

## History of Coastal Environment Recorded in Coral from Fongafale Island, Tuvalu

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Because of their low altitudes, atoll islands in Tuvalu, the South Pacific is concerned for the earliest influence of the sea level rise and resultant submergence caused by global warming. However the local environmental change such as land development and water pollution with recent increasing population also damages the ecosystem and the sustainability of coral reef islands. To examine the time series of anthropogenic impacts on the coastal reefs, we analyzed the coral annual bands obtained in 2009 from the lagoon of Fongafale Island, the capital of Tuvalu.

The coral core fg01 from living colonies of *Porites lutea* (core length; 78 cm) shows growth interruption at 20cm under the top and the characteristic black bands were observed along annual bands above that break. We introduced the age axis to fg01 using the  $\Delta^{14}\text{C}$ - annual bands correction constructed with the other continuous coral annual bands (fh11, core length; 93 cm, 1940-2009) from Funafala Island on the same atoll. The core fg01 started the growth from 1940-50s and the discontinuous period was for 1970s-1990s, after that the coral has restarted its growth but the black bands pollution is conspicuous.

To identify this pollution we performed organic/ inorganic analysis and studied a microscopic inspection. We found high dense fibers of boring microbes; some kinds of algae and fungi in the black bands of coral skeleton. The propagation of microbes into the feeble coral skeleton and the construction of the black bands started from 1990s, which was coincident with increase of living drainage caused by densely population at Fongafale Island (Yamano *et al.*, 2007, Fujita *et al.*, 2013, 2014). Further the construction of the black annual bands suggests the seasonal propagation of microbes related to coastal environment.

On the other hand, in the process of the organic analysis using GC/MS we detected the higher concentration of petroleum hydrocarbons from the bottom of the coral core corresponded to 1940-50s annual bands than the upper part. The low CPI value (Carbon Preference Index; a rate of diagenesis) suggests this hydrocarbon was used as fuel for heavy equipments introduced during the World War II. Fongafale Island has the history that the US Army built a heavy bomber-runway for one month in 1943.

70yr coral annual bands from Fongafale Island recorded both the trace of the World War II and recent human impact in that skeleton.