

Astronomical calibration of the Boreal Santonian (Cretaceous) based on the marine carbon isotope record and correlation to the tropical realm

Nicolas Thibault (1), Ian Jarvis (2), Silke Voigt (3), Andy Gale (4), Kevin Attree (2), and Hugh Jenkyns (5)

(1) University of Copenhagen, Department of Geosciences and Natural Resource Management, Copenhagen, Denmark (nt@ign.ku.dk), (2) Department of Geography and Geology, School of Natural and Built Environments, Kingston University London, Penrhyn Road, Kingston upon Thames, Surrey KT1 2EE, UK, (3) Institute of Geosciences, Goethe-University of Frankfurt, Altenhöferallee 1, 60439 Frankfurt, Germany, (4) School of Earth and Environmental Sciences, University of Portsmouth, Burnaby Building, Burnaby Road Portsmouth PO1 3QL, UK, (5) Department of Earth Sciences, University of Oxford, South Parks Road, Oxford OX1 3AN, UK

New high-resolution records of bulk carbonate carbon isotopes have been generated for the Upper Coniacian to Lower Campanian interval of the reference sections at Seaford Head (southern England) and Bottaccione (Gubbio, central Italy). These records allow for a new and unambiguous stratigraphic correlation of the base and top of the Santonian between the Boreal and Tethyan realms. Orbital forcing of stable carbon and oxygen isotopes can be highlighted in the Seaford Head dataset, and a floating astronomical time scale is presented for the Santonian of the section, which spans five 405 kyr cycles (Sa1 to Sa5). Macro-, micro- and nannofossil biostratigraphy of the Seaford section is integrated along with magnetostratigraphy, carbon-isotope chemostratigraphy and cyclostratigraphy. Correlation of the Seaford Head astronomical time scale to that of the Niobrara Formation (U.S. Western Interior Basin) allows for anchoring these records to the La2011 astronomical solution at the Santonian–Campanian (Sa/Ca) boundary, which has been recently dated to 84.19 ± 0.38 Ma. Five different astronomical tuning options are examined. The astronomical calibration generates a c. 200 kyr mismatch of the Coniacian–Santonian boundary age between the Boreal Realm in Europe and the Western Interior, likely due either to slight diachronism of the first occurrence of the inoceramid *Cladoceras undulaticus* between the two regions, or to remaining uncertainties of radiometric dating and the cyclostratigraphic records.