OCEAN ACIDIFICATION IN THE WESTERN INDIAN OCEAN (WIO) REGION

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Overview

In the WIO region over 48.3 million people live within 100 km of the coast with many local communities highly depended on coastal and marine resources and associated services for their livelihood.

Healthy and functioning coastal and marine ecosystems are key to food security, coastal protection, provision of employment as well as other forms of livelihood to these coastal communities.

However, there are concerns regarding the service and product provision and conservation of marine resources with respect to new and emerging threats from climate change stress, especially ocean warming (OW) and acidification (OA).

How will these ecosystems and communities respond or adapt to OA impacts and what needs to be done to mitigate these impacts (for resilience and adaptation)

The Picture

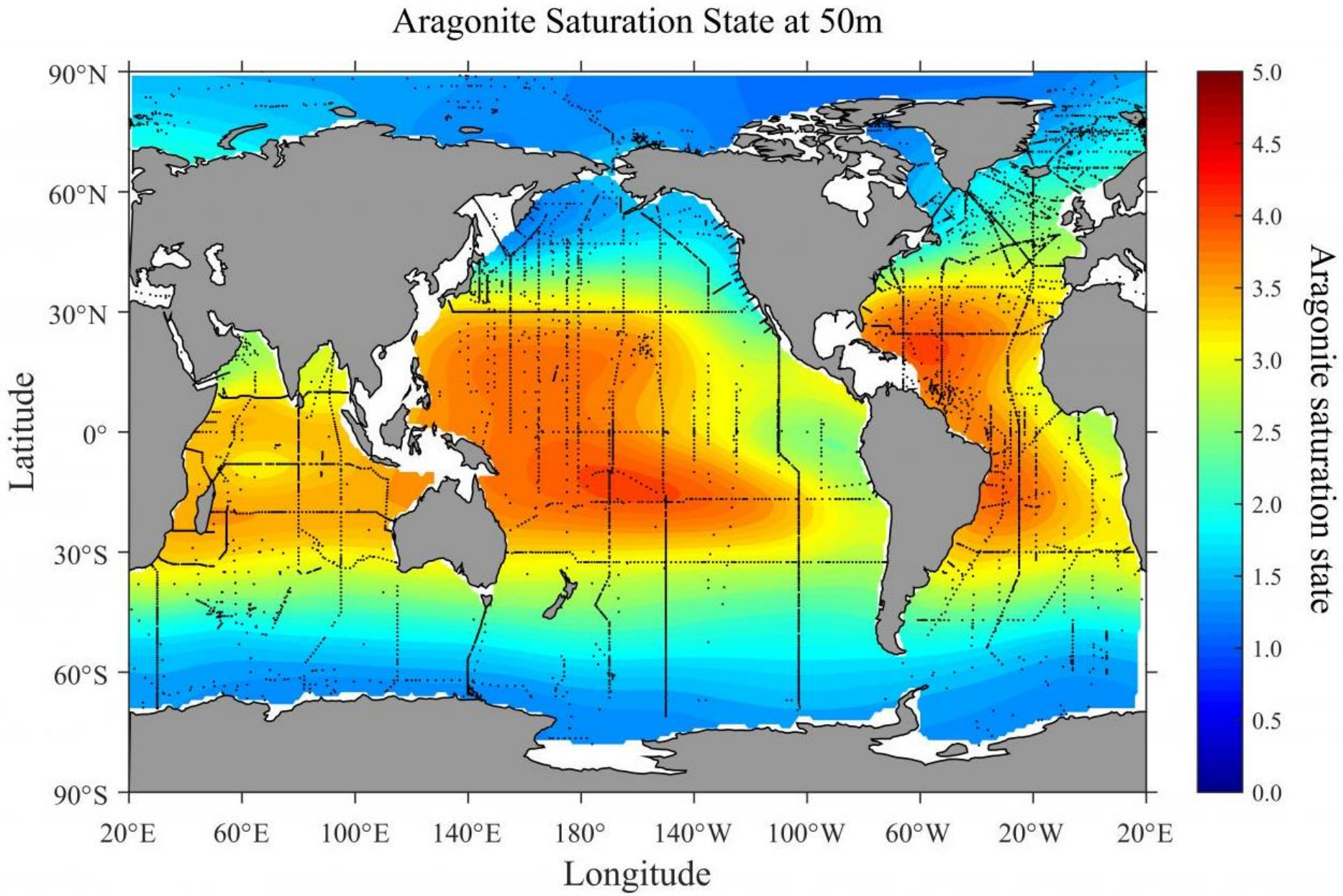
- Over the last two decades (1980s and 1990s), the oceans have taken up about 30% (1.6 trillion tonnes) of the CO_2 released from the burning of fossil fuels...and this will likely increase in a business as usual scenario

- Future projections indicate that 90% of the anthropogenic CO_2 released into the atmosphere will be taken up by the ocean in the next 50 years

- The increased uptake and dissolution of CO_2 leads to profound changes in the carbonate chemistry of seawater through increased pCO_2, dissolved inorganic carbon (DIC) and bicarbonate ions (HCO_3^-) concentration, and a decrease in the concentration of carbonate ions (CO_3^{2-}), pH and carbonate saturation state (Ω)

- This has been identified as a key threats to marine ecosystems, (particularly to calcifying organisms) as well as coastal livelihoods

Ocean Acidification Hot Spots



Potential Impacts

- A decrease in carbonate ion concentration could thus affect the ability of calcifying organisms to precipitate $CaCO_3$ directly impacting marine ecosystems by affecting $CaCO_3$ skeletons.
- Further, organisms with narrow pH (OA) tolerance ranges may encounter increasing stressful, or even lethal conditions in the coming decades.
- reduction in biodiversity and negative consequences on lower level trophic food webs and transfer of energy to higher trophic levels
- predator-prey interactions, prevalence of invasive species, changes in pathogen distributions, bio-availalability and toxicity of certain metals and other toxic substances.

= reduced fisheries and revenues, public health and food security concerns, poverty and more ecosystem degradation

- OA will thus impact the national and global economy as well as cause serious health and food security concerns for many coastal communities that rely on marine ecosystems for sustenance.

WIO Status

- Despite the OA threat and the fact that the livelihoods of coastal communities in the WIO region are inextricably linked to the quality of coastal resources, mechanisms need to put in place in order to buffer marine ecosystems and societies in the WIO region from OA impacts (and interaction with local stresses).
- Increased attention and focus on OA impacts, development of mitigation and adaptive policies/strategies for the region's critical and vulnerable ecosystems and societies needed

Knowledge gaps, information needs and capacity building

This should include

- understanding the relation between changes in the marine environment, ecosystems and socio-economic impacts of OA.
- establishing OA vulnerability status of ecosystems, species and processes as well as coastal societies.
- understanding the impacts of OA on food web dynamics, plankton composition(including harmful algal blooms HABs) and transfer of energy to higher trophic levels.
- Building capacity and establishing regional and global long-term investigations on the impacts of OA.
- modeling the impacts of ocean acidification and response of communities and ecosystems.

Recommendations

- Formulate strategies that boost communities and ecosystem health so that they can better cope with AO impacts (reducing local acidifying factors, overfishing, pollution, habitat alterations)
- Establishment of a framework for coordinated regional/global integrated coastal ocean acidification and carbon chemistry observing network and capacity development (WIO-OAN, WIO-OA study gp?).
- Develop strategies for the sensitization and capacity building of OA vulnerable marine resource-dependent communities to improve their resilience and adaptation
- Promotion of management strategies for the restoration of degraded marine ecosystems, and developing last-resort technologies to cope in the worst-case scenario (e.g. alternative livelihood options, culture of OA resistant organism)

Recommendations

- Initiate policies and strategies that promote collaboration between institutions and countries of the region to develop infrastructure and standardized methods for generating scientific information and data to critically address the impacts of OA
- Encourage the inclusion of OA mitigation strategies in national/regional ocean governance and many other policy platforms oceans and marine resources/ecosystems.
- Promotion of understanding based on scientific knowledge that will possibly lead to the adoption of adaptation measures, identification of less impacted/resilient areas and their conservation.

Thank you

Merci

Ahsante

Siyabonga

Obrigado