SECRETS FROM THE

Antarctic Dry Valleys

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Cover photograph: Wright Valley

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Bull Pass and the Asgard Range, Wright Valley

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Lake Vanda and North Fork, Wright Valley: an approaching storm.

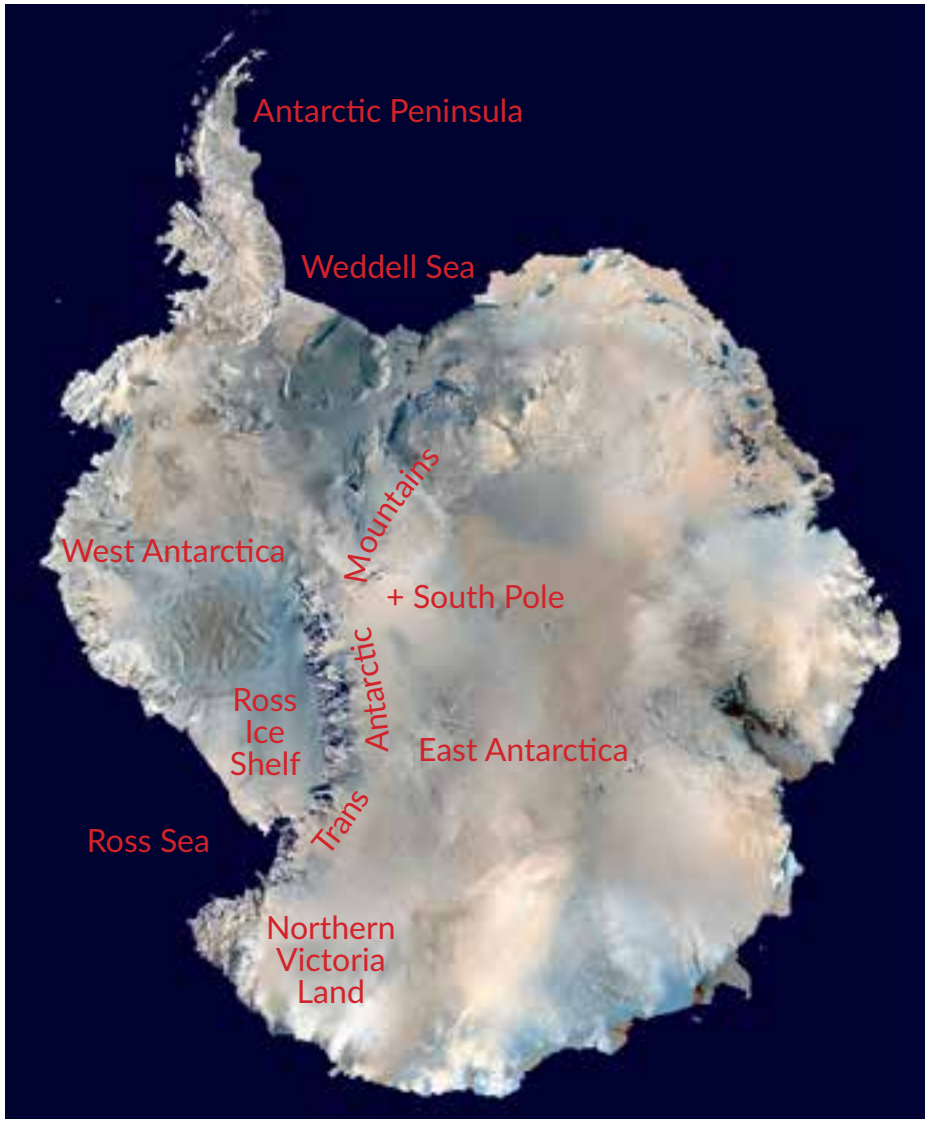
Introduction

Antarctica is the world's 5th largest continent with an area of approximately 15 million square kilometres. Roughly circular in shape, the elevation rises steeply from the coast to a vast interior plateau that forms two distinct parts. The largest, East Antarctica has an elevation that exceeds 4,000 m, the ice sheet being grounded on the underlying mountains. As they are mostly above sea level East Antarctica is subject to little influence from sea level changes. The smaller West Antarctic ice sheet by comparison reaches around 3,000 m and as it is partly grounded on land that is below sea level, it has expanded and shrunk many times in response to past sea level changes.

East and West Antarctica are separated by the Transantarctic Mountains, a range that is around 3,500 km in length extending across the continent from Northern Victoria Land toward the Weddell Sea. Reaching an elevation of over 4,500 m in places and varying in width from 100–300 km, the Transantarctic Mountains are cut by numerous ice streams that provide ice drainage from East Antarctica and which flow into the Ross Ice Shelf and into West Antarctica.

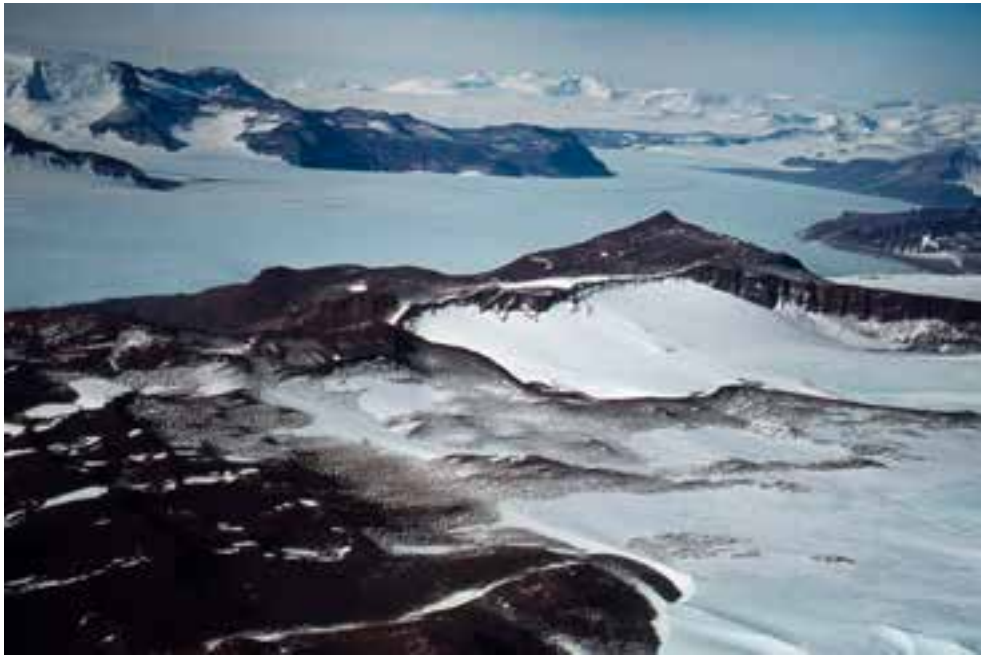
Scattered throughout the Transantarctic Mountains are areas of bare ground on exposed mountains and in valleys where glaciers have retreated. The total area of bare ground in Antarctica is estimated at 46,000 km^2 or just 0.3% of the continent with roughly half of this occurring in the Transantarctic Mountains. The remainder is in the Antarctic Peninsula and distributed around the margins of the continent.

The largest continuous area of bare ground is located at the eastern edge of the Transantarctic Mountains adjacent to the southern part of the Ross Sea and this area is broadly known as the Dry Valleys.



Opposite: View south along the Transantarctic Mountains from Northern Victoria Land. The two prominent cone shaped volcanic peaks in the left distance are Mt Melbourne (left 2733 m) and Mt Overlord (right 3396 m). Beyond is Mt Erebus (3794 m) some 650 km distant from where the picture was taken and Mt Discovery, just visible beneath a cloud is 750 km distant.

A typical Transantarctic Mountains landscape with glaciers descending from the Polar Plateau and dissecting the Mountains as they flow towards the coast. The Nimrod Glacier is below and there are a few patches of bare ground on some steeper slopes.



Further to the north, the Hatherton Glacier, with limited and probably diminishing ice flows from the Polar Plateau. In this part of the Transantarctic Mountains, glacial recession has left numerous areas of bare ground and some small dry valleys.

The Dry Valley System

Covering about 4,800 km² the Dry Valleys were discovered during Robert Scott's 1901–03 Antarctic expedition. The Dry Valleys comprise a loosely defined geographic entity that encompasses the largest semi-continuous area of bare ground in Antarctica. Sometimes called the McMurdo Oasis, owing to the existence of the bare ground area surrounded by ice and bordering McMurdo Sound, these names emphasise the absence of large glaciers in a landscape that resulted from glacial retreat and also the extremely arid nature of the environment. The aridity of the Dry Valleys is due to low precipitation which only falls as snow, with liquid water available in summer during brief periods of thawing. The bare ground in Antarctica is sometimes referred to as cold desert because of numerous affinities of the landscapes and soils with those of hot desert lands.

The Dry Valleys owe their existence in part to tectonic activity which millions of years ago uplifted the land, with ice that flowed into the valleys from the Polar Plateau subsequently being cut off or restricted. Within the area broadly known as the Dry Valleys, there are numerous smaller ice-free valleys of varying size. The three largest valleys are Taylor Valley to the south, Wright Valley toward the centre and Victoria Valley to the north and they vary in length from 40 to 60 km. Contiguous to the Victoria Valley are several other smaller valleys

It is believed that the landscape evolved initially as river valleys, at a time when the Antarctic continent was situated in a more northerly location and before the glaciation that enveloped the continent about 35 million years ago.

Topographic features, various glacial deposits and weathered soils all point to a present day landscape with a history that extends back over many million years with each of the three main valleys having different features.

The brown shaded areas comprise land that is free of permanent snow and ice and encompasses the region known as the Dry Valleys.

Opposite: The lowermost part of Taylor Valley near the coast with its broad U-shaped valley form resulting from early glaciation. The glaciers on the valley floor and on the Kukri Hills on the far side of Taylor Valley are alpine glaciers which respond to local precipitation changes. The Commonwealth glacier is in the foreground, the Canada Glacier beyond and glacial Lake Fryxell between the two.