

POLAR REGIONS RESEARCH MILESTONES 1818-2005

METEOROLOGY
GEOLOGY AND GEOPHYSICS
GLACIOLOGY
OCEANOGRAPHY
BIOLOGY

1818-24: The John Ross and John Franklin expeditions to the Canadian Arctic both return with many **geological specimens**.
 1820-23: William Scoresby Jr publishes several books describing **Arctic environments**, whaling and whale biology, and several new Arctic animal species.
 1830-33: The first report of **fossil remains** (fragment of carbonised wood) during the first American expedition to Antarctica in 1830.
 1831: Sir James Clark Ross is the first to reach the **Magnetic North Pole**.
 1840-43: Sir James Clark Ross discovers the **Ross ice shelf**, source of tabular icebergs.
 1840: First official sample of **volcanic rock** collected from Possession Island by the Sir James Clark Ross.
 1841: The first active volcano, **Mount Erebus**, is discovered by Sir James Clark Ross.
 1843: Publication of "The Zoology of the Antarctic Voyage of HM Ships Erebus and Terror". Includes the first definitive description of the **Emperor penguin**.

1800

1876: H. W. Fielden and H.C. Hart publish **'The Greenland Manual'** which includes the study of plants and their relation to climate.
 1882-83: **First International Polar Year**. An international network of scientific stations is established all around the Arctic circle for synchronous meteorological and magnetic observations.
 1893-96: F. Nansen's ship the **Fram becomes imprisoned by pack ice** and drifts to the vicinity of the Pole, demonstrating the drift of the pack ice under the influence of the wind (Ekman drift).
 1897-99: The Belgica – **first purely scientific Antarctic expedition**; important results on plankton biology; bathymetric charting, hydrological soundings (Drake Passage and Gettche measurements from Antarctica).

1850

1901-04: Geologist Hartley Ferrar maps **sedimentary rocks** known today as the Beacon Supergroup and recognises that the region must have been warmer because of plant traces and animal burrows.
 1901-12: Edward Wilson studies the characteristics, life histories and behaviour of **Antarctic sea birds** both on Captain Scott's Discovery a Terra Nova expeditions.
 1908-09: Members of Shackleton's expedition find **important fossils** in the Beardmore Glacier region as well as coal seams indicating a previous wetter and warmer climate.
 1910-13: Members of Scott's expedition discovered the **first fossil Glossopteris leaves** indicating an important link with other continents that once formed a supercontinent Gondwana.
 1910-13: G.C. Simpson, meteorologist on R.F. Scott's ill-fated expedition, carries out pioneering studies of the **meteorology of the Ross Sea region**, including the first upper-air measurements from Antarctica.
 1918-25: Maud tries for **North Pole** on board a **ship lodged in floating ice**. Amundsen attempt.
 1925: Large-scale **circumpolar oceanographic investigations** of Southern Ocean begin (also researching whales' food supply and krill stocks and migration patterns).
 1926-62: Alwin Pedersen publishes the first detailed accounts on the **ecology of Arctic birds** and mammals in Northeast Greenland, including the first upper-air measurements from Antarctica.
 1930-31: A British expedition makes the first **weather observations** high inland on Greenland's icecap.
 1933-35: Lichens discovered half way up the Scott Glacier by the second Byrd Expedition are the **most southerly plants yet found**.
 1949-52: Norwegian-British-Swedish Antarctic Expedition **sets the standard** for: seismic shooting for subglacial and ice thickness; snow stratigraphy; ice movement and strain network.

1900

1950: Discovery of **Polar Lows**: Small cyclones forming within Arctic air masses during the cold season.
 1951-52: SKJUMP operation: **anticyclonic surface circulation**, now called the Beaufort Gyre, detected and Lomonosov Ridge, separating the waters of east and west Arctic detected.
 1954: W. Dansgaard (University of Copenhagen) shows how seasonal **changes in deposited snow** can be interpreted by isotopic composition, enabling a high precision dating technique.
 1955-58: Discoveries of the oldest **Cambrian body fossils** in Spitsbergen (by Norwegian and Polish geologists).
 1956: F. K. Ball publishes his theory of the generation of **Antarctic katabatic winds**.
 1957-58: Many new meteorological observatories established during the **International Geophysical Year**, enabling synoptic studies of Antarctic meteorology for the first time.
 1958-60: First modern theory that cold, **deep water formation** in the Labrador, Sea and the Weddell Sea are key drivers of global ocean circulation.
 1960: First studies of sub-ice **topography of Antarctica** by radio echo soundings revealing hidden mountain ranges.
 1963: First field test (by M. Walford) in Antarctica of the **SPRI MARKI equipment for radio echo sounding**, developed by Stan Evans at Scott Polar Research Institute.
 1964-74: Four programmes of the **International Biological Program (IBP)** are implemented in the Arctic Tundra, providing the first complete overview of the biodiversity and function of these ecosystems.
 1966: The **first deep ice core** to penetrate the total ice thickness (1387 m) at Camp Century, NW Greenland. Opens the door to reconstructing global climatic history and function through the investigation of atmospheric processes.
 1971: Launch of **Earth Resources Technology Satellite** and successors allows mapping of untouched terrain and inferring ice surface velocities from sequential imagery.
 1972: Laurence Irving publishes the first comprehensive work on the **physiological adaptations of Arctic birds and mammals** (including man).
 1979-82: Repeat of **Nansen's 19th century ice drift experiment** advances Arctic research.
 1980: Intensive research into the structure and dynamic functioning of the **Antarctic marine ecosystem** under the BIOMASS Programme (34 voyages through to 1985).
 1985: First **deep drilling results at Vostok** span a full glacial cycle (150 000 years). High correlation between isotope temperature signal and greenhouse gas concentration demonstrated in 1987. (among many other things) the flora and fauna of the region.
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 1989: Hypothesis that the Southern Ocean productivity is presently limited by **iron availability**. This forms the basis of subsequent iron fertilisation experiments worldwide.
 1992: The European-funded Greenland ice core project **GRIP reaches bedrock**.
 1993-98: SCICEX programme observes **inflow of Atlantic water** to the **Troposphere** (FROST) uses remote sensing data and numerical weather prediction products to advance understanding of Antarctic atmospheric processes.
 1994-95: The First Regional Observing Study of the **Troposphere** (FROST) uses remote sensing data and numerical weather prediction products to advance understanding of Antarctic atmospheric processes.
 1997: A geological synthesis of **Svalbard** (by W. B. Harland and co-authors, British).
 2000-04: The **Arctic Climate Impact Assessment (ACIA)** report highlights Arctic climate change and its impact on many other things the flora and fauna of the region.
 2002-05: Discovery of the **first Cenozoic (Middle Eocene) glaciers** in West Antarctica (on King George Island by Polish scientists).
 2004: **Arctic coring expedition** to the Lomonosov Ridge. Retrieval of the deepest Arctic sedimentary core ever, 233 km from the North Pole – an archive of the past 55 million years.
 2004: **EPICA** (European Project on Ice Coring in Antarctica) reaches a drilling depth of 3 270 m (virtually bedrock) at Dome C (Concordia) and through the investigation of atmospheric processes which occur in the Weddell Sea.
 2005-06: The **WECCON** (Weddell Sea Convection Control) sets out to better understand the **role of the Southern Ocean** in global climate variability through the investigation of atmospheric processes which occur in the Weddell Sea.

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