4.63.33

Solar activity changes inferred from radionuclide records

R. MUSCHELER[1] AND J. BEER[2]

[1] GeoBiosphere Science Centre, Quarternary Geology, Soelvegatan 12, SE-223 62 Lund (raimund.muscheler@geol.lu.se)
[2] EAWAG, Ueberlandstrasse 133, CH-8600 Duebendorf (beer@eawag.ch)

The solar influence on climate is the subject of current debate. Prior to the period of direct satellite-based solar observations (last 20 years) and indirect solar observations based on sunspots (400 years) most evidence for a solar influence on climate is based on the comparison of radionuclide with climate records. For this period radionuclide records represent the most reliable proxies to reconstruct changes in solar activity.

Cosmogenic radionuclides are produced in the atmosphere by the interaction of galactic cosmic rays with the atoms of the atmosphere [1]. The solar and geomagnetic field influence the production rates indirectly by deflecting the galactic cosmic rays. Radionuclide records are also influenced by climatic changes. Atmospheric radiocarbon concentration, for example, can be influenced by changes in oceanic ventilation (e.g. [2]). ^{10}Be and ^{36}Cl measured in ice cores can be influenced by changes in atmospheric transport and deposition. It is crucial to identify potential climatic influence on radionuclide records since otherwise the comparison of radionuclide with climate records could feign a solar influence on climate.

We will show that the comparison of different radionuclide records allows the identification of climate induced changes in radionuclide records. This allows us to improve the reconstruction of past changes in solar activity. Especially the ^{10}Be record from Summit in Greenland shows a very high similarity with changes in atmospheric ^{14}C concentration which points to a dominant solar and geomagnetic influence on these records during the Holocene.

References

[1] Lal D., Peters B. (1967) *Handbuch für Physik* **46/2,** 551-612.
[2] Muscheler R., Beer J., Wagner G., Finkel R.C., (2000) *Nature* **408,** 567-570.

4.63.41

The land wards translation of the maximum Littorina transgression at the end of the climatic optimum around 5500 yr cal BP-recorded in lake sediments, geochemistry, stable isotopes, pollen and diatoms from a fjord, cove, and near shore lake basins transect, Sjælland, Denmark

N. NOE-NYGAARD

Geologisk Institut, University of Copenhagen, Østervold gade 10, 1350 København K Denmark (nannan@geol.ku.dk)

Towards the end of the Atlantic period the eustatic sea level from the post glacial melting of ice sheets had reached its highest level in Northwest Sjælland, Denmark. The sea level around Denmark had raised about 30m in less than 1000 years. Shorelines from that time may be found 4-6m above present day sea level. Data from five localities in the area demonstrats the effect the relative sealevel rise, from marine flooding of fjord regions, coves, near shore threshold lake basins to ground water dependent lacustrine basins. Three of the basins are connected by the same river, but at an increasing distance from the coast. As Denmark is very flat country the effect of the marine flodding can be traced a long distance inland from the sea, where it had an emence impact on the flora, fauna and especially man and his culture.

The five basins are: 1. an open profile at the Saltbæk Vig fjord, 2. a threshold sealed inclosure Tengslemark of the Klintsø fjord, 3. the Classic Littorina transgression locality Søborgsø former fjord but sealed from the Kattegat sea by a 4 m threshold, 4. the Tissø lake (1,5 m above presen day sl.), 5.- the little Åmose lake (5 m above prensent day sl.) and the Store Åmose lake at 23 m above sea level.

The contemporaneous events in the four basins are correlated by sedimentology, geochemistry TS, TOC, $CaCO_3$, Mag.Sus. stable isotopes of C and N, pollen and diatom analyses and where possible by ^{14}C datings

The effect of the transgression contemporaneous with the decline of the summer insolation curve, destabilisation of the climax forest, the elm decline and increasing impact on nature of the human population led to a complete change in culture from the hunter gathere to a farming society.