ID: W3033306016

TITLE: The Tropical Atlantic Observing System

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ABSTRACT:

The tropical Atlantic is home to multiple coupled climate variations covering a wide range of timescales and impacting societally relevant phenomena such as continental rainfall, Atlantic hurricane activity, oceanic biological productivity, and atmospheric circulation in the equatorial Pacific. The tropical Atlantic also connects the southern and northern branches of the Atlantic meridional overturning circulation and receives freshwater input from some of the world?s largest rivers. To address these diverse, unique, and interconnected research challenges, a rich network of ocean observations has developed, building on the backbone of the Prediction and Research Moored Array in the Tropical Atlantic (PIRATA). This network has evolved naturally over time and out of necessity in order to address the most important outstanding scientific questions and to improve predictions of tropical Atlantic severe weather and global climate variability and change. The tropical Atlantic observing system is motivated by goals to understand and better predict phenomena such as tropical Atlantic interannual to decadal variability and climate change; multidecadal variability and its links to the meridional overturning circulation; air-sea fluxes of CO2 and their implications for the fate of anthropogenic CO2; the Amazon River plume and its interactions with biogeochemistry, vertical mixing, and hurricanes; the highly productive eastern boundary and equatorial upwelling systems; and oceanic oxygen minimum zones, their impacts on biogeochemical cycles and marine ecosystems, and their feedbacks to climate. Past success of the tropical Atlantic observing system is the result of an international commitment to sustained observations and scientific cooperation, a willingness to evolve with changing research and monitoring needs, and a desire to share data openly with the scientific community and operational centers. The observing system must continue to evolve in order to meet an expanding set of research priorities and operational challenges. This paper discusses the tropical Atlantic observing system, including emerging scientific questions that demand sustained ocean observations, the potential for further integration of the observing system, and the requirements for sustaining and enhancing the tropical Atlantic observing system.

SOURCE: Frontiers in marine science

PDF URL: https://www.frontiersin.org/articles/10.3389/fmars.2019.00206/pdf

CITED BY COUNT: 105

PUBLICATION YEAR: 2019

TYPE: article

CONCEPTS: ['Tropical Atlantic', 'Atlantic hurricane', 'Upwelling', 'Climatology', 'Oceanography', 'Atlantic Equatorial mode', 'Ocean observations', 'Environmental science', 'Atlantic multidecadal oscillation', 'Amazon rainforest', 'Climate change', 'North Atlantic Deep Water', 'Tropical cyclone', 'Thermohaline circulation', 'Sea surface temperature', 'Geology',

'Ecology', 'Biology']