

To the Editor of *Nature Climate Change*,

on 06/14/2011

We, Claire Péri­gaud ([MoonClimate,LLC](#). USA), Gregory Dubos (PhD, [GeorgiaTech](#), USA), Serena Illig ([IRD](#), FRA), Joseph Dureau ([London School of Economics](#), UK), and Christophe Cassou ([CNRS](#), FRA), send you this cover letter for the manuscript entitled “Earth-Moon-Sun alignments influencing tropical climate events” that we wish to submit for publication as an Article in *Nature Climate Change*.

This manuscript aligns well with the aims and scope of *Nature Climate Change* as it encourages readers to question some essential assumptions traditionally made in **ocean climate modeling and satellite data processing** to monitor the variations of sea level and “Ocean Vector Winds” (OVWs). In addition, our manuscript is the first paper to demonstrate with current datasets and climate proxies that the Moon actually plays a role in El Niño events. We thus believe that publishing these new findings to reach out to the growing community of readers concerned with the on-going climate evolution is likely to trigger a series of important debates and correspondences that would be best fostered by *Nature Climate Change*. Building on 30 years of climate research experience with satellite datasets providing sea level, precipitations, and OVWs used in ocean/atmosphere/land models of the tropics, this article provides answers to the following questions:

- What is the source of biweekly ocean-atmosphere coupled system instabilities in the three tropical oceans and in the atmosphere?
- Why do coral reef records since 1850 lead to conclusions on the role of solar activity in El Niño that do not agree with how solar forced climate models simulate symmetric recharge of tropical warm events from the North and South?

1) The first question follows a long series of controversies between oceanic and atmospheric communities on the genesis of Tropical Instability Waves (TIW). We find that both fluids receive **mid-latitude energy increase every 14.7 days from lunar and solar gravitational attractions of the Earth**. The biggest challenge that we faced to ensure the validity of this finding came from **the common widespread habit of saving climate signals once per day, which contaminates datasets and model outputs that have lunar tidal content into the 14.7 day aliased period**. This issue got resolved when we found that the main energy source is not semi-diurnal, but diurnal.

2) The biweekly mechanism now allows to solve the inconsistency between Sea Surface Temperature (SSTs) well explained by the symmetric recharge of warm events from the subtropics (Ref 20), and the intriguing results recorded by coral reefs (Ref 21): **every 18.6 years the Moon weakens the 14.7 day inter-hemispheric luni-solar forcing of cold and salty subsurface waters (mass centred in the South) between continents up to the surface**. Our manuscript is at the core of the research we conduct to detect remaining uncertainties in satellite datasets that may matter for climate monitoring/modeling. We do so by extracting information from satellites on OVW and rain activity to compensate for the lack of ocean climate

model skill in reproducing the observed weather. We had to replace the model OVW climatology with atmospheric products, because the “satellite OVWs” used as if they were atmospheric winds yield unrealistic sea level variations. We have reported this satellite OVW inconsistency with model sea level to the weather and climate science teams responsible for satellite and atmospheric OVW products (Refs 17, 18), then consulted experts for tides and orbits and proposed solutions (Ref 51). We have now reached certainty that **the biweekly ocean-atmosphere instabilities are triggered by the Earth-Moon-Sun alignments that facilitate the cross-equatorial and vertical fluid circulations. We continue finding possible improvements for climate modelling/monitoring from satellites**, and invite the reader to discuss alternatives to traditional assumptions in weather, climate and tidal modelling.

Our manuscript meets the technical criteria required by *Nature Climate Change*. The main document regroups the abstract and main text, the reference list and the four figure captions. The file for Supplementary Material contains a list of Data_Acronyms, Discussions_Models, Discussions_Gravi, and four Supplementary_Figures. The reader interested by the Supplementary Figures only needs not spend time with the *_Models* nor *_Gravi* sections to understand the main paper. The online Material is provided herein to encourage readers to further explore the issues addressed in the paper.

Should you require further information about this submission, please do not hesitate to contact the corresponding author. Thank you very much for considering our manuscript.

Sincerely yours,

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