Multidecadal Weakening of Indian Summer Monsoon Circulation Induces an Increasing Northern Indian Ocean Sea Level

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North Indian Ocean sea level has shown significant increase during last 3-4 decades. Analyses of long term climate datasets and ocean model sensitivity experiments identify a mechanism for multi-decadal sea level variability relative to the global mean. Our results indicate that north Indian Ocean sea level rise is accompanied by a weakening summer monsoon circulation. Given that Indian Ocean meridional heat transport is primarily regulated by the annual cycle of monsoon winds, weakening of summer monsoon circulation has resulted in reduced upwelling off Arabia and Somalia and decreased southward heat-transport, and corresponding increase of heat storage in the north Indian Ocean. These changes in-turn lead to an increased thermosteric sea level rise given the increased retention of heat in the north Indian Ocean. These findings imply that rising north Indian Ocean sea level due to weakening of monsoon circulation demand adaptive strategies to enable a resilient South Asian population.