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Revising climate dynamics during the Panama Isthmus closing: a multiproxy approach

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This study reconstructs the climatic conditions at both sides of the Isthmus of Panama during its closing time (10-4 Ma). We use molecular proxy records from the Pliocene down to the late Miocene to better understand the early effects of the closing on regional and global climate and ocean circulation1.
We measured lipid biomarkers for terrestrial riverine and eolian transport as well as marine production and temperature. Abundance of biomarkers is in general lower in the Pacific than in the Caribbean in agreement with other studies in the area. An increase in terrestrial riverine input is observed from 7.2 Ma at both sides but it then decreases in the Pacific while it remains high in the Caribbean probably related to increased precipitation and runoff2. Additionally, eolian n-alkane transport seems to be influenced by changes in trade wind intensity. In the Pacific, we see a clear shift between more humid conditions before 6 Ma and drier after while the Caribbean displays only little variation and our data indicate an overall drier regime. This could be related to shifts in the source region of the material and/or the drift of the Pacific core away from the equator3.
The two cores show an overall temperature decrease consistent with global climatic patterns between 8 and 4 million years. Both UK'37 and TEX86H show similar temperature ranges with an average 28°C which is in agreement with other temperature reconstructions. However, our SST data suggest a slightly warmer Caribbean. Unlike other studies in the tropical pacific3, we do not observe a marked difference between surface and subsurface temperature. This may be because either temperatures were very similar in the first 0-200m of the water column, the difference has been diluted by the error associated to both proxies and/or analytical differences between measuring laboratories. We see three main contrasting periods one from 4-4.5 Ma after a major closing event and coinciding with the establishment of the ocean current system in both sides. The second between 4.8-5.5 Ma which is concurrent to the Messinian salinity crisis. Finally, the third is between 7 and 8 Ma overlapping with one of the uplift pulses of Los Andes and the period when the Isthmus is supposed to have reopened1.

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2. Bickert et al. (2004). Paleoceanography, 19(1), 1-11.
3. Seki, O. et al. (2012). Paleoceanography and Paleoclimatology, 27(3), 1-14.