Paleosols distributed in marine terraces in the Goshogawara area, Aomori Prefecture, Northeast Japan

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The paleosol suggests the climatic conditions in the past because major soil groups are formed and affected by the normal soil forming action of climate. Already, Matsui and Kato (1962) reported the existence of red paleosols distributed in the wide area in Japanese Islands, from Kyushu to the northern end of Honshu, and discussed its implications. In particular, the existence of red paleosol in the Tsugaru Peninsula, located at the northern end of Honshu island, is important in discussing the spread of past warm climatic conditions during the last interglacial period.
At the foot of the Tsugaru Mountains, marine terraces formed during the last interglacial period widely developed (Azuma, 1995). In this study, we examined paleosol layers intercalated in the terrace located from Iizume, Goshogawara-city, to Nakasato, Nakadomari-machi, Aomori Prefecture. In the field, the soil color was described using the Munsell soil color chart, and sedimentary facies was described for reconstruction of sedimentary environments.
As a result, the sedimentary environments in the study area was divided into channel, river floodplain, and lake facies. It is conceivable that the lake facies was formed as a part of the river sedimentary facies since the lake facies is located at the top of the floodplain facies and the bottom of the river channel facies. In this study area, 7.5YR brown soil layer have the majority, and only 5YR red soil layer was found at one site. In the laboratory, thin sections of the samples collected from layers with different sedimentary facies and soil colors were observed under microscope to find the soil structure. The paleosol layers that have soil structures such as clay filling and clay coating were found at two sites. In addition, XRD analysis was conducted on the horizons where the development of the clay filling and clay coating were observed. As a result, the clay minerals such as halloysite, vermiculite and kaolinite were found in the sample where the accumulated clay minerals are contained, while the halloysite was almost the only clay mineral contained in the sample where the accumulated clay minerals were not observed. These layers, which were rich in clay minerals of the accumulated clay, correspond to horizon B of the general soil stratigraphy, suggesting the formation of a mature soil.
The paleosol color of B layer of the paleosol layer distributed in this study area is 5YR4 / 8 (red brown), 5YR5 / 8 (light red brown), 7.5YR4 / 6 (brown) and 7.5YR5 / 8 (light brown). The clay mineral composition of horizon B is mainly composed of halloysite and vermiculite and shows the similarity to typical red-yellow soil distributed around eastern Asia present days.
It is revealed that paleosol consisting of red-yellow soil developed on the terrace deposits formed during the last interglacial period in the Tsugaru Peninsula. The climate condition in the Tsugaru Peninsula at the last interglacial period is considered to have been very warm because the current red-yellow soils are formed around subtropical forests.

References

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