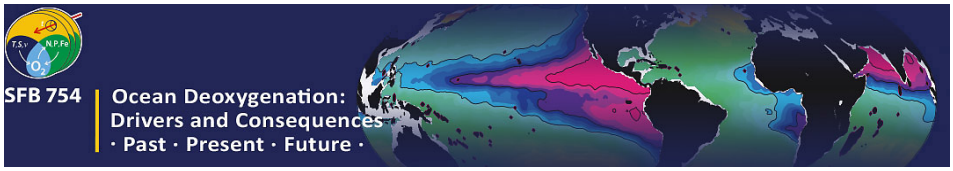

Contribution ID : **39** Type : **Oral**

Volcanic Impacts on Air-sea Oxygen Exchange: Insights From the Large Ensemble Experiment

Monday, 3 September 2018 15:30 (15)

Volcanic eruptions are expected to have a major influence on ocean physics and biogeochemistry. The magnitude, spatial patterns, and mechanisms of volcanic impacts on the oceans, however, remain poorly understood due to the confounding effects of internal variability and limited observations. Here, the oceanic response to recent major tropical eruptions is evaluated in the Large Ensemble experiments of the fully coupled Earth system models of CESM and GFDL, focusing on air-sea heat, oxygen and carbon exchanges. Substantial and spatially complex ocean heat loss and oxygen and carbon uptake immediately follow the Agung, El Chichon and Pinatubo eruptions. These volcanic signals are relatively consistent across eruptions and models, and are in general agreement with available observations. The oceanic response to tropical eruptions is characterized by intense surface cooling over the subtropics and northern high latitudes, but is also accompanied by El Niño-like surface warming in the eastern and central tropical Pacific initiated by climatological upwelling of warm subsurface anomalies in the east. These El Niño-like changes in the source and intensity of equatorial upwelling lead to anomalous outgassing of O2, but are largely counteracted by intensified ventilation at higher latitudes that drive the global oceanic uptake of O2. Volcanic eruptions thus induce a complex biogeochemical ocean response that is highly relevant to the attribution of recently observed O2 trends in the ocean and their prediction, and may serve as a powerful analog for the unintended consequences of geoengineering in the ocean.

Position

Postdoc

Affiliation

Scripps Institution of Oceanography

Email Address

yeddebba@ucsd.edu

Are you a SFB 754 / Future Ocean member?

No

Primary author(s) : Dr EDDEBBAR, Yassir (Scripps Institution of Oceanography)

Co-author(s) : Dr RODGERS, Keith (Princeton); Dr LONG, Matt (NCAR); Dr KEELING, Ralph (Scripps Institution of Oceanography)

Presenter(s) : Dr EDDEBBAR, Yassir (Scripps Institution of Oceanography)

Session Classification : 01 Prediction and Monitoring

Track Classification : 01 Prediction and Monitoring