

Progressing influences of rapid sea-level rise in the mangrove peat depositional area: Relationship between tree density of *Rhizophora* species and ground level dynamics

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In the western Pacific low-latitude region between the Philippines and Micronesia, the sea level is rising at over 10 mm/yr (IPCC 2013). Mangrove habitats on the oceanic islands are generally situated in the low sediments inflow areas. In such areas, *Rhizophora* pure forest is formed as a pioneer community and mangrove peat is created. However, the mangrove peat accumulation rate is considered to decrease with the vegetation succession because of the decline of tree density of *Rhizophora* sp. The mangrove communities decreased mangrove peat accumulation rate is possibly affected by sea-level rise first. In Pohnpei Island, Micronesia, the surface erosion is not recognized in the *Rhizophora stylosa* and *Rhizophora apiculata* communities, while it is recognized in the communities dominated by other species.

We will report first the ground level dynamics for a year by observing the aboveground length of piles installed into the peat deposits up to the base for the main mangrove communities in Pohnpei. Secondly, we will analyze the relationship between the tree density of *R. apiculata* and ground level dynamics using the 20-years monitoring data in a 1 ha permanent plot (PE: 50m by 200 m) established in an estuary type mangrove habitat.

We set five stainless piles with 5 mm in diameter for each observation plot. The observation plots were established seaward and landward sites of four permanent plots, i.e., PR, PC, PS and PK, whose dominant species are *R. stylosa*, *R. apiculata*, *Sonneratia alba* and *Bruguiera gymnorhiza*, respectively. We could not set piles in PE because of the deep mangrove peat over 5 m. The ground level increased in PR and PC, indicating mangrove peat accumulation against sea-level rise, while it decreased in PS and PK, indicating surface erosion.

For PE, we created ground level maps at 1994 and 2014 using ArcGIS 3D Analyst and calculated average ground level by ten meter square subplot for each ground level map. The difference between the two time points was used for the data of ground level change. The tree density of *R. apiculata* was calculated by counting the existing tree numbers in each subplot. The analyses showed a strong positive association in 0 to 50 m and 150 to 200 m zones between the *Rhizophora* tree density and ground level change, whereas the ground level between 50 and 150 m zone, in which a tidal creek is located, increased independently of the *Rhizophora* density.

Keywords: Mangrove community, Mangrove peat, Sea-level rise, Surface erosion, Oceanic islands