

# ***Interactive comment on “Earth as diode: monsoon source of the orbital $\sim$ 100 ka climate cycle” by R. Y. Anderson***

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Review of : Earth as diode, Anderson

## **1 Summary and overall impression**

The author discusses a varve record from the Mesozoic era. The record is fairly thoroughly discussed with description and interpretation of its petrological and geochemical characteristics. The discussion focuses on the varve thickness time-series. The spectrum contains evidence for power at 100, 23, 19, 9, 7 and 5.4 ka, which is, reasonably, interpreted as the consequence of climatic ‘rectifying mechanisms’ of the precession

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signal.

There is no question that the article contains valuable material for publication. The varve record is impressive; the author provides interesting considerations about rectifying mechanisms. He recalls that they may arise in the recording process; in the insolation measure itself (for example, the absolute maximum of equatorial insolation) or in the climate system itself, especially related to monsoon phenomena given an asymmetric distribution of the continents across the equator. Emphasis is here placed on the fact that the varve thickness record is thought to respond linearly to climate, hence only the two latter rectifying mechanisms are relevant, which makes it more interesting.

However, the manuscript suffers from important editorial weaknesses. It is genuinely hard to read. Part of it is due to the structure and part due to numerous inaccurate or imprecise sentences. My overall impression, from texts and graphics, is that the authors made an effort to be creative and visual but the best is the enemy of the good and unfortunately the result is fairly confusing.

## 1.1 structure

It must be made very clear from the beginning that we are speaking about the Mesozoic era. Therefore, the considerations about Croll (who was unaware of the 100-k cycle anyway) and glaciations are distracting. The historical background contains little historical considerations; Some of the material about insolation rectification present in the discussion should best be placed in the introduction as part of the state-of-the-art.

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## 1.2 inaccurate / obscure / ill-formed sentences

I listed : *'trade off for its great antiquity'*; *'... encounters the same obstacle in forcing that doomed James Croll's theory in that there are only minor differences in insolutions from Earth's eccentric orbit'* (which insolation ? how do you get a difference from an orbit ?) *'placed near the lower bound of dense, solid black values'* (in what sense is a value 'solid black'); *'was acquired from differences in insolation as the Sun moves over land, twice annually at equinox'* (which insolation; difference between what and what?); *'alignment of equinox, precession, and eccentricity'* (in what sense may equinox be aligned with precession? ; *'It is the similar lag [...] that confirm the ancient evaporite location close to the equator'* (can a lag confirm a location ?) , *'empowered during the solstice cycle'*, a *'virtual obligatory correlation'* etc. There are sufficient cases where I honestly could not understand what the author means to make reading tedious.

Also noted :  $\varepsilon \sin(\omega)$  is a sine wave : no, it is an amplitude and frequency modulated wave. The conventional symbol for eccentricity is  $e$  and not  $\varepsilon$ , the latter being reserved for obliquity.

## 1.3 weaknesses in the argumentation

1. I appreciate that the argumentation is mainly qualitative but at places it is a bit too disturbingly so. For exemple, when before section 4.1 : 'The result was a series structure that generally resembles the PI after being subjected to a nonlinear clipping function (compare with Fig. 2c)'. This resemblance is really subjective and arguable, especially that the X-axis scales are different.
2. one of the most interesting hypothesis formulated by the author is that different climatic phenomena may contribute to varve growth depending on the value of precession : high insolation in spring or autumn will contribute to varve growth by direct land heating ; high insolation in summer will act on the record through

a monsoon effect. This implies, if I got the message well, that the varve growth record is proxy for temperature at different seasons (spring, summer or autumn) depending on the value of the climate precession parameter. If this really is what is meant then this has to be expressed more directly and simply under section 6.2; otherwise I just failed to get the idea and this might also indicate some pedagogical deficit.

1.4 non-conventional graphic layout

missing X or Y axis; no clear labels...

1.5 description of the methodology

how are varves counted ? how is  $T_0$  determined ?

## 2 Recommendation

I recommend major revision of the present manuscript and would be happy to review it again.

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Interactive comment on Clim. Past Discuss., 6, 1421, 2010.

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