

## ***Interactive comment on “The PRISM4 (mid-Piacenzian) palaeoenvironmental reconstruction” by Harry Dowsett et al.***

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We appreciate the comments and suggestions made by this reviewer.

We feel the reviewer’s comments suggest the PRISM4 reconstruction only as boundary condition data for paleoclimate models. We explicitly state “These reconstructions serve two purposes: to assemble the best information possible to provide a conceptual model of the Piacenzian palaeoenvironment, and to provide the data as quantitative, gridded arrays to the palaeoclimate modeling community for global climate model simulations.” Our responses to the reviewers numbered comments are made with the understanding that PRISM4 is not simply a data set for PlioMIP2.

1. We respectfully disagree with this comment. The PRISM interval has always been within the Piacenzian Stage. However, our decision is necessary in order to correctly

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address the new “official” stratigraphy of the Pliocene (enacted by the International Commission on Stratigraphy), which moved the Piacenzian from the mid to the late Pliocene. This decision made the former division into an early (Zanclean), mid- (Piacenzian) and late (Gelasian) Pliocene obsolete. Calling the Piacenzian still “mid-Pliocene” is not only even more confusing, it is also scientifically incorrect.

2. We thank the reviewer for this comment on map projections. We agree that our choice of map projections obfuscates the information we are trying to display. We will add map views and projections that make it easier to discern changes made to the North Pacific, Greenland and the Canadian Arctic.

3. As the reviewer suggests, a more appropriate heading for section 3.4 is “Sea Surface Temperature and Sea-Ice.” We have changed this in the manuscript and will add information on sea-ice. We will explicitly state, as we did for previous PRISM reconstructions, that PRISM displays sea ice as SST =  $-1.8^{\circ}\text{C}$ . This is easier to see in the PRISM3 monthly SST reconstruction. We can provide the sea ice limits as a dashed contour and place these PRISM3 monthly SST maps in the supplement.

4. We agree with reviewer#2 that the terrestrial temperature and precipitation estimates and anomalies are “certainly interesting parameters”. The PRISM4 Biome reconstruction (Figures 3 and 6a) is based on 208 palaeobotanical sites and has been updated from Salzmann et al. (2008, 2013) and Dowsett et al.(2010). Surface temperature and precipitation anomalies have been derived from literature, from multi-proxy temperature reconstructions or by applying the Coexistence Approach (Mosbrugger and Utescher,1997). All numerical climate estimates including a discussion on relative confidence for each locality and uncertainties can be accessed in Salzmann et al (2008 and 2013). As previously stated this manuscript focusses on the PRISM4 reconstruction and not on climate modelling or data-model comparison. We therefore prefer to keep our paper focused and not include already published data and discussion. However, in order to address reviewer#2’ concerns, we reworded this section to make clearer where climate estimates and anomalies can be accessed.

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5. We originally included the albedo values for the different soil types used in PRISM4 but decided to remove them since they were provided in Pound et al. (2014). We agree that different modeling groups might assign different values, but this is an issue for PlioMIP2 and not the PRISM4 reconstruction. We note the albedo values are also provided in the PlioMIP2 experimental design paper included in this theme issue, but we will add the albedos to the supplement for completeness.

6. We are not sure how to respond to the reviewer comment about “being sure these changes are not artificial.” The steps used to create our palaeogeography are clearly stated and shown in the figures. The method is reproducible. Whether every change, in any PRISM data set, is representative of the actual mid-Piacenzian state, is impossible to ascertain. PRISM is a conceptual model of mid-Piacenzian conditions. It is undoubtedly incorrect in many places and over the years has been modified when new and better data became available. At present, we feel the new PRISM4 palaeogeography is a major improvement over that used in previous PRISM reconstructions. It is consistent with the limited data available for palaeotopography, and is a useful working hypothesis for mid-Piacenzian conditions.

7. We thank the reviewer for this comment and agree that it would be beneficial to include a figure showing at least one site with high resolution data. We will include a figure and some discussion of the variability in our revision.

8. The PRISM4 reconstruction uses the PRISM3 SST fields, unchanged. As a conceptual model the difference in coastline between PRISM3 and PRISM4 is negligible. We can extend the mean annual SST field in the figure so that it matches the PRISM4 coastline, but we cannot make changes to the existing PRISM3 data. If the reviewer is thinking in terms of PlioMIP2, those experiments do not use SST as a boundary condition and, it is never appropriate to use the highly interpolated and extrapolated SST fields for data model comparison (though that has unfortunately been done by those unfamiliar with the data).

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9. We appreciate the comment on the quality of Figure 6 and the size of Figure 4. All figures will be revised based upon both reviewers comments.

The typing errors noted on pages 3 and 11 will be changed as suggested.

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