

## Variation of North Atlantic nitrogen fixation in Caribbean coral skeletons

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Oceanic nitrogen fixation is important as new nitrogen in oligotrophic oceans and balances with denitrification in global nitrogen cycle controlling primary production. North Atlantic ocean is known to have higher nitrogen fixation rates, although the controlling factors have been debated by modern observations and sediment cores in geological time scales. Reef corals have been widely used as paleo-environmental proxy in oligotrophic oceans. Recent studies suggested that nitrogen isotopes of organic matter preserved in coral skeletons  $\delta^{15}\text{N}_{\text{coral}}$  have the potential to record coral nitrogen sources on decadal to millennia scale. In this study, we report recent 90-year records of nitrogen isotopes in *Diploria* sp. coral cores from Cayman Islands.  $\delta^{15}\text{N}_{\text{coral}}$  values were  $+1.9 \pm 2.6$  ( $\sigma$ ) ‰ (n=139), which suggested that the variation of  $\delta^{15}\text{N}_{\text{coral}}$  was controlled by nitrogen fixation ( $\sim 0$  ‰) in ambient seawater. The trend line of  $\delta^{15}\text{N}_{\text{coral}}$  increased  $\sim 4$  ‰ from 1920s to 2010s. This result suggests that nitrogen fixation rate in Caribbean Sea decreased during the past 90 years. Detrended  $\delta^{15}\text{N}_{\text{coral}}$  showed a negative correlation between Atlantic Multi-decadal Oscillation (AMO) index ( $R=-0.71$ ,  $P \ll 0.001$ ), which suggested that nitrogen fixation rate increased in higher SST condition leading an index for hurricane activity on multi-decadal scales. In this presentation, we discuss the relationship between nitrogen fixation and hurricane activity in global warming state.

Keywords: Coral skeletons, nitrogen isotopes, nitrogen fixation, Caribbean Sea, North Atlantic Ocean