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Climate of the Past Discussions

Interactive comment on "Potential imprint of Spörer and Maunder solar minima on coral skeleton carbon isotopes" *by* T. Ourbak et al.

Anonymous Referee #1

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The manuscript "Potential imprint of Spörer and Maunder solar minima on coral skeleton carbon isotopes" from Ourback, Malaizé and Corrège lies on the interpretation of d13C signal measured in coral skeleton. After a rapid review of the different factors which could potentially affect carbon isotopes, the authors propose the interpretation of d13C variability at different time scales. They conclude after spectral analysis that the so detected periodicities are essentially linked with solar irradiance leading to a change in the coral feeding mode.

Indeed, coral skeleton d13C is systematically measured but not used in term of climatic indicator. In the introduction, the reasons of examing carbon isotope signal coud be better argued. For example, the strong seasonality showed by d13C and used for chronology, which could be a reason, could be introduced as soon as this part of the

paper. Among the main factors influencing coral d13C, the nature of the carbon reservoir is never mentioned. However, we know now that seawater DIC and also metabolic carbon may be used for skeleton (see Furla et al, 2000). How the Suess effect, recognized during the XXth century could be recorded in the skeleton? The different influences affecting carbon ratio are listed with references which are approximative. The paper Reynaud-Vaganay et al (2001) does not deal with nutrition but light effect on stable isotopes. The discussion from Swart et al (1996) is not restricted to insolation effect. The relative effects of autotrophy and photosynthesis on d13C is not clearly exposed. Is there a competition? Or are they only opposed because one takes place of the other as feeding mode? At the end of the introduction, the aim of the manuscript for the authors appears to be the following: possible light effect could be recorded on longer time scale than seasons.

The effect of light on carbon isotope ratio is based on a six years record. Restrictions are made about the annual cycle, but the sentence(p1024 from line 24) is very confused and it is difficult to understand what it means. We conclude with the authors that d13C is a tracer of solar radiation. At this step, we could expect that the different time scales of the isotope variations would be supported by a spectral analysis but this is given after the presentation of the different variations. The trend showed during the XXth century is attributed to Suess effect without any explanation or discussion and the longer trend recorded before remains not explained. Is the trend over several centuries, justified only for one hundred years? I do not understand. In addition, the light amplitude experienced during a year is probably much higher than during several decades, but no relative quantification is given.

Concerning centennial events, the correlation between isotopic signal and solar activity is not based on solid arguments: is there really a correlation? What about the relative chronology of the two records? Why do they authors choose the light effect on d13C more than other reasons given in the introduction? The argument joining d13C and d18O distribution is not convincing. The relationship between solar activity and feeding

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mode is still ambigous. You give percentages related to Spörer and Maunder minima, with what? Over which time? The data given by the spectral analysis may be considered as the most robust arguments. However, it is stressed that, although the two cores d13C present some similar periodicities, the famous 11 year periodicity is visible on only one.

Volcanic events seem to have an impact on d13C. Why, in this case, the authors mention only solar effect? It seems to me that you suppose that the changes are too fast to modify coral metabolism. Are there metabolic proofs to support such an assumption?

I am not sure that the data from these cores are not simple and consistent enough to provide the proof of the d13C capability as an efficient environmental tracer. But, a more rigorous rewritting could improve the demonstration.

Furla P., I. Galgani, I. Durand and D. Allemand (2000), Sources and mechanisms of inorganic carbon transport for coral calcification and photosynthesis, J. Exp. Biol., 203, 3445-3457.

Interactive comment on Clim. Past Discuss., 3, 1021, 2007.