Palau

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Observed and Projected Climate for Palau

Introduction

Palau is a small country in the north-west tropical Pacific, 800 km East of the Philippines (Figure 1). It is a beautiful tropical paradise, and one of the true unspoiled destinations on the planet. Total land area is 535 km^2 making Palau one of the smallest nations in the world. The economy revolves around agriculture and fishing, but scuba diving in the pristine reefs is an increasingly popular tourism activity. A change in climate may have potential flow on effects on the economy of Palau.

Palau has five operational meteorological observation stations. Multiple observations within a 24-hour period are taken at Koror and at the Palau International Airport. Climate observations are taken twice a day at Kayangel and once a day at Nekken and Peleliu; and surf observations are taken twice a day at Kayangel, Melekeok and Angaur.

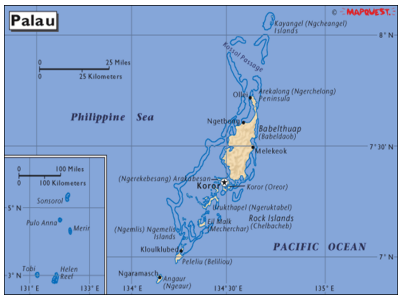


Figure 1: Map of the Republic of Palau

Observed Climate and Climate Variability

Temperatures in Palau have very little seasonal variation. In Koror, the mean daily air temperature is 82°F (28°C) throughout the year and there is only a 1.5°F (0.8°C) difference between the hottest and coolest month. The average relative humidity is 82%. During El Niño events, the Inter-Tropical Convergence Zone tends to shift closer to the equator, and this shift has a profound influence on rainfall and sea level.

The inter-annual variability in rainfall at Koror is high and is mainly influenced by the El Niño-Southern Oscillation. A shortened wet season is usual for Koror during El Niño and prolonged wet season is normal during La Niña years. The dry season can extend to a six-month period with little rainfall during El Niño. El Niño-Southern Oscillation also influences air temperatures in Koror during the wet season. In El Niño years wet season minimum temperature are usually above average while maximum temperature are below average.

Being on a small island surrounded by ocean, air temperatures in Koror are closely related to the sea-surface temperatures.

Healthy Ocean Environment

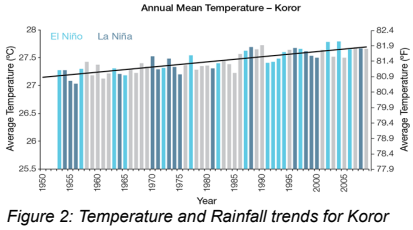


Figure 2: Temperature and Rainfall trends for Koror

Maximum temperatures have increased at a rate of 0.2°F (0.11°C) per decade (Figure 2) while rainfall is unchanged and varies from year to year in Koror. Data since 1950 show no clear trends in annual and seasonal rainfall (Figure 2).

Climate Projections

Methods

After analyzing data from CMIP3 (24 global climate models from around the world), 18 models were identified which provide a reasonable representation of observed climate over the Pacific region. Projections from these 18 models, are given for three emissions scenarios [B1 (low), A1B (medium) and A2 (high)] and three 20-year periods (centered on 2030, 2055 and 2090), relative to 1990.

Summary of Projections

Surface air temperature and sea-surface temperature are projected to increase (Figure 3) as all models agree on increases and this is consistent with rising greenhouse gas concentrations. Projected changes are for a slight increase (<1.8°F; <1°C) in annual and seasonal mean temperature by 2030 with increases greater than 4.5°F (2.5°C) by 2090 under a high emissions scenario.

Annual average rainfall and extreme rainfall (magnitude of the 1-in-20 year daily rainfall total) are projected to increase but it is unknown how the El Nino-Southern Oscillation will change in the future.

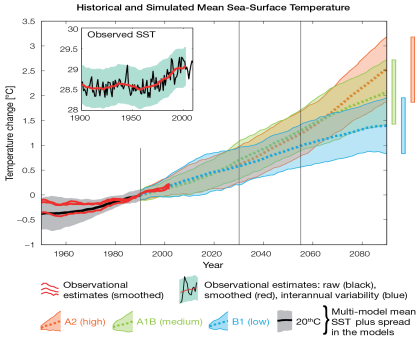
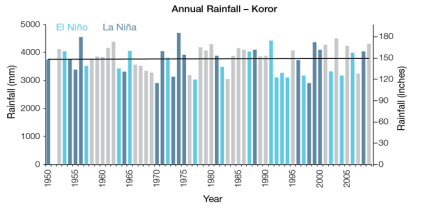


Figure 3: Projected Sea-surface temperatures

Projections from all analyzed CMIP3 models indicate that the annual maximum aragonite saturation state will reach values below 3.5 by about 2040 and continue to decline thereafter. Aragonite saturation levels above 4 are considered optimal for coral growth and reef health. Oceans absorb about one quarter of the carbon dioxide emitted from human activities each year. This causes the ocean to become more acidic, which impacts the growth of corals and organisms that construct their skeletons from carbonate minerals.



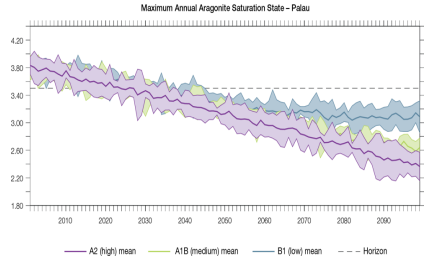


Figure 4: Projected Aragonite saturation levels

Inter-annual variability of sea level will lead to periods of lower and higher regional levels; and it is likely that a similar range will continue through the 21st century. Mean sea level is projected to continue to rise with rises of 5-15cm by 2030 and increases of 20-60cm by 2090 under a high emissions scenario (Figure 5)

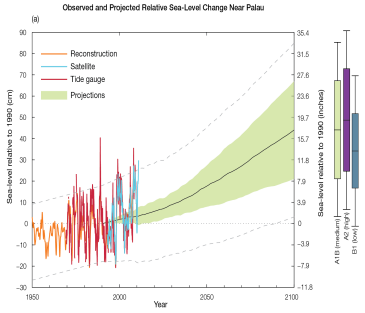


Figure 5: Projected Sea level change

Acknowledgements

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Beautiful Rock Islands of Palau

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