

THE ANTARCTIC

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The Antarctic includes the continent of *Antarctica* (the fifth largest), the surrounding *Southern Ocean*, and the 19 *peri-Antarctic islands*. The limit of the Southern Ocean is the *Antarctic Convergence* or Polar Front, which is subject to seasonal variation and large gyres. Antarctica is the most isolated of the 7 continents, separate by 900 km from South America, the closest one. It is also the only one entirely isolated by abyssal deeps.

Antarctica is 99.77% covered by a permanent *ice sheet* and has a surface area of 13.88×10^6 km², including several massive ice-shelves. It includes subcontinents of Greater Antarctica (10.35×10^6 km²) and Lesser Antarctica (3.53×10^6 km²), separated by the Transantarctic Mountains. The *South Pole* is 2835 m above sea level (its 'pressure altitude' is about 3300 m), about 2757 m of which is ice. The ice surface at the pole flows about 10 m annually. The mean ice thickness is 2034 m, maximum measured depth is 4776 m (69.9°S, 135.2°E). The ice sheet has a maximum elevation of 4231 m (81°S, 75°E) and a volume of about 25.4×10^6 km³ which is 90% of that on Earth. Much of the bedrock is depressed below sea level by the weight of ice; the greatest depression is 2496 m (81°S, 110°W). Many peri-Antarctic islands have ice caps, these are of insignificant size compared with the ice sheet.

Antarctica's highest peak is Vinson Massif at 4892 m (78.6°S, 85.4°W, first climbed on 17 December 1966). The remotest spot is the Southern Pole of Inaccessibility (83.8°S, 65.8°E), 1330 km inland (first reached in 1958 by surface traverse). In 2004 the *South Magnetic Pole* was at 64.5°S, 138.2°E, some 50 km off the Terre Adélie coast; it was inland in 1909 when first reached. The average surface elevation of Antarctica is 2300 m, the highest of any continent.

The *Southern Ocean* includes the Scotia Sea, Weddell Sea, Amundsen Sea, Bellingshausen Sea, and Ross Sea. As well as the peri-Antarctic islands there are many submarine seamounts, which also cause important upwellings of nutrient-rich waters. Much of the ocean is covered by *pack ice* which has an average winter maximum area of 20×10^6 km² (60% of the Southern Ocean). At the height of summer this decreases to: 2.4×10^6 km² (12% of the ocean). The mean thickness of the ice is 1.2 m; the average duration of a floe is only 1 year as the majority drift north during summer. Massive tabular icebergs, calved from the ice shelves, are a distinctive feature of the ocean. Its greatest measured depth is 8325 m (56°S, 26°W).

The *first lands* seen in the Antarctic were several of the peri-Antarctic islands. Mainland Antarctica was first sighted in 27 January 1820 and the first landing was probably in late 1820. It was not until 1899 that a winter was spent on the continent and continuous presence began in 1944. The *South Pole* was reached on 14 December 1911. *Sealers*, mainly during the 19th century, and *whalers* during the 20th century were major exploiters of Antarctic resources. The latter

established land stations on several of the peri-Antarctic islands. Currently *fishing* and *tourism* are the only commercial operations; research is the principal activity. Unlike in the Arctic neither mineral extraction nor commercial transport routes exist in the Antarctic. Many economic minerals undoubtedly occur but none have yet been exploited.

During the 2005 austral winter 44 *stations* were open in Antarctic regions (26 on Antarctica, all but 3 on coasts) recording meteorological data and involved in other scientific research. These were operated by 18 countries. The winter population of the Antarctic is about 1100, at least twice as many are present during the brief summer. Most stations are relieved by icebreakers and other ships. Only five intercontinental landing strips are maintained.

The Antarctic *climate* is the most severe on Earth. Winds often become blizzards and a minimum temperature of -89.2°C has been recorded (Earth's lowest) at Vostok station (78.4°S, 106.9°E) in 1983. The continent is essentially a frigid desert because there is very little precipitation from the cold dry atmosphere - and virtually all this is frozen (snow). In many areas sublimation may exceed melting in ablating glaciers, and humidifying the air. The *Aurora Australis* may be prominent on dark nights.

Terrestrial *flora* and *fauna* are highly endemic. They are characterized by few species which may occur in very isolated concentrations. A few lichens and algae survive on the most remote nunataks. Marine organisms are, on the contrary, abundant in local situations and include many species of whales, seals, and commercial fish. The peri-Antarctic islands are particularly important breeding sites for *penguins* and other sea-birds, and seals. No indigenous humans have existed; although a small number of children have been born on continental Antarctica (the first was in 1978), and on several peri-Antarctic islands.

The terrestrial part of the Antarctic south of 60°S is subject to the *Antarctic Treaty* (made in 1959) which, currently, has 45 signatory countries (covering over 80% of the Earth's population). A Secretariat was established in Buenos Aires in 2004. The treaty puts the 7 sovereign claims (Argentina, Australia, Britain, Chile, France, New Zealand, and Norway, some of which overlap) in abeyance and its subsequent instruments regulate most activities in its region. Current *military deployments* in the Treaty region are mainly to provide transport for, and supplies to, the stations, and for hydrographic survey. Neither nuclear explosions nor disposal of radioactive waste have been reported within the Treaty region (although nuclear explosions and military operations have occurred in other parts of the Antarctic). *Scientific research* is coordinated internationally by the Scientific Committee on Antarctic Research (founded in 1958), with a Secretariat in Cambridge, and its specialised groups.

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