



Variability of the organic C-isotope record across the Triassic-Jurassic boundary of the Danish and German basins

S. Lindström (1), B. van de Schootbrugge (2), K. Dybkjær (1), S. Richoz (3), C. Heunisch (4), L.H. Nielsen (1), and M. Erlström (5)

(1) Geocenter Denmark, Geological Survey of Denmark and Greenland, Copenhagen, Denmark (sli@geus.dk, sofie.lindstrom@geol.lu.se), (2) Institute of Geosciences, Goethe University Frankfurt, Altenhöferallee 1, D-60438, Frankfurt, Germany, (3) University of Vienna, Department of Paleontology, Althanstrasse 14, 1090 Vienna, Austria, (4) State Authority for Mining, Energy and Geology, Stilleweg 2, D-30655 Hannover, Germany, (5) Geological Survey of Sweden, Kiliansgatan 10, SE-223 50 Lund, Sweden

Marked by one of the five largest mass extinctions during the Phanerozoic, the Triassic-Jurassic boundary (T/J; 199.6 Ma) is associated with major perturbations in the carbon cycle recorded in stable carbon isotope records globally. Negative C-isotope excursions have been documented in whole-rock inorganic (carbonate) C-isotope records from Austria, Italy, Hungary and Slovakia, and also in oyster calcite from the UK. Bulk organic C-isotope records in many areas (e.g. UK, USA, Spain, Austria, and British Columbia) show two rapid negative excursions, the “initial” and “main” excursions, that bracket the boundary. The negative C-isotope excursions are generally attributed to the effects of outgassing of ^{12}C -enriched carbondioxide from the flood basalts of the Central Atlantic Magmatic Province (CAMP). However, when studied in detail organic C-isotope records from various areas show variability in magnitude and timing of individual excursions, and in e.g. Greenland, Hungary and Canada the recognition of two negative excursions is less clear.

Here we present new high resolution organic C-isotope and palynological data across the T/J boundary from a cored clastic succession (Stenlille) in the Danish Basin. In the Stenlille succession the organic C-isotope record is characterized by three negative excursions marked by shifts in the magnitude of $-2.0\text{\textperthousand}$ to $-3.5\text{\textperthousand}$. The oldest negative excursion is associated with the on-set of the late Rhaetian maximum flooding event that can be recognized throughout the Danish Basin and in many other areas in NW Europe. This is sharply succeeded by an interval with more positive, although widely fluctuating values. The start of the second negative excursion is marked by the first occurrence of *Cerebropollenites thiergartii*, a marker for the T/J boundary. This second negative excursion is also succeeded by a sharp shift to more positive albeit also more constant values. A marked change signals the on-set of the third negative excursion that appears as a prolonged interval in the Hettangian. The high resolution organic C-isotope and palynological data of the Stenlille succession can be correlated with other T/J boundary records from several localities within the Danish Basin, and from two cores in the German Basin (Mariental and Mingolsheim). As all these organic C-isotope records are accompanied by high resolution palynological data, the potential influence quantitative variations in carbon sources with different isotope composition may be evaluated. The Stenlille organic C-isotope record is further compared with published organic C-isotope records from T/J boundary sections at Kuhjoch in Austria and St Audries Bay in the UK.