



## Using $^{10}\text{Be}$ records to identify possible $^{14}\text{C}$ calibration uncertainties during the Holocene

Muscheler Raimund

Department of Earth and Ecosystem Sciences, Division of Geology, Lund University, Sölvegatan 12, SE-223 62 Lund, Sweden

The Intcal04 and Intcal09 radiocarbon calibration records are based on multiple tree-ring  $^{14}\text{C}$  data sets for Holocene period (Reimer et al. 2004, Reimer et al. 2009). While the dendrochronological dating of the trees is supposedly free of errors there are differences between various  $^{14}\text{C}$  data sets that underlie the  $^{14}\text{C}$  calibration curve. Due to lack of knowledge about the reasons for the differences the Intcal04/09 calibration curves provide a smoothed average of the underlying  $^{14}\text{C}$  records. Therefore, problems in one or several of the underlying  $^{14}\text{C}$  records would translate directly into errors in the  $^{14}\text{C}$  age calibration.

Additional knowledge about expected variations in the  $^{14}\text{C}$  production rate could help to improve the calibration record since it would allow us to assess how well the different  $^{14}\text{C}$  records represent the atmospheric  $^{14}\text{C}$  concentration.

I propose that  $^{10}\text{Be}$  records could be used as additional criteria to chose which of the published  $^{14}\text{C}$  records should be preferred (or given stronger weight) for the construction of the calibration curve. Alternatively,  $^{10}\text{Be}$  records could point to periods where  $^{14}\text{C}$  data should be re-measured in order to improve the calibration curve. I will show for some case studies that the  $^{10}\text{Be}$  records from the Greenland ice cores (Muscheler et al. 2004, Vonmoos et al. 2006) indeed provide useful information to scrutinise the Intcal04/09 calibration curve, which could help to improve the  $^{14}\text{C}$  calibration curve during the Holocene. Especially shorter-term changes are strongly damped in the Intcal04/09 calibration record. However,  $^{10}\text{Be}$  and some  $^{14}\text{C}$  records do exhibit more variability as compared to the calibration record. Therefore, the combined  $^{10}\text{Be}/^{14}\text{C}$  approach could add confidence that these should be reflected in the  $^{14}\text{C}$  calibration record.

### References:

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