

Geographical features and use of Ryukyu limestone

Shigekazu Mezaki

Coral reef islands in the Ryukyu Islands can be roughly divided into 'High Islands' or 'Low Islands', based on their geomorphology; where the former supports mountains while the latter are low-land plateaus. While High Islands are either composed of ancient metamorphic or volcanic rocks, of the Palaeozoic and Mesozoic era, most of Low Islands are composed of Ryukyu limestone (Pleistocene limestone) (Fig. 1). About one third of the Okinawa Prefecture is covered by Ryukyu limestone.

Karst topography, shaped by solvent etching processes, exists at the surface and underneath the Ryukyu limestone. In some parts of the Amami Island group, there are karst plateaus with shallow geographic depressions, or dolines (sinkholes). However, most of the islands are composed of convex geographical features that resisted solvent etching, for example, Okinawa Island. Okinawa was named 'limestone wall' by the U.S. military geological survey in postwar days, because of its peculiar bank-like topography that parallels fault or terrace ledges. They are well developed in central and southern parts of Okinawa Island and on Miyako Island. The 'upheaval atoll' of Kitadaito Island and Minamidaito Island are rare geographical features, since there are only about 10 examples in the world of such low island karst topography.

Ryukyu limestone areas support few surface running

rivers, and the soils are difficult to dig. Therefore, the location of traditional villages was closely related to spring water or underground rivers. Spring water is easily obtained at the bottom of faults and terrace ledges because the limestone layer plays a role of aquifer. Many villages were built at the south and southwest side of faults and ledges. This premeditated 'geomancy' village protects houses from the northeast monsoon in winter, but faces the sunny south. Since the limestone banks are elevated, many were also used to support castle walls (*Gusuku*) or for places of worship (*Utaki*). The negative aspect was the residual soil of weathered limestone (called the *Shimajiri maagi*) is sparse on terrace flat lands, therefore, only potatoes and sugarcane grow well on these soils.

Ryukyu limestone is associated with innumerable limestone caves. However, because the Ryukyu limestone layer is thin, short-horizontal caves are most common. 'Gyokusendo', the caves in southern part of the Okinawa Island, are famous for sightseeing. The caves were originally used as grave yards and places of ancestral worship. However, some of them are now historic war sites, because they were used for shelters during World War II.

Thus, Ryukyu limestone is used in multiform and in people's living on Okinawa.

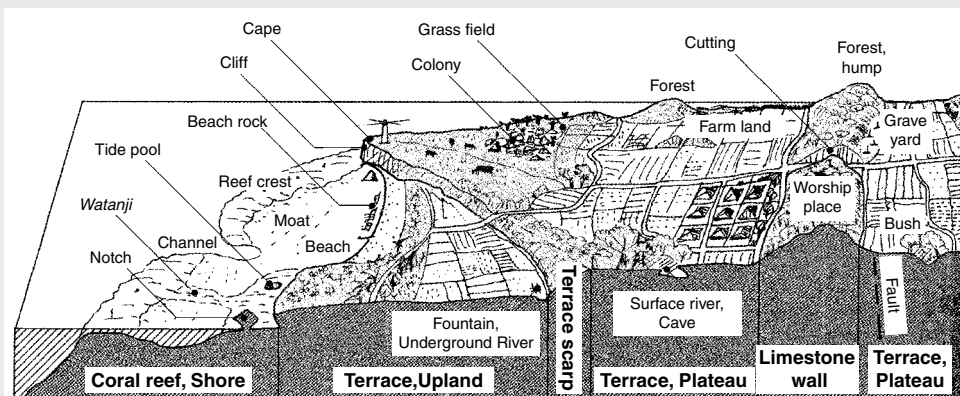


Fig. 1. A model map of the geographical features, their names, and the land use of 'Low island' composed of the Ryukyu limestone (from Mezaki and Toguchi 2002). *Watanji*: in filled moat that provides people's pathway to the reef during low tides.