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Late Miocene onset of the Amazon River and the Amazon deep-sea fan: Evidence from the Foz do Amazonas Basin: Reply

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K. Campbell (2010) questions our data presented in Figueiredo et al., (2009) and proposes a late Pliocene (ca. 2.5 Ma) origin for the Amazon River. Here, we provide some clarifications and show that a late Miocene origin of the Amazon River is underpinned by a very robust data set. Firstly, Campbell comments that the absolute ages of the base and top of biozone NN9 differ from Lourens et al. (2004). The presented biostratigraphic zonation is based on information from Petrobras’ data bank, and this in-house nannofossil biozonation scheme is somewhat different from the International zonation. Based on Lourens et al. (2004) and Raffi et al. (2006), the absolute age of Amazon River onset changes to 10.5 Ma, far from the 2.5 Ma proposed by Campbell’s model.

Secondly, the Purus Arch originated as a NNW-SSE-trending graben, and inverted to a high during the Proterozoic (Brito Neves, 2002). Throughout the Phanerozoic, this structural feature alternately separated—or connected—the Solimões (western Amazonia) and Amazonas basins (eastern Amazonia) (Cunha et al., 2007; Wanderley Filho et al., 2007). The Solimões Formation—of Miocene age (Hoorn, 1993, and references therein)—is restricted to western Amazonia, therefore a reactivation of the Purus Arch must have happened during this time. Causal mechanism for this reactivation is ascribed to the Quechuá I tectonic event which is coincident in age with deposition of the Solimões Formation (Noble et al., 1990, and references therein).

Thirdly, Campbell wrongly cites Lourens et al. (2004) who did not say “… sea level had reached nearly modern levels by the beginning of NN9” as stated in Campbell’s Comment. Instead they said “Sea level gradually started to fall after 15 Ma, culminating in a dramatic drop around 10.5 Ma…” (p. 425), an age that coincides with the base of the biozone NN9 (Lourens et al., 2004; Raffi et al., 2006), and therefore supports our interpretation since it reflects a higher contribution from younger cratonic sources located in the westernmost Amazonia. In spite of this, we do thank Campbell for pointing out that the label of the axes in our Appendix 5b were inverted. The corrected version of Appendix 5 has been posted online.

In conclusion, all data we presented support our hypothesis for a late Miocene onset of the transcontinental Amazon River, and show that Campbell’s model for the late Pliocene initiation of the Amazon River is flawed.

REFERENCES CITED


