores, making them potential isochrones for wide parts of the North Atlantic region.

Absolute age determinations of marine sequences from the North Atlantic by means of radiocarbon dating are hampered by the uncertainties connected with spatial and temporal variations of the marine reservoir effect. On the other hand, the comparison of the radiocarbon ages of 16 samples of organic material (wood, peat, gyttja) underlying the Saksunarvatn tephra in Northern Iceland with published radiocarbon dates as well as ice core and varve ages for this chronohorizon demonstrates that the radiocarbon ages in undisturbed terrestrial sections can differ several hundred years from those determined by counting of annual layers. This means that environmental proxy data which is purely based on (singular) radiocarbon dates must be interpreted with great caution, and underlines the importance of independently dated chronostratigraphic markers.

Against this background, tephrochronology defines exactly dated time markers for correlating records of environmental and climatic change from different environments (terrestrial records from North-West Europe, marine cores, Greenland ice cores) in the North Atlantic region. These isochronous marker horizons become even more important in view of the fact that in the time of instrumental meteorological recording climate conditions in this area have shown extreme variations within few decades, which is beyond the present temporal resolution of radiocarbon dating.