



# PHYSICS AND ASTRONOMY COLLOQUIUM

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### “Modification of Sea Surface Temperature by Vertical Mixing in the Equatorial Cold Tongues”

#### Abstract

Cool sea surface temperatures (SSTs) in the eastern equatorial Atlantic and Pacific Oceans define the equatorial cold tongues. These are vast tracts of net heat uptake from the atmosphere. As such, the cold tongues are likely critical to global heat balances. While they are continually heated from above, solar heating exceeding net losses throughout the year, they exhibit a strong annual signal in SST, similar to what is observed at higher latitudes that are clearly governed by annual changes in net atmospheric heating.

The cold tongues are also regions of strong near-surface currents, a westward wind-driven surface current overlying an eastward pressure gradient-driven undercurrent. This combination yields a stratified shear flow that is marginally unstable with resultant intense turbulence and mixing. It is also unsteady and influenced by equatorially-trapped waves. Prior to a couple of years ago, our understanding of vertical mixing processes in the cold tongues has been limited to a few, limited shipboard experiments that have shown tremendous variations in turbulence levels and hence, heat exchanges with the atmosphere. Such large variability from limited measurement indicates that the variability has been crudely sampled.

Our attempt to resolve the mixing variability problem has led to the development of a means of extending turbulence measurements beyond a short shipboard experiment. Deployed on existing long-term oceanographic moorings at the equator since 2005,  $\chi$  pods are beginning to yield time series that show a more complete depiction of cold tongue mixing.

Wednesday, January 7, 2015

3:30 p.m.

Bob Wright Centre

Room A104