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Climate, climate variability and change of FSM

Introduction

Federated States of Micronesia (FSM) is an independent sovereign island nation made up of four states, from west to east: Yap, Chuuk, Pohnpei, and Kosrae. It comprises approximately 607 islands with 700 sq. km. of area in the western Pacific Ocean about 2,700 km north of eastern Australia.

There are three Meteorological service offices on the main islands of Yap, Chuuk, and Pohnpei (see Fig. 1).

The climate of the FSM is maritime tropical.

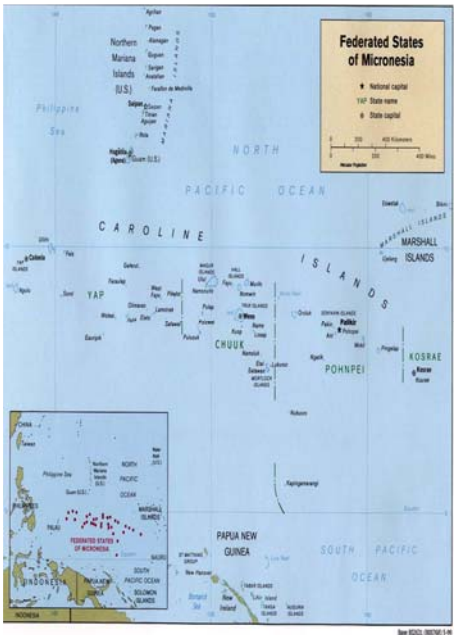

Figure 1. Map showing the location of FSM in the Pacific region and details of the 4 states.

Data availability and homogeneity

3 key (WSO) stations: Yap, Chuuk, Pohnpei

Data available:

- Rainfall: 1974 – 2009 (a few missing months)
- Temperature: 1939 – 2009 (many missing years, 1957 – 1972)

None of the data used in this study from these stations have been homogenised as no break points are known.

The results shown in this poster are for the station at Chuuk in the central region of FSM.

Seasonal Cycles

The seasonal cycle of the monthly means of maximum and minimum temperatures show some variation between the dry and wet seasons, however these are so small as to almost be negligible.

The monthly mean rainfall cycle clearly shows the demarcation of the wet (May – September) and dry (November – April) seasons. Both active phases of ENSO show clear influences and impacts on rainfall in the region (particularly in the dry season when El Niño typically peaks). El Niño tends to result in drier climatic conditions with the suppression of rainfall, while La Niña tends to bring above average monthly totals.

Climate Drivers

Due to the geographical spread of the islands in FSM, the period of impacts can vary across the FSM region.

ENSO

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Monsoon

While present throughout the year in this region, the monsoon has a high positioning correlation to the active ENSO phases (farther east during El Niño, and a more western position during La Niña), with the impact on local rainfall as indicated above for ENSO. Additionally, with the monsoon generally associated with the generation of typhoons in the region, its association with the El Niño phase (and activeness in the region) also brings with it the negative impacts of storms, wind gusts and the seeding of typhoons.

Intertropical Convergence Zone

The ITCZ positioning varies north (during NH summer) to south (during NH winter). There is more noticeable presence of gusty winds and rainfall in association with the ITCZ.

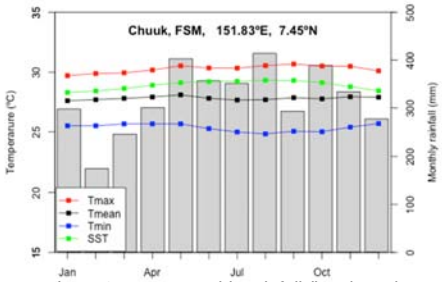

Figure 2. Mean monthly rainfall (bars), and maximum, mean, minimum and nearby sea surface temperature (lines) for Chuuk from 1961-1990.

Observed inter-annual variability and trends

Interannual variability in rainfall in Chuuk is high due to the influence of ENSO.

There has been an increasing maximum temperature trend (see Fig. 3) and a decreasing minimum temperatures trend in the region. For rainfall, Chuuk shows (see Fig. 3) a decreasing trend, as does Pohnpei, while Yap shows an increasing trend. Yap tends to receive more rainfall because of its active convections and being influenced by monsoon more frequently than the rest of the region.

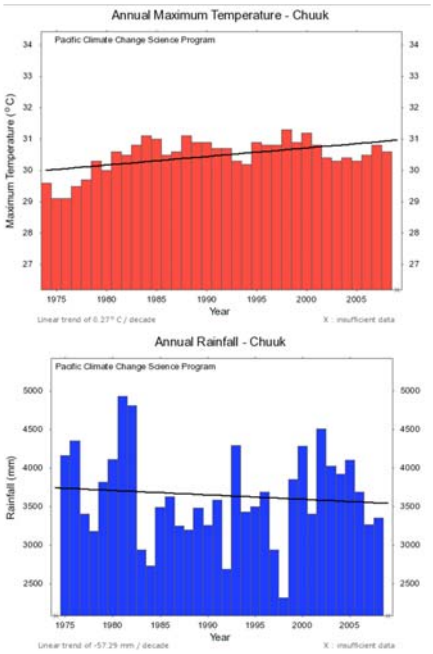

Figure 3. Annual mean maximum temperature (top) and rainfall (bottom) at Chuuk station from 1974-2009. Linear trend lines are also shown.

Impacts and extremes

The major extreme events that occur in FSM are drought, tropical storms, high winds, high surfs, flooding and landslides.

The impacts of these extreme events include fire, water and food shortage, diseases, landslides, coastal erosion, and inundation.

Climate drivers affect these extreme events. Drought is more frequent during El Niño, and tropical storms are more frequent during La Niña events and high winds, high surfs, and flooding occur.

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