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Climate of the Past Discussions

Interactive comment on "The Aptian evaporites of the South Atlantic: a climatic paradox?" *by* A.-C. Chaboureau et al.

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General comments:

This manuscript by Chaboureau and coworkers deals with an extremely interesting aspect of Cretaceous palaeogeography which is the presence of evaporites at equatorial latitudes. Evaporites are not (in any significant volumes) present at these latitudes at present and, therefore, this requires some explanation. The authors address this problem from a climate modelling perspective. They conclude, based on their modelling results and on latitude-related changes in evaporite mineralogy, that evaporites in the northern South Atlantic region are of hydrothermal origin. Therefore, they are not related to climate, which, according to the results presented here, was humid in the northern South Atlantic.

I think this is an interesting manuscript dealing with an interesting problem that has not really been addressed before (as far as I know). My main criticism of the manuscript is a lack of more background information. In my opinion, the authors should include a figure (and perhaps a table) with a compilation of known evaporite deposits in the South Atlantic region for the time interval studied. Moreover, the authors could discuss the problematic of evaporites at equatorial latitudes a bit further, and include literature on vegetation at low latitudes during the Cretaceous (see, for a starting point, the paper by Beerling, 2000 and the paper by Spicer et al., 1993; as well as Chumakov et al., 1995 which the authors already refer to).

The P–E data which is modeled compares well with data for the present-day equatorial region, I think (the authors may correct me if I'm wrong). This raises the interesting question: why was vegetation xeromorphic in those regions (see Spicer et al., 1993)? In fact, the biomes used by the authors in the model (see Sewall et al., 2007) reflect this knowledge. Yet, climate appears to have been humid following the model results. This certainly warrants discussion.

What would happen to the modelling results if the Andes were higher? I cannot help but wonder.

Another interesting question can be raised by comparing the mineralogical distribution of evaporites given by the authors and the data presented in Paz et al. (2005). In their manuscript, Paz and coworkers document gypsum, anhydrite (locally) and black shales from NE Brazil. Based on their analyses, the authors determined that these are upper Aptian continental deposits. However, the studied region falls under the area in which the present model shows highest P–E values. This also warrants discussion (and therefore I suggest the authors include more detailed data on the evaporite deposits around the South Atlantic).

Other comments:

Page 128, ln 11: I think SO is SW?

Page 129, 3: How would varying orbital parameters affect the ITCZ position? See also page 132, ln 19 where you mention that climate would always be more humid to the north. Is that really so (if you vary orbital parameters)?

Page 130, ln 1: Evaporites.

Page 130, ln 17: Please be more specific than just adding the reference.

Page 132, ln 23: Rift flank?

Page 133, ln 1: How does this inferred reduction in relief compare to clastic deposition in the basin prior to salt?

A figure could be add showing topography and bathymetry.

In figure 3 the caption mentions TopoB. I think it should be TopoHigh.

I hope you find my review fair and my comments useful.

Yours sincerely,

João

References:

Beerling 2000 Geol Soc London Spec Publ 181: 17

Paz et al. 2005 Sedimentology 52: 1303

Spicer et al. 1993 Phyl Trans Royal Soc London B 341: 277

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