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KEY ROLE OF FOSSIL SEAWATER IN NEOGENE SEDIMENTARY ROCKS FOR LANDSLIDE OCCURRENCES IN THE NORTHERN PART OF CENTRAL JAPAN

Summary:

The south-western area of Niigata Prefecture has the highest landslide densities in Japan. Saline groundwater emerges from several landslides in this area and is an influential factor in the occurrence of these landslides. The geochemical approaches to groundwaters and application of the electromagnetic surveys for landslide slopes revealed the hydrogeological structure of the large-scale landslides which was located on the outlet of saline waters from deep reservoirs and landslide-prone area where wide zonal distributions of saline water at depths of more than 50–100 m and fresh water at depths of shallower than 50–100 m. It is most likely that the saline groundwater behavior emerging in large-scale landslides is controlled by injections of the geo-pressured saline waters from deep reservoirs. The injection of the geo-pressured waters into the landslide mass likely results in excess pore pressure, which is a possible cause of landslide occurrence. On the other hand, the shallow fresh groundwater is inferred to be meteoric water of origin that replaced the saline groundwater, which likely weakened the shear strength of bedrocks, resulting in landslides. Thus, pore saline water plays an important key role in the occurrence of landslides, both large-scale landslides with low frequency and common landslides.

Key words:

Landslide, Fossil seawater, Geopressured reservoirs, Electromagnetic survey, Groundwater geochemistry

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