

POSTER

THERMOKARST AT MARINE PLAIN, EAST ANTARCTICA

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PHOTO: BRENT FRASER

Ice Cave Entrance. Photo Competition First Prize for a Print in the Entrances and Other Surface Features category.

Thermokarst, a cold-climate form of pseudokarst, comprises irregular, hummocky terrain with closed depressions that appear similar to sinkholes but which are formed in very cold (periglacial) environments by the melting of permafrost ice in the ground and settlement of the sediments in which the ice occurs, rather than by dissolution of soluble rock as in true karst.

It is well developed in high northern latitudes but is rare in the southern hemisphere. The largest occurrence of periglacial thermokarst that has been recorded in East Antarctica occurs at Marine Plain (67°37'S, 78°9'E), a small basin of 4 km² that is filled with Pliocene marine diatomite sediments c. 9m thick which are overlain by thin glacial sediments.

Summer thawing of the ground at Marine Plain is confined to the upper c. 1 metre with the ground below this depth remaining permanently frozen.

The diatomite includes some very minor limestone lenses but dissolution of these does not appear to have contributed significantly to development of the pseudokarst landforms.

These landforms include thaw pits, thaw lakes, ground ice slumps, linear closed depressions and very small-scale beaded

drainage features. Strong thermal conductivity adjacent to bedrock hills on the margin of the plain is an important process that has promoted progressive degradation of the subsurface permafrost by formation and back-wearing of low scarps, causing formation of the principal thermokarst landforms.

The existence of only small thaw pits away from the bedrock margins of the plain suggests the permafrost is probably closely in equilibrium with the present day climate and is undergoing only very slow degradation over a long time.

Human disturbance of the ground surface has locally thinned the seasonally-thawed surface sediments that form an insulating blanket over the deeper permafrost, and this has caused some accelerated melting and slumping.

Marine Plain was designated as a Site of Special Scientific Significance in 1987, primarily in response to the discovery of Pliocene dolphin and mollusc fossils.

Its significance as a thermokarst was not recognised at that time. It has recently been re-designated as Antarctic Specially Protected Area No 143 and a new management plan now recognises the significance of the thermokarst. ■