

Interactive comment on “Stable isotope compositions of a late Jurassic ammonite shell: a record of seasonal surface water temperatures in the southern hemisphere?” by C. Lécuyer and H. Bucher

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General Points This paper examines an exceptionally preserved aragonitic ammonite in order to evaluate seasonal temperature variations of Mesozoic surface waters. Carbon and oxygen isotope data have been obtained from a Late Jurassic (Oxfordian) ammonite from Madagascar. This certainly an interesting approach that has the potential to offer seasonal temperature variation data, of importance and use in reconstructing Jurassic climates. In addition to minor points there are a number of other more specific points that need to be addressed.

Specific Points The carbon and oxygen isotope profiles show two distinct intervals of depleted carbon isotopes. These have been interpreted as influxes of meteoric water. Whilst this interpretation initially appears sound, for the 2nd event there appears to be less correspondence with the oxygen isotope profile - 4 data points appear to have been excluded - yet these are less depleted than some of the adjacent points. The carbon isotope values at the beginning of the profile are also very depleted yet the corresponding oxygen values are not excluded from the subsequent isotope profile.

If inferences regarding seasonality are to be made it is important to have some constraint upon time. For example observations on the growth rate of *Nautilus pompilius* indicate the formation of new septa in time intervals of about 2-4 months depending on maturity. Hence by counting septa or chambers the lifespan of a nautiloid can be estimated. Assuming that ammonite shells grow in a similar manner it may be possible to provide an estimate of the lifespan of the perisphinctid ammonite in question and duration of the isotope profile?

The comparison with the bivalve data is a useful one. However, again there are a number of points that need to be addressed. Is analysis of single specimens (both ammonite and bivalve) likely to produce a record that is likely to be representative of the local environmental/climate conditions? Although the *Astarte* bivalve shell is noted to be composed of low-Mg calcite are there any other data providing supporting evidence that is also well preserved - i.e. thin section or SEM data. It is noted that the shell was drilled at regular intervals over a linear distance of 8 cm from the umbo to the ventral edge, which corresponded to the maximum growth axis of the valve. Were any growth lines visible along this transect?

A spelling error is noted 26

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