Abstract
Characteristics of fresh water lenses in the equatorial Indian Ocean

The equatorial Indian Ocean is marked by strong insolation, generally weak winds and intermittent precipitation caused by atmospheric convection. Heavy downpours form cool, fresh lenses at the surface of an otherwise warm and salty upper ocean layer. We are investigating the thermohaline, turbulence and kinematic properties of twenty freshwater lenses observed over a 34 day period in October-November 2011. Bow measurements of temperature, salinity and density allow for a descriptive analysis of these puddles in TS-space and their sharpness. Sequences of X-band radar images provide a kinematic description of the spreading of the lenses and suggest that some propagating fronts resemble buoyant gravity currents, with the presence of a highly turbulent "head" and convergence at the front.

A lens on 19 October 2011 between 0900-1700 exemplifies many of the characteristics common in the observed freshwater lenses. This lens was 31 km long and 5 m deep on average. The temperature (salinity) anomaly and gradient are about 0.3 °C and 0.2 °C m^{-1} (0.2 psu and 0.06 psu m^{-1}). This rain patch propagated at a speed of 0.51 m s^{-1} with a turbulent head down to 18 m, embedded in a 0.78 m s^{-1} eastward current.
Assuming a lens shape of an inverted oblique cone with diameter inferred from the duration of the observed salinity anomaly, and depth approximated from an isotherm, we estimate the volume of the lens. From this volume, a freshwater volume of 5.3e6 m^3 is estimated to create the observed salinity anomaly within the rain patch.