Cape Crozier consists primarily of trachyte plugs and younger basalt and scoria vents. Basaltic units older than the trachyte may be present. Pyroclastic units of various ages are found, and some large pillows (?) occur in the bedded pyroclastic rocks.

White Island appears to consist primarily of pyroclastic units, olivine basalt, and scoria. The cones and rib-like ridges that partially connect all of the outcrop areas are constructed essentially of pyroclastic rocks that are partially covered by a thin mantle of basalt and scoria.

Black Island consists of trachyte plugs, olivine basalt, and scoria. Some green, trachytic glass and breccia occur at Mount Aurora.

Additional field work was done at Cape Royds, Cape Evans, Brown Peninsula, and Minna Bluff, and in the McMurdo area. In general, the results of this work are similar to those reported earlier by the author. Work on specimens collected by Dr. G. Denton and M. Alford from Mounts Erebus and Terror indicate that the trachyte (Kenyte) high on the flanks of Mount Erebus is the same as the rocks that occur at Capes Royds and Evans. A specimen from Mount Terror rocks consists of olivine and iddingsite.

Mount Cis appears to be a pingo rather than a vent. Remnants of a yellowish trachyte flow (?), 1–1½ m thick, cap this feature.

Miers Valley and the "Brando" vent in the Radian Glacier area were studied. The unit identified as a Kenyte by earlier workers in Miers Valley appears to be a porphyritic (plagioclase-phenocryst) basalt.

Pedology of Enderby Land, Antarctica*

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Although the ice-free portions of Antarctica comprise only about 4 percent of the present-day continental surface, pedologic investigations are yielding data important in the understanding of periglacial environments and weathering processes. With few notable exceptions, detailed pedologic studies in Antarctica have been conducted in West Antarctica, mainly in Victoria Land. As the USARP exchange scientist to the 12th Soviet Antarctic Expedition, the author collected field data and soils from the ice-free areas (oases) of coastal Enderby Land. The data derived and reduced to date indicate that these soils differ measurably in many parameters from the soils of Victoria Land. The present postulate is that the coastal Enderby Land soils more closely resemble arctic soil conditions than the soils of Victoria Land.

Soil morphology and moisture dynamics of a soil group tentatively designated red and brown ahumisolic have been described (MacNamara, 1969). In contrast to the ahumic soils of Victoria Land (Jensen, 1916; Tedrow *and* Ugolini, 1966; Claridge, 1965; Ugolini, 1963, 1964, 1967; Campbell *and* Claridge, 1969; Ugolini *and* Bull, 1965; McCraw, 1967), these soils of coastal Enderby Land have well-developed horizonation, bright colors, visible structural elements, and are deep and moist. The average soil moisture contents throughout the profile are three to four times greater than those reported from Victoria Land. Figs. 1 and 2 present soil-moisture data from two soil sites monitored over a 12-month period. The term "impeded drainage" is used to describe the moisture content when all the overlying soil is thawed but the underlying material is frozen. In general, zones of continuous high moisture content are finer textured and exhibit structural reorientations. These are the zones of maximum weathering, color development, structure development, etc., approximating the B horizons of the classical soil.

Further laboratory investigations have shown that the Enderby Land soils have acid soil environments with greater cation exchange capacities, lower quantities of water-soluble salts, and differing ratios of exchangeable cations than formerly reported in Antarctica.

The composition of water-extractable ions from a representative ahumisolic soil profile, as sampled in the late-summer or dry period, is presented in the table. The concentration of the more mobile ions in the surface layers is the result of two processes: vertical migration of soil solutions in response to thermal gradients with subsequent deposition of soluble salts when the phase transformation from liquid to vapor occurs and minor additions of wind-borne salts (aerosols) from the nearby open sea. Local on-shore breezes (upslope winds) develop during the summer periods as a result of the intensive heating of the exposed rock and soil surfaces. The surface-deposited salts are, to a large extent, stripped and blown to sea during infrequent summer storms and the first major storms of autumn, for these are associated with strong katabatic (downslope) winds.

The effect of the stripping during the early fall storms has been shown by analysis of wind-driven snow captured at the 1-m level. This snow had high (2–7 ppm) concentrations of water-soluble silica,

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Chemical composition of 1:1 (soil:water) extracts from red ahumisolic soil from coastal Enderby Land, Antarctica

Depth (cm)	Na (ppm)	me/100g	K (ppm)	me/100g	Ca (ppm)	me/100g	Mg (ppm)	me/100g	Cl (ppm)	me/100g	SO_4 (ppm)	me/100g	pH	E.C.* (micro-mhos)
0/5	344	14.96	101	2.59	0.9	0.05	.5	0.04	404	11.38	27.2	0.57	7.0	325
5/10	54	2.48	9	0.23	0.9	0.05	.5	0.04	367	10.34	19.0	0.40	6.9	56
10/15	66	2.87	15	0.38	1.1	0.06	.8	0.07	226	6.37	29.6	0.62	6.9	50
15/20	47	2.04	12	0.31	1.2	0.06	1.3	0.11	222	6.25	22.8	0.48	7.0	45
20/25	56	2.43	10	0.26	2.4	0.12	1.3	0.11	226	6.37	28.4	0.59	4.9	50
25/30	46	2.00	14	0.36	2.6	0.13	1.6	0.13	194	5.46	24.5	0.51	5.5	43
30/35	46	2.00	14	0.36	2.8	0.14	1.7	0.14	197	5.54	24.4	0.51	6.0	56
35/40	52	2.26	13	0.33	2.9	0.15	1.5	0.13	206	5.80	25.8	0.54	5.2	44
40/50	52	2.26	13	0.33	11.7	0.59	1.5	0.13	230	6.48	24.9	0.52	5.0	58
50/60	50	2.16	13	0.33	12.1	0.61	1.4	0.12	230	6.48	25.9	0.53	5.0	61
70/80	28	1.22	22	0.56	14.8	0.74	1.3	0.94	230	6.48	20.5	0.43	4.8	72

* 1:10 (soil:water) extract used for electrical conductivity measurements. Small amounts of soluble silica were detected in most samples.

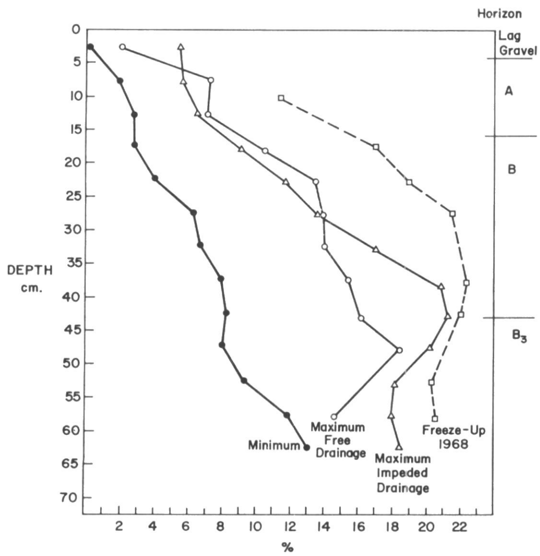

Figure 1. Annual soil-moisture dynamics of brown ahumisolic soil from coastal Enderby Land. Horizon terminology is tentatively assigned, as determined from soil morphological criteria. Moisture-content terminology is discussed in text.

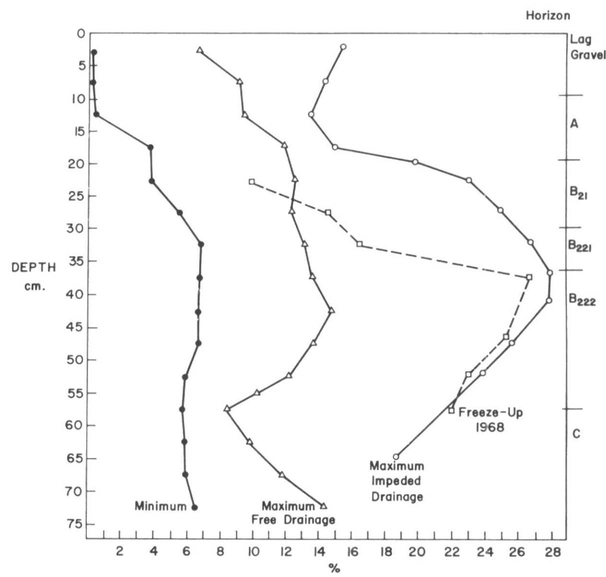

Figure 2. Annual soil-moisture dynamics of red ahumisolic soil from Molodezhnaya oasis, coastal Enderby Land. Detailed profile morphology has been reported previously (McNamara, 1969).

which obviously had originally been on weathered rock and soil surfaces. Additionally, the sodium and chloride ion contents of captured wind-blown snow were 3–8 times greater during March storms (autumn) than during July storms (mid-winter). Soluble salt profiles from the same site as presented in the table, determined during the early spring period, do not show the marked concentrations of sodium, potassium, chloride, or sulfate at the surface revealed in the mid-summer study.

Preliminary soil micromorphological investigations have shown similarities between Enderby Land soil conditions and northern Alaska soil conditions (personal communication, W. L. Kubiena, June 25, 1969). Further studies into these similarities will form the major part of laboratory studies in 1969–1970.

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Volcanic Eruption on Deception Island*

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The volcanic eruption of February 21, 1969, on Deception Island off the northern coast of the Antarctic Peninsula (Fig. 1) was preceded by earth tremors which began on February 14. The tremors increased in intensity until the 21st, when volcanic activity began as a cloud of steam rising to an estimated height of 3,000 m. Ash, pumice, and scoria were then ejected from a fissure about 4.5 km long and 120 m wide, trending about N.20°W. in the eastern part of the island. The ejecta and gases were erupted through the permanent ice cap, a hundred meters or so thick, that crowns the mountainous, horseshoe-shaped island caldera. Several hundred thousand cubic meters of bombs and blocks up to 3 m in maximum dimension were discharged and came to rest adjacent to the vent near its northern extremity; elsewhere, only ash and scoria appear to have been erupted. Areas that had been active during the December 1967 eruption, such as "Yelcho Island," which was built during that eruption, and the smaller eruptive center east of Telefon Bay, were inactive. Considerable gas was emitted in Fumarole Bay before the recent event (Kaye R. Everett, as quoted in Anonymous, 1969).

Although the eruption was minor in duration and amount of ejecta, it resulted in total destruction of the Chilean base (Fig. 2), previously damaged in 1967 (Valenzuela *et al.,* 1968), and also in partial destruction and abandonment of the British base (Fig. 3). Both base facilities were built on alluvial slopes near

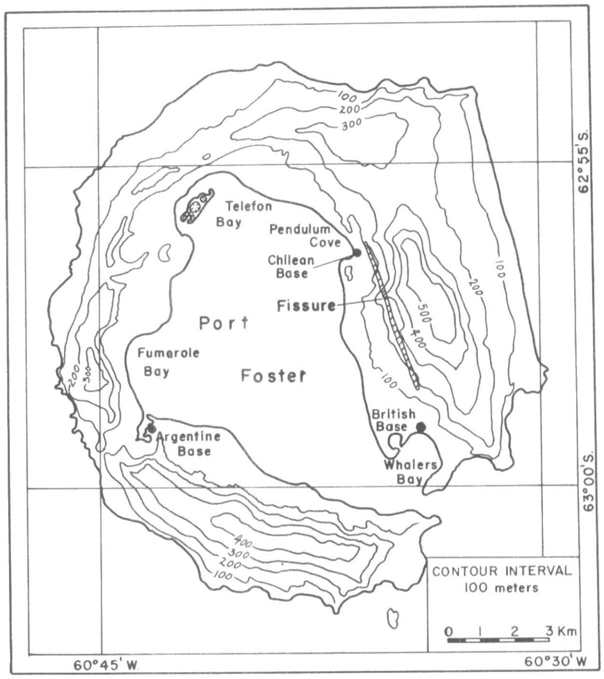
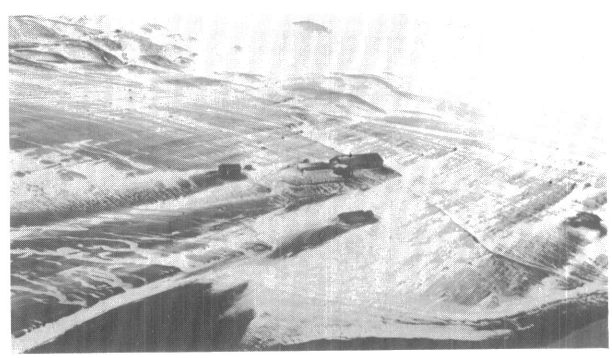


Figure 1. Deception Island. Base map modified from Valenzuela and others (1968).

Figure 2. Remains of living hut at Chilean station destroyed by eruption on February 21, 1969. Ash and scoria mantle surface in foreground. Fissure, mostly concealed by steam, lies on far side of bomb-covered slope behind station.



U.S. Coast Guard Photo

Figure 3. The British station after the eruption. Meltwater floods rushing from the fissure in the ice cap (just beyond upper left corner) to the sea (lower right) severely damaged the huts.

* Publication authorized by the Director, U.S. Geological Survey.