# New information of the mangrove habitat development at the northern limit, Iriomote island Japan.

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The mangrove habitat at the Nakama River Delta is very famous typical habitat as the Northern limit. The authors established the DSM data, ortho photo images, field measurement and tree ring data. The changing processes of the mangrove forest structure during last 40 years were clarified based on the data. The forest such as the height of the forest crown changed dynamically. The ages of the forest were also identified.

Keywords: Maongrove Ecosystem, Iriomote Island Okinawa, Geo ecology, Tree ring analysis, UAV/SfM, Zonation

 

# Preliminary report on progressing influences of rapid sea-level rise corresponding to mangrove communities in the mangrove peat depositional area and near future prediction

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Sea-level rise induced by global warming are surely progressing. IPCC (2013) reported that global mean of sea level already rose 17 to 21 cm between 1901 and 2010 and predicted that it will rise 26 to 82 cm by the end of this century from the global mean between 1986 and 2005. Sea level at Pohnpei Island in Micronesia, which is our study area, had risen at 1.8 mm/yr between 1974 and 2004, which is similar to global mean, but rapid sea-level rise at 16.9 mm/yr had been observed between 2002 and 2010 by Australian Bureau of Meteorology. Mangrove peat accumulation rate estimated by the numerous data on thickness of mangrove peat layer and its radiocarbon age is more than 2 mm/yr but less than 5 mm/yr. We will urgently report the progressing phenomena with rapid sea-level rise on main mangrove communities in mangrove peat depositional area and discuss the possible response in the near future.
In the *Bruguiera gymnorrhiza* dominant forest with few *Sonneratia alba*, *Xylocarpus granatum* and *Rhizophora apiculata* behind the seaward fringe *Rhizophora stylosa* forest about 20 m depth, roots which usually develop in the belowground have exposed on the ground surface. Average gap height between the base of *B. gymnorrhiza* tree and ground surface, which is considered as an index of surface erosion, reached 42.8 cm. Surface erosion was also identified at the seaward fringe of the *S. alba* forest, whereas *R. stylosa* forest lack signs of surface erosion, even though both communities are seaward fringed forests. In the *R. apiculate* forest situated about 300 m inland, the old prop roots have been getting buried in mangrove peat.
These evidences suggest that the influences of sea-level rise appear first in climax forests located seaward side, whose standing tree density of *Rhizophora* sp. sufficiently decreased, and the *S. alba* forest. Dieback, fallen trees and decrease of growing rate possibly appear in the communities in the near future.

Keywords: Sea-level rise, Mangrove peat, Surface erosion, Pohnpei Island, Oceanic island

 

# Estimation of fine root production and decomposition rates in tropical and subtropical mangrove forests.

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Mangrove forests generally store a large amount of carbon as peat in their substrata compared with terrestrial forests. Mangroves have the distinctive feature of allocating a large production of biomass belowground as shown by their low top/root biomass ratio (Fujimoto et al. 2000). Furthermore, production of a large volume of belowground fine roots with a short lifespan contributes considerably to the net primary production (NPP) of mangrove forests (Poungparn et al. 2016). Indeed, the concomitant high volume of production and low decomposability of mangrove roots under anaerobic belowground conditions account for the large amount of carbon sored belowground in mangrove forests. Few studies, however, have attempted to comprehensively evaluate the contribution of fine root production to peat accumulation in mangrove. We examined fine root dynamics in several tropical and subtropical mangrove forests in order to understand the role of carbon sequestration in natural mangrove forests. We evaluated the production and decomposition of fine roots using the ingrowth core method and the root litterbag method, respectively.

We studied five mangrove species (*Rhizophora stylosa, R. apiculata, Sonneratia alba, Bruguiera gymnorrhiza, and Xylocarpus granatum*) in four forest stands on Pohnpei Island, Micronesia (6˚53′N, 158˚20′E) and two stands on Iriomote Island (24˚17′N, 123˚51′E). Pohnpei Island is located in the center of the tropical zone and Iriomote Island is at the northern limit of the mangrove habitat range. Fine root production (FRP) in mangrove peat (0-30 cm depth) ranged from 2.3 to 16.9 t/ha/year on Pohnpei Island and from 2.0 to 3.5 t/ha/year on Iriomote Island. These results indicate that FRP in mangrove forests was generally equal and/or relatively high compared with values previously recorded for terrestrial forests (Finér et al. 2011). FRP in the seaward side near forest edge of *S. alba* stand was 16.9 ±2.6 t/ha/year, which was higher than that of the stands on Pohnpei Island but not significantly so. FRP in the *R. stylosa* and *B. gymnorrhiza* stands on Pohnpei Island were 5.9 ±5.3 and 7.0 ±3.0 t/ha/year, 1.5 to 4 times higher than on Iriomote Island, which reflects larger tree size and the tropical climate condition of the former (i.e., high temperature and humidity). Annual mass loss of fine roots ranged from 21 to 73wt%/year on Pohnpei Island and from 38 to 52wt%/year on Iriomote Island. These results indicate that the decomposability of fine roots considerably lower than the values previously reported for leaf litters of mangrove forests (Ono et al. 2006). Although annual mass loss of *B. gymnorrhiza* roots on Pohnpei Island was markedly lower than that of other species' roots, the difference was not significant.

The results of the present study suggest that mangrove forests tended to have high FRP values and low decomposition of fine roots, but that FRP and decomposition did not differ significantly among species. Amount of belowground stored carbon differed among the mangrove community types. Thus the results of the present study indicate that carbon storage in mangrove peat is controlled by elements of fine root dynamics (e.g., FRP and decomposability) in respective mangrove communities.

Keywords: mangrove peat, fine root dynamics, belowground stored carbon, Pohnpei Island, Iriomote Island

 

# Vegetation change viewed from pollen analysis around Haven Lake in Adak Island, Central Aleutians, Alaska

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To determine vegetation change in Adak Island (central Aleutians), we collected peaty sediments (ADK13083002 Core) from Haven Lake in the island. We confirmed six apparent tephra layers (Black, 1976), 40 Years (0.4 cal kBP), YBO (3.6 cal kBP), Sandwich (4.7 cal kBP), Intermediate (7.2 cal kBP) and Main (9.5 cal kBP) and Upper and Lower Gritty (ca. 10 kBP). Four major pollen assemblage zones (HL-1 to -4 in descending order) are recognized in the cored sediments. The HL-1 pollen zone is dominated by Ranunclaceae and *Empetrum*. The HL-2 pollen zone is dominated by Poaseae, Ranunclaceae, and *Empetrum*. The HL-3 pollen zone is dominated by Poaseae and *Empetrum*. The HL-4 pollen zone is dominated by Poaseae, Cyperaceae, *Empetrum* and Lycopodiaceae. The charcoal chips increased above Intermediate Tephra. It's contemplated that the Aleut people arrived at Adak Island and started settling down from *ca*. 9.5 cal kBP.

Keywords: tephra, pollen analysis, vegetation change, peaty sediments, charcoal chip

 