Natalie J. Burls, PhD

Assistant Professor, Department of Atmospheric, Oceanic and Earth Sciences
Research Scientist, Center for Ocean-Land-Atmosphere Studies

Education

PhD, Physical Oceanography, University of Cape Town

Key Interests

Climate Dynamics | Coupled Ocean-Atmosphere Interaction | Climate Variability | Seasonal and Decadal Climate Modeling | Paleoclimatology | Climate Change

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SELECT PUBLICATIONS

- N. J. Burls & A. V. Fedorov. Wetter subtropics in a warmer world: contrasting past and future hydrological cycles. *Proceedings of the National Academy of Sciences* 114(49), 12888-12893 (2017).
- N. J. Burls *et al.*, The Cape Town "Day Zero" drought and Hadley cell expansion. *npj Climate and Atmospheric Science* 2 (1) 27 (2019).
- N. J. Burls *et al.*, Active Pacific Meridional Overturning Circulation (PMOC) during the warm Pliocene. *Science Advances* 3 (2017).
- N. J. Burls *et al.*, Extra-tropical origin of equatorial Pacific cold bias in climate models with links to cloud albedo. *Climate Dynamics* 49(5-6), 2093-2113 (2017).

Research Focus

My research is focused on improving our understanding of the key processes determining Earth's climate and climate variability on a variety of timescales ranging from seasonal, to decadal, to much longer geological scales. In particular, I am interested in the climatic role of ocean general circulation, ocean-atmosphere interactions and cloud dynamics. My research efforts acknowledge that, to fully understand, model and predict changes in climate characteristics that have a large impact on society (especially temperature and precipitation patterns), a fully coupled ocean-atmosphere perspective is needed one that accounts for changes in important variables such as the thermal structure of the slowly-adjusting ocean. Complementing observations with theory, I endeavor to accompany complex simulations of climate phenomena with simple models capturing the essential dynamics required to explain unanswered questions within climate science.

Current Projects

- Understanding cloud feedback and natural aerosol fingerprints to interpret past warm climate forcing and constrain tropical climate sensitivity
- Examining the links between Atlantic Meridional Overturning Circulation and Atlantic Multidecadal Variability
- The effect of variations in cloud versus CO_2 radiative rorcing on tropical SST gradients, atmospheric circulation, and rainfall patterns
- Characterizing and simulating ocean meridional overturning circulation during the warm Pliocene