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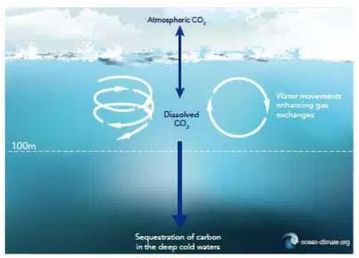
Ocean Acidification in the Pacific

Intro

The planets oceans act as a large carbon sink, a natural reservoir that absorbs and stores CO2. However, the sink is rapidly filling. As a consequence our oceans today are more *acidic* than ever before in human history. High acidity has detrimental effects on marine life and ecosystems.

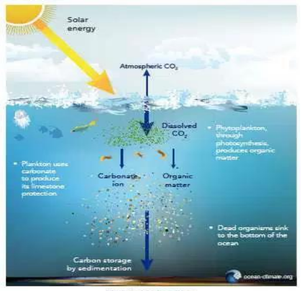
Background

Fig. 1



Physical carbon pump

Fig. 2



Biological carbon pump

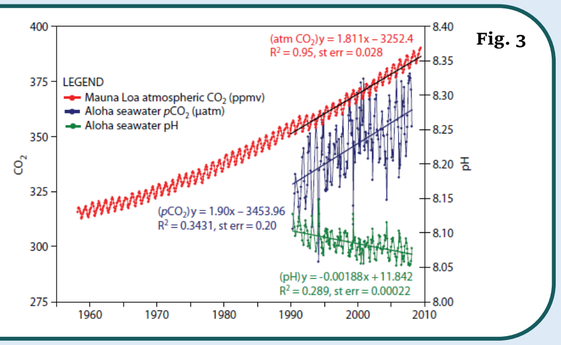
The earths oceans store carbon dioxide via physical and biological mechanisms. These processes form the ocean carbon pump. It is composed of two compartments: a biological pump which transfers surface carbon towards the seabed via the food web (it is stored there in the long term), and the physical pump which results from ocean circulation (Ocean-Climate,2017)[4]

Drivers

Anthropogenic CO2 emissions

The main driver behind current ocean acidification is anthropogenic CO2 emissions (red). Oceans absorb ~25% of anthropogenic emissions (blue), lowering the pH of ocean water (green)[2]. *Data from Hawaii.*

Fig. 3

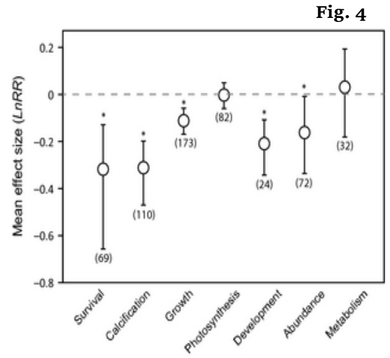


Impacts

Marine life

Decreased survival, growth, calcification, development & abundance of a broad range of marine species[1]

Fig. 4



Regulating ecosystem services

Oceans' capacity to absorb CO2 and regulate climate change is reduced[2]

Supporting ecosystem services

Loss of biodiversity and ecosystem support[1,2]

Provisioning ecosystem services

Reduction in important source of food and protein for humans[2, 3]

Small island developing states

Disproportionately affects small island developing states[3]. 1/3 of SIDS, incl. Fiji, Kiribati & Tuvalu, are located in the Pacific

Solutions

Mitigation

Reducing emissions is the only way to reduce long-term & large-scale risks[2]

Adaptation

Diversification of economies and diets

Note: adaptation possibilities are limited

References

1. **Kroeker, K. et al. (2013)** "*Impacts of Ocean Acidification on Marine Life: Quantifying sensitivites and interactions with warming*" in *Global Change Biology,* vol. 19-6, jun 2013, pp. 1884-1896

2. **IGBP, IOC, SCOR (2013)**. *Ocean Acidification Summary for Policymakers – Third Symposium on the Ocean in a High-CO2 World.* Stockholm: International Geosphere-Biosphere Programme.

3. **Cooley, S. et al. (2009)** "*Ocean Acidification's Potential to Alter Global Marine Ecosystem Services*" in *Oceanography*, vol. 22-4, dec 2009, pp. 172-181

4. **Climate ORG,(2017)** *Ocean Acidification Processes,* Available athttps://ocean-climate.org/?p=3896&lang=en

Fig.1. & Fig. 2. **Climate ORG,(2017)** *Ocean Acidification Processes,* Available athttps://ocean-climate.org/?p=3896&lang=en

Fig. 3. **Levinson, D. & Lawrimore, J. (2007)** "State of the climate in 2007" in *American Meteorological Society,* jul 2008.

Fig. 4. **Kroeker, K. et al. (2013)** "Impacts of Ocean Acidification on Marine Life: Quantifying sensitivites and interactions with warming" in *Global Change Biology,* vol. 19-6, jun 2013, pp. 1884-1896