

Interactive comment on “Detecting human impacts on the flora, fauna, and summer monsoon of Pleistocene Australia” by G. H. Miller et al.

Anonymous Referee #2

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This is a substantial paper that attempts to integrate a number of related studies, each of which has demonstrated high significance through publication in quality journals such as Science and Geology. In addition to its significance, the paper is both novel and controversial. The application of dating and palaeoenvironmental techniques to fossil egg shells provides a remarkable history of the history of large flightless birds and their differential response to habitat change in central Australia. The paper also provides some of the best evidence for the timing and cause of megafaunal extinction on the continent in relation to the most substantial climate reconstruction for the region and also presents controversial evidence for habitat change resulting in sustained climate alteration. Consequently, it has lessons for present and immediate future predictions of anthropogenically- induced climate change and environmental responses.

The generalized sections of the paper (i.e. the abstract, introduction and summary and conclusions) are interesting in that they all start from a different perspective - Late Pleistocene megafaunal extinctions, isolation of the continent in the early Tertiary, and Holocene monsoon activity. This provides a broad understanding of aspects of Australian environments and biota but makes the focus of the paper rather difficult to determine. The abstract is probably comprehensive but not easy to follow for a reader unfamiliar with both the nature of the research and its location. It is uncertain why the central Australian records are of greatest importance and why two other study areas are mentioned when there are three shown on figure 1. I think the abstract could be shortened and simplified.

The guts of the paper, sections 2, 3, 4, and 5, focus on the major individual themes and these could be better integrated. It is clear that they are summaries from different papers which results in some apparently inadvertent, introductory overlap material. There is also a lack of discussion of evidence that does not appear to easily support this neat story.

The background pattern of climate change is set up from interpretation of the Lake Eyre record over the last glacial cycle. The influence of northern hemisphere precessional control resulting from connections with the East Asian monsoon is emphasized. However, this relationship is really only based on the Holocene part of the sequence: before this time dating is too uncertain to separate northern and southern hemisphere precessional, and perhaps obliquity influences. It is stated that Australia differs from Southern Africa and South America in having a northern rather than a southern monsoon influence but no references are provided in support of this assertion. I don't think that the patterns are so clear cut in any of these areas. In fact, North Atlantic forcing is probably dominant in the southern hemisphere regardless of the influence of the monsoon. It is stated that there must have been a change in boundary conditions after 60 ka as a lead in to the next section (large scale changes in Australia after 60 ka) yet the potential impact of a big change in amplitude of precessional variation (whether this is

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driven from the north or south) from the last interglacial to the Holocene is ignored.

Perhaps the most controversial component of the paper is the proposal that it was alteration of the plant landscape that led to a reduction in monsoon activity. There is no mention of a similar alteration in vegetation in northwestern Australia around the same time (van der Kaars and De Deckker, 2002, Review of Palaeobot. and Palynol. 120:17-39) that has nothing to do with monsoon penetration into the interior. Nor is the recent paper in Quaternary Science Reviews by Pitman and Hesse that fails to support the hypothesis through modeling mentioned.

There are a number of minor features that need to be addressed.

Throughout. I should have thought genus names *Dromaius* and *Genyornis* should be italicized - after all they are capitalized.

Throughout. Are there formal subdivisions within the Quaternary? i.e. Late or late Quaternary etc.

Introduction, line 5. I am unsure how necessary or relevant it is to go back to the early Tertiary, but if it is, shouldn't the sweeping statements be referenced?

Page 540, line 7. omit 'a'

Line 9. Why millennial rather than orbital?

Page 541, line 1. Not quite sure why we now need to know that *Genyornis* is ostrich sized. Perhaps note should be taken of what has been written earlier including the abstract.

Page 541, line 24. As above, only with emu

Page 543, line 26. Omit 'ranging'

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