



HAL
open science

Holocene hydrological changes in the Eastern Equatorial Pacific

Guillaume Leduc, Laurence Vidal, Tachikawa Kazuyo, Corinne Sonzogni, Marta Garcia Molina, Frauke Rostek, Yoann Fagault, Edouard Bard, Jérémy Jacob, Luc L Beaufort, et al.

► **To cite this version:**

Guillaume Leduc, Laurence Vidal, Tachikawa Kazuyo, Corinne Sonzogni, Marta Garcia Molina, et al.. Holocene hydrological changes in the Eastern Equatorial Pacific. PAGES OSM Meeting, May 2017, Zaragoza, Spain. hal-03550942

HAL Id: hal-03550942

<https://amu.hal.science/hal-03550942>

Submitted on 1 Feb 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

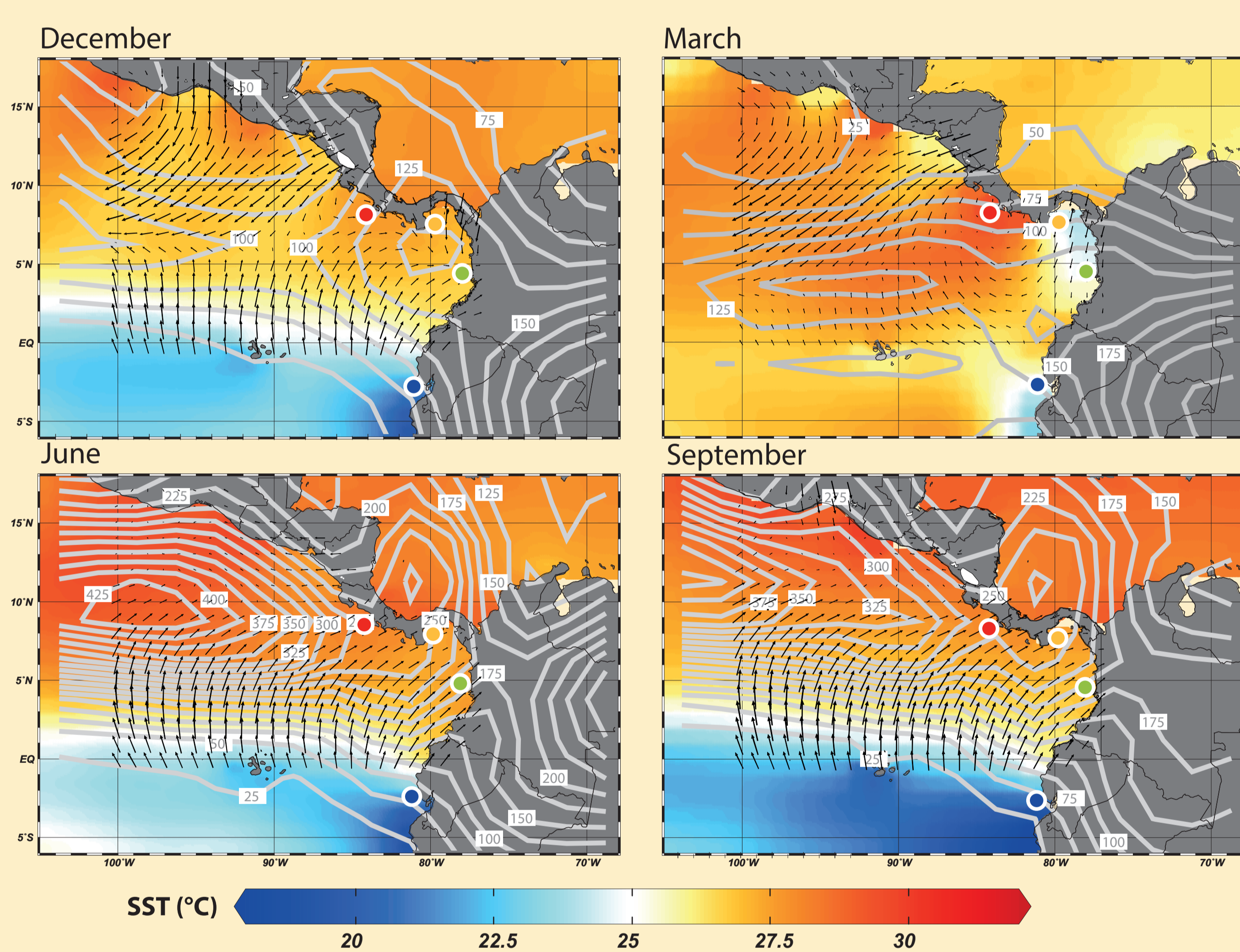
Holocene hydrological changes in the Eastern Equatorial Pacific

Guillaume Leduc¹, Laurence Vidal¹, Kazuyo Tachikawa¹, Corinne Sonzogni¹, Marta Garcia¹, Frauke Rostek¹, Yoann Fagault¹,
Edouard Bard¹, Jérémy Jacob², Luc Beaufort¹, Claire Waelbroeck³, Ralph Schneider⁴

1: CEREGE, Aix-en-Provence, France
2: ISTO - Université d'Orléans, France
3: LSCE, Gif-sur-Yvette, France
4: Christian-Albrechts University, Kiel, Germany

Abstract - The Eastern Equatorial Pacific region is marked by extreme latitudinal gradients in sea surface temperature and precipitation regimes, varying from the hyperhumid warm pool region North of Panama Basin to the hyperarid coast of southern Ecuador and northern Peru. In between those two regions lies a fresh pool, with the lowest mean and strongest seasonal cycle of sea surface salinity. The fresh pool building and erosion at the seasonal and interannual timescales are associated with changes in atmospheric circulation that cannot be easily tracked back in time. Yet, major changes in the central American monsoon intensity and in the El Niño/Southern Oscillation occurred during the Holocene, but it is still unclear if both climate phenomena have varied independently or if they were intrinsically tied to each other. We will present preliminary results of a multiproxy study performed on a latitudinal transect of marine sediment cores to track changes in riverine runoff and hydrological parameters such as sea surface temperature and salinity during the Holocene. Those results will allow refining how the fresh pool dynamically responds to regional ocean-atmosphere-land interactions under natural climate variability.

Regional climatology - The Eastern Equatorial Pacific region is characterized, at the seasonal timescale, by a strong link between SST, local wind patterns and precipitation intensity, all of which varying in synchrony with changes in the strength of the equatorial front



Colours: Sea Surface Temperatures (WOA 2013)
Arrows: wind fields (COADS)
Grey Lines: isohyets (NCAR Reanalysis, mm/month)
MD02-2529: Leduc et al., 2007; Leduc et al., 2009, unpublished
MD02-2531: unpublished
KN176-2 JPC32: Pahnke et al., 2007
M772-069: unpublished

Main challenges:

- Different proxy carriers (alkenones and foraminifer) may not sample the same season and/or water depth
- Land-ocean interactions could obscure marine and terrigenous-derived hydroclimate
- Contrasting local signals indicate that the regional paleohydrological patterns are more complex than previously thought

Next steps (coming soon):

- Obtain better age models on the sedimentary sequences
- Measure (increase resolution) on selected cores (oxygen and hydrogen isotopes)

References:

Leduc G., Vidal L., Tachikawa K., Rostek F., Sonzogni C., Beaufort L., Bard E. Moisture transport across Central America as a positive feedback on abrupt climatic changes. *Nature*, 445, 908-911, 2007.
Leduc G., Vidal L., Tachikawa K., Bard E. ITCZ rather than ENSO signature for abrupt climate changes across the tropical Pacific? *Quaternary Research*, 72, 123-131, 2009.
Pahnke, K., J.P. Sachs, L.D. Keigwin, A. Timmermann, S.-P. Xie. Eastern tropical Pacific hydrologic changes during the past 27,000 years from D/H ratios in alkenones. *Paleoceanography* Vol. 22, PA4214, doi:10.1029/2007PA001468, 2007.
Rincón-Martínez D., Lamy F., S. Contreras, Leduc G., Bard E., Saukel C., Blanz T., Mackensen A., Tiedemann R. More humid interglacials in Ecuador during the past 500 kyr linked to latitudinal shifts of the equatorial front and the Intertropical Convergence Zone in the eastern tropical Pacific. *Paleoceanography*, 25, PA2210, doi:10.1029/2009PA001868, 2010.

Regional paleohydrology - preliminary results

