

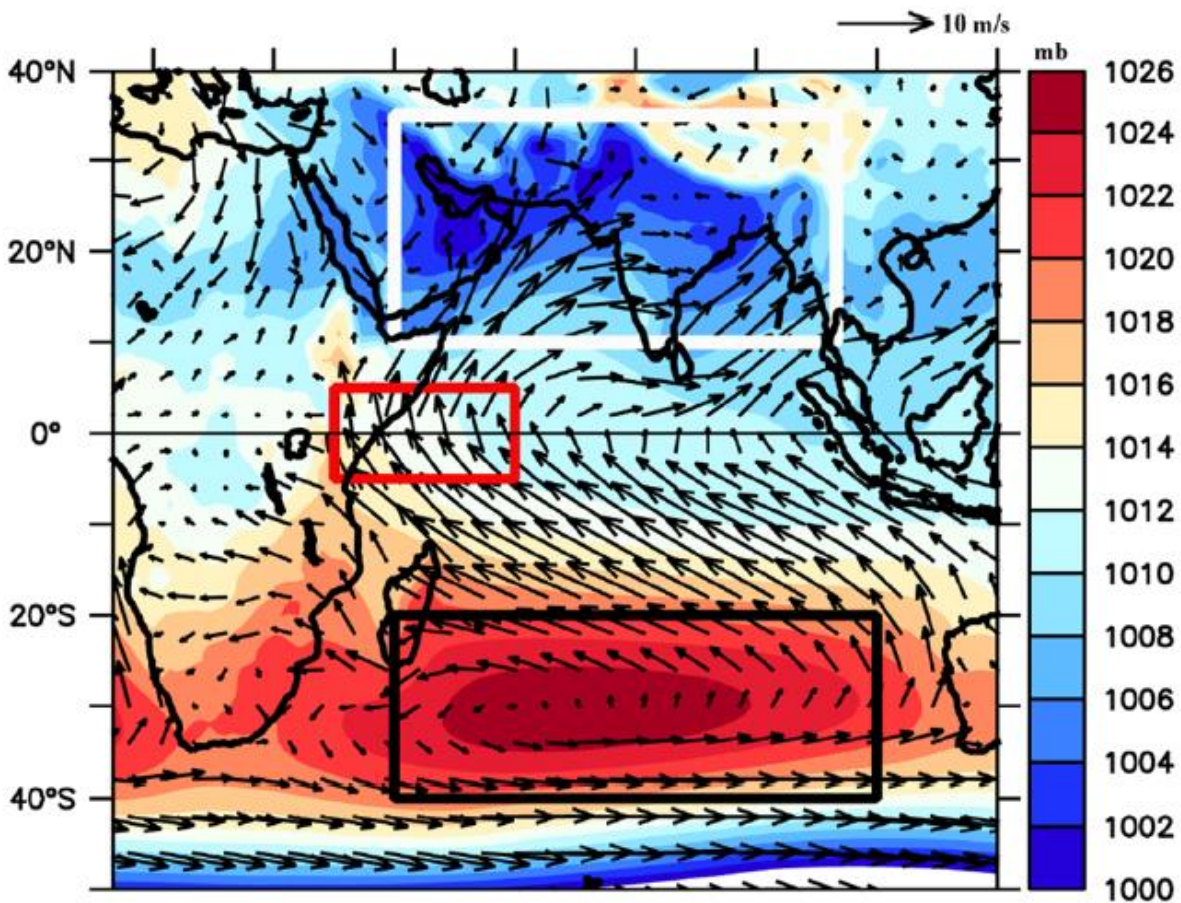
Weakening of the Mascarene High due to Global Warming Hiatus and its Impact on Arabian Sea ecosystems

New Delhi, September 16 (Vigyan Samachar): Agricultural sector plays a key role in economy of India and other developing countries. The southwest monsoon from June to September determines the state of agriculture which includes forestry, hunting, and fishing, as well the cultivation of crops and livestock production in nearly 25 countries and its influence stretches across a distance of 18,000 kilometres (from east to west) and 6,000 kilometres (from south to north).

The southwest monsoon derives its name from winds that blow from a southwesterly direction in the Indian subcontinent. We often read about “cross-equatorial winds” in various news reports or weather forecasts. However, rarely do we think about the "source" of these winds. These come from a Mascarene High (MH), located more than 4,000 kilometres from India. The Mascarene Islands is a group of islands in the Indian Ocean east of Madagascar. It is also called the Indian Ocean subtropical high, is a high-pressure area located between 20°S latitude-35°S latitude and 40°E latitude-90°E latitude near the Mascarene Islands in the Southern Indian Ocean (SIO). The southwest monsoon, the strongest component of the Indian subcontinent monsoon contributes about more than 80% of the annual rainfall in East Asia. It provides the principal water supply for more than a billion people.

Global warming triggers new climate patterns across the world in many ways. Now, a new study on variability in the Mascarene High (MH) during global warming hiatus (GWH) led by National Centre for Polar and Ocean Research (NCPOR) revealed that the MH region experienced significantly increased sea surface temperature (SST) due to global warming during this period. This warming in SST resulted in decreasing of the pressure gradient between the MH and the Indian landmass, which in turn suppressing the intensity of low-level cross-equatorial winds over the western Indian Ocean affecting the onset of the monsoon over the India subcontinent and rainfall over the East Asia. These are alarming findings for a country whose food production and economy depend heavily on monsoon rainfall.

As per NCPOR scientist, the weakening of the MH in the Southern Indian Ocean during GWH may affect the strength of the upwelling along the coast of Somalia and Oman and thus influence the Arabian Sea ecosystem. During the study it was found that increased sea level and heat content in the MH region during the GWH (1998-2016) suppressed the intensity of low-level cross-equatorial winds inducing strong upwelling along the coast of Somalia and Oman, which made the region highly productive by supplying nutrient to the upper surface layers.



The anticyclonic circulation in the MH and its associated cross-equatorial winds in the western Indian Ocean, transport moisture from the Southern Indian Ocean to South Asia, establishing a relationship between the Mascarene High (MH) and the Indian monsoon trough. This, in turn, affects the onset of the monsoon over the Indian subcontinent and rainfall over the east Asia.

NCPOR scientists have also investigated recent warming trend in MH during GWH period and found significant positive trend in SST, sea surface height (SSH) and oceanic heat content (OHC). Out of which SST influenced more on the monsoon during

with rainfall during the last 18 years. Scientists therefore call for urgent steps to reduce greenhouse gas emission to avert associated risk of climate change effect, including killer heat wave and stop flooding from snow and glacier melting caused by rising temperatures.

Led by Vidya P. J. the research team comprised of Ravichandran, M., Subeesh M. P., Chatterjee S., and Nuncio M. of NCPOR, Goa, Ministry of Earth Sciences. The research paper is published in Scientific report in Nature Research

Keywords: Mascarene High (MH), Southern Indian Ocean, Global Warming Hiatus, sea surface temperature, southern Monsoon, Arabian Sea ecosystem, NCPOR

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