

# Spatial biome changes in southwestern Japan during 20,000 years.

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We compiled pollen data in southwestern Japan between 20k yr BP and the present from the published palynological studies. The collected pollen data were digitized and estimated the age based on  $^{14}\text{C}$  dating and/or tephrochronology, then compiled in 1000-year intervals. Biomization procedure for Japan (Gotanda et al. 2002) was applied to this fossil pollen dataset for reconstructing the past biome patterns during the past 20,000 years, and then the spatial and historical biome changes in southwestern Japan has been investigated.

We mapped past biome distribution each millennial time slice. The obtained 20 past biome maps showed the biome changes (from cool-mixed forest (COMX) to warm-mixed/broadleaved evergreen forest (WAMX)) and their migration process. During the Last Glacial Maximum, southwestern Japan was covered with COMX forest, which shows the climate was cooler than the present. The mean annual temperature was estimated to be around 7 degree Celsius below the present using the Warm Index (Kira, 1949). From 17k to 10k yr BP, WAMX forest established in western Kyushu Island, temperate deciduous forest (TEDE) dominated in Chugoku region. There has been no pollen data from Shikoku Island before 10k yr BP. We considered, however, the WAMX forest existed in southern Shikoku Island during the Last Glacial Maximum according to the appearance of WAMX in 9k yr BP and their migration speed. WAMX forest, which established in northern Kyushu Island at 17k yr BP, migrated to Chugoku region, and the established in the coast of Sea of Japan at around 7k yr BP. It is considered that the delay of WAMX forest migration was caused by the environmental changes of Sea of Japan. Before 8k yr BP, when the Tsushima warm current did not strongly flow into the Sea of Japan, the climate was similar to continental condition and winter temperature was not enough to exist WAMX forest. After 8k yr BP, WAMX forest spread into Chugoku region and reached to higher altitude. Around the 4k yr BP, WAMX forest distribution was reached its maximum during the Holocene. Then, the distribution of WAMX forest retreated suggesting the appearance of colder climate.