

# CMIP6 Ocean and Atmospheric Climate Change Projections in the Seaflower Biosphere Reserve – Caribbean Sea – by the End of the Twenty-First Century

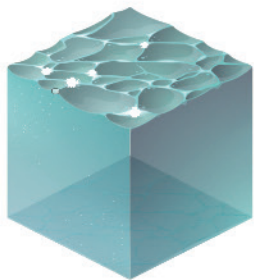
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## Abstract

Seventeen climate models from CMIP6 were examined to assess expected behavior of seven atmospheric/ocean variables in the Caribbean Basin and the Seaflower Biosphere Reserve (SBR) during the twenty-first century, under two socioeconomic scenarios (SSP2-4.5 and SSP5-8.5). Additionally, an ensemble is made with the five models with the best oceanic resolution in the Caribbean Sea. Precipitation shows significant negative trends in most of the projected periods, while air and sea surface temperature, surface salinity and mean sterodynamic sea level (SDSL) have significant positive trends. Air temperature in SBR will probably increase 2°C compared to the preindustrial period after 2050 (SSP5-8.5) or 2060 (SSP2-4.5). The warming trend in the region could extend the hurricane season and/or increase hurricane frequency, affect ecosystems like coral reefs and mangroves, and intensify ocean stratification. For the same period, SDSL is expected to rise in SBR between ~24.2 and 39.9cm. If all contributing factors are included, an increase of up to ~95 cm (SSP5-8.5) could be expected by the end of the twenty-first century. This sea level rise would modify the ecological balance and enhance flooding, affecting tourism and risking the disappearance of the low elevation islands.

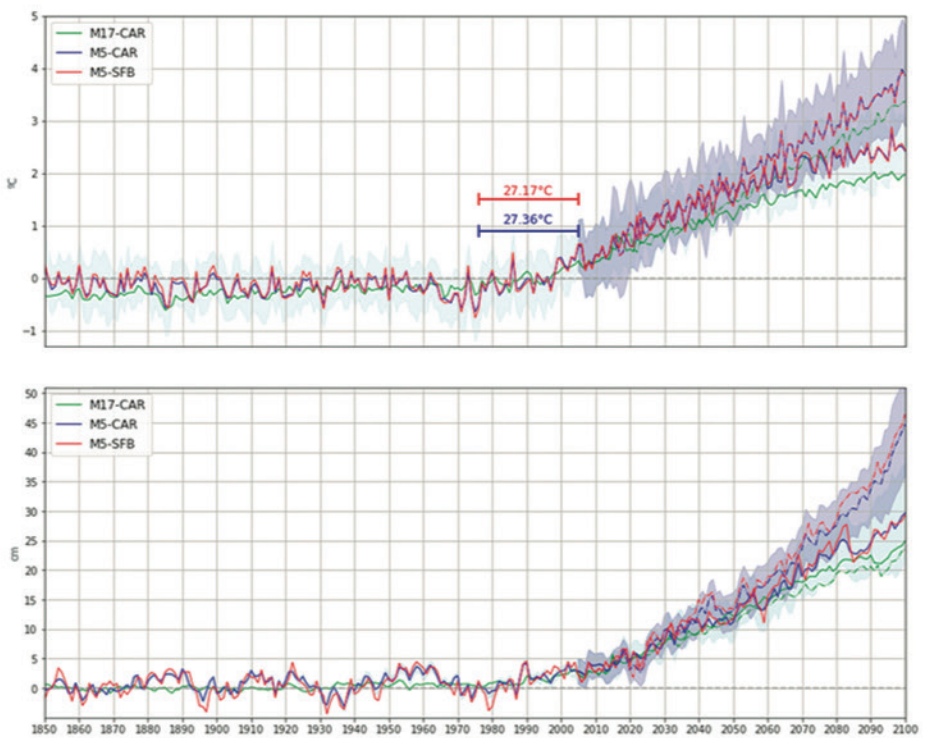
**Keywords:** Climate Change. Mean sea level rise. Archipelago of San Andrés, Providencia and Santa Catalina. CMIP6. Caribbean Sea.

## 21st Century CLIMATE CHANGE Projections in the Seaflower Biosphere Reserve using CMIP6 models

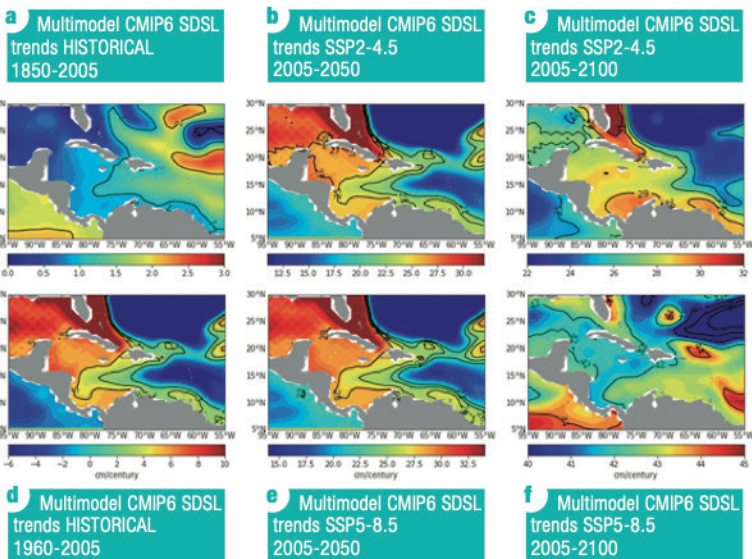


Sea Surface Temperature (SST) for the end of the 21st century is expected to increase between 2.04-3.20 (2.09-3.18) °C for the Caribbean (Seaflower) respectively with respect to the 1976-2015 period. Furthermore, Sterodynamic Sea Level (SDSL) changes are expected to be between 12.8-23.6 (18.6-34.6) cm under SSP2-4.5 (SSP5-8.5) scenarios with respect to the 1995-2014 period.

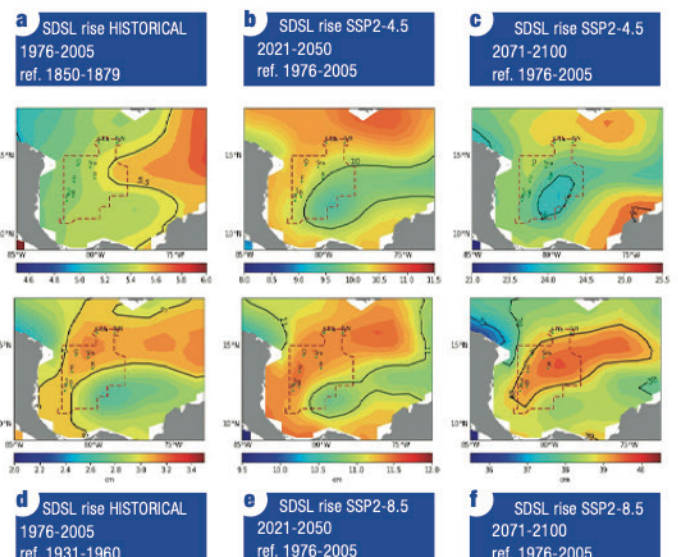
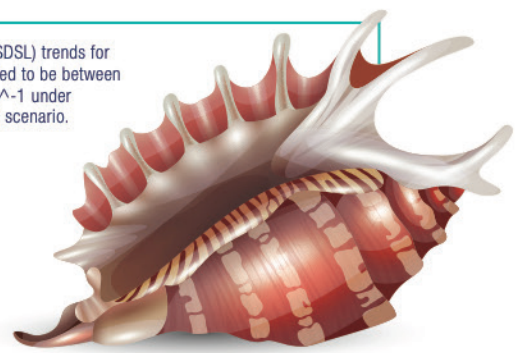
**a** Sea Surface Temperature time series anomalies referenced to the 1976 – 2005 Multi model mean value



**b** SDSL time series anomalies referenced to the 1850 – 1879 Multi model mean value



Sterodynamic sea level (SDSL) trends for the Caribbean are expected to be between 27-30 cm (41-44) cm cy<sup>-1</sup> under the SSP2-4.5 (SSP5-8.5) scenario.



Sea level rise for 2071-2100 in the Seaflower Reserve and the San Andrés Archipelago could increase > 24.2 (> 38.8) cm with respect to the 1976-2005 period under the SSP2-4.5 (SSP5-8.5) scenario respectively.