

# European Polar Research

A regional focus for world-class polar science

Europe has internationally acknowledged leadership in many key areas of polar research. This is coupled with extensive infrastructure and operational capabilities in both the Arctic and Antarctic.

## EUROPEAN RESEARCH CAPACITIES

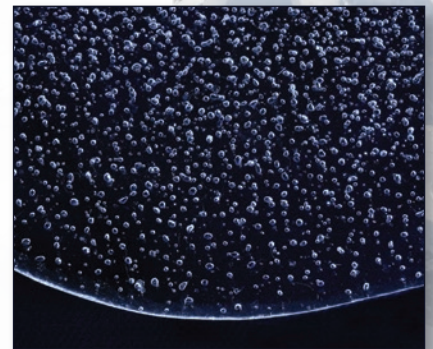


Europe has contributed substantially to major international initiatives, including all four International Polar Years from 1882 to the recent International Polar Year in 2007-2008.

European Polar science addresses the entire spectrum of research topics across a full range of polar environments and examples include:

### 1. Ice Coring: a bipolar perspective to deciphering past climate patterns

Over the past two decades European researchers have established international leadership in exploiting the remarkably detailed climate records held in the polar ice sheets through the European Project for Ice Coring in Antarctica (EPICA), collaboration with Russia and USA at Vostok Station and both the Greenland Ice Coring Project (GRIP) and North Greenland Eemian Ice Drilling Project (NEEM).



### 2. Permafrost and the Global Carbon Cycle



Arctic permafrost in both terrestrial and shelf sea environments contains vast amounts of carbon, and permafrost thaw could result in significant emissions of this carbon as various greenhouse gases, including methane. The PAGE21 project has extensively investigated effects of changing permafrost environments and the potential global consequences.

### 3. Investigating Polar Oceans and Polar Resources

**Sea-ice and permafrost:** European funded research projects (e.g. DAMOCLES, ACCESS) have coordinated complex scientific and logistical assets of various European nations to better understand Arctic sea-ice, evaluating Arctic climate change scenarios and their impact on specific economic sectors and human activities over coming decades.

**Ecosystems and biodiversity:** European researchers have contributed substantially to the long-running ecosystem-based Southern Ocean fisheries management programme (CCAMLR) and have undertaken extensive ocean floor biodiversity surveys in both Polar Regions (e.g. AOD, CAML).

**Marine geology:** Europe's two heavy research icebreakers (*Polarstern* and *Oden*) have contributed, with North American and Russian collaborators, to logistically extremely challenging marine geological studies (e.g. AMORE, ACEX, LOMROG) on the mid-oceanic ridges in the central Arctic Basin.





#### 4. The Arctic as a Homeland

European researchers work with indigenous and local communities across the Far North, identifying how these respond to rapid environmental change, and collaboratively formulating strategies for safeguarding social integrity, local culture, health and access to vital resources. The ESF-funded research programme BOREAS, has highlighted the importance of humanities and social sciences in a changing Arctic.

#### 5. The Polar Regions as Platforms for Space Research

There is a long tradition of using the Polar Regions as a platform for European research on near-space with a current focus on space weather and Sun-Earth connections. Europe is also involved in polar satellite instrument calibration and validation (e.g. DOMEX at Concordia Station in Antarctica).

#### 6. European Infrastructure facilitating Polar Research

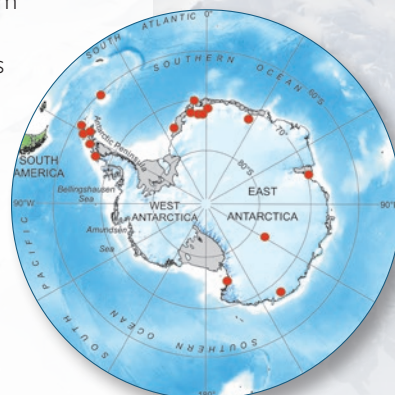
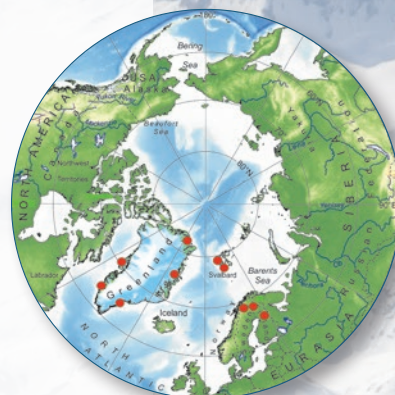
Europe is territorially represented in the High Arctic through Svalbard, Greenland and northern Scandinavia and Arctic stations of its member states (red dots) facilitate both regional and Earth System science. These stations are linked to a pan-Arctic network of terrestrial research stations through the programme INTERACT.

**Svalbard** is a significant focus for long-term observation of greenhouse gases and atmospheric pollutants and lies adjacent to both the deep ocean gateway of the Fram Strait and the biologically rich Barents Sea. There is an under-sea observatory (Hausgarten) for oceanographic and biological studies located in Fram Strait. Europe's research infrastructures in **Greenland** can undertake research on both the largest ice sheet in the northern hemisphere and the surrounding productive seas.

European research stations (red dots) are also extensively distributed across the Antarctic continent and on offshore islands.

Europe has a range of ice-capable research and support ships (including two heavy icebreaker class vessels, *Polarstern* and *Oden*) and dedicated aircraft for deep field support and instrumented survey activities. A new station in north-west Greenland will have a fleet of autonomous underwater vehicles and a seasonal sea-ice camp that will significantly enhance Europe's capabilities in this key region.

The European Space Agency (ESA) has substantial polar orbiting satellite assets providing sophisticated remote sensing capabilities over both the Arctic and Antarctic, including the cryosphere-focussed satellite, Cryosat II.



## REGIONAL AND INTERNATIONAL COOPERATION

1. Individual national research priorities are still evident but increasingly bilateral/multilateral polar cooperation is occurring between nations. This brings access to more researchers, diverse infrastructures, new technologies, larger data sets and more extensive modelling capabilities.
2. The 2013 **Galway Agreement** on Atlantic and Arctic Cooperation between Europe, Canada and the United States provides a foundation for extensive multilateral marine-related research activities in coming years.
3. Several European nations have polar cooperation agreements with the **Russian Federation**. Further regional scale agreements through the European Commission could expand levels of European activities to a pan-Arctic scale, comparable to the European research coverage available in Antarctica and the Southern Ocean.
4. The European Polar Board (EPB) provides a valuable bipolar forum within Europe that can take a long-term perspective for polar research nations and provide the facility to develop cooperation with the wider international polar community at a regional level.



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