

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Axially asymmetric rotating tank experiments for thermally forced stationary waves in geophysical fluids HUEI-PING HUANG, Arizona State University, JULIAN HUNT, University College London, ASHISH SHARMA, LOUIS TSE, Arizona State University, HARINDRA FERNANDO, University of Notre Dame, ANDREY GUNAWAN, PATRICK PHELAN, ARTHUR MADRID, MICHAEL THOMPSON, Arizona State University — Fluid dynamical experiments using a rotating tank with an imposed radial temperature gradient provide classical examples of the realization of large-scale atmospheric circulation in a laboratory setting. The last decade has seen a revival of such experiments for research and education. Classical rotating tank experiments have adopted axially symmetric boundary conditions to maintain a zonally uniform “pole-to-equator” temperature gradient. Symmetry breaking arises from internal dynamics of baroclinic instability. A notable exception is the class of experiments for topographic effects, in which an isolated obstacle is added to the bottom boundary. This study explores a new type of experiments that are axially asymmetric due to an imposed, zonally non-uniform, temperature in the lateral boundary. This mimics the contrast of warm pool versus cold tongue in the tropical Pacific Ocean. The experiments produced thermally forced quasi-stationary waves with their wavelength comparable to the scale of the localized thermal boundary forcing. The applications of this new type of experiments to understanding Earth’s climate will be discussed.

Huei-Ping Huang
Arizona State University

Date submitted: 01 Aug 2011

Electronic form version 1.4