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**Water Circulation and Carbon Flux on Shiraho Coral Reef of the Ryukyu Islands, Japan**

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**Abstract:**

Field studies were undertaken on Shiraho Reef, Ishigaki Island, Japan to describe the circulation pattern on the reef flat and to quantify the water flux, and to examine the carbon flux between the reef ecosystem and the surrounding ocean. Shiraho Reef is about 700 m wide in the north and about 850 m wide in the south. Fringing reefs are divided into two topographic zones: the reef flat and the reef slope. The reef flat can be subdivided into five topographic sub-areas according to depth, gradient and surface roughness. The distribution of the coral reef communities coincides well with those of topographic sub-areas. Five communities are found on the reef flat: a seagrass community, a sand bottom community, an inner reef flat coral community, a reef crest algal community, and an outer reef flat coral community. Water depth was obtained from a classification map of the organisms and substrata on the reef flat using the light attenuation coefficient of the seawater. The estimated depths were checked along a transect A-A' in which actual depths had been measured. Current velocities were measured at two stations by an electromagnetic flowmeter. Organic and inorganic production rates of the reef communities were measured using the plastic underwater tents method. Shiraho Reef flat has a single water circulation unit, where the sea water comes in through the reef edge and is drained into a Southern Reef through the depression on Watanji. The driving force of the circulation is caused by tidal oscillations and set-up effects when waves break at the reef edge. Water flux of the circulation unit is about 2,240,000 cu m/day. Total volume of the sea water on the reef flat is estimated to be about 1,370,000, with a flushing time of about 15 hours. The net organic and inorganic productions of Shiraho Reef flat are estimated to be about 135 tons C/year and 339 tons C/year, respectively. (Brunone-PTT)