Italy

Points of Contact:
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Arctic Research Policy and Goals

Italy's Arctic policy is to increase knowledge of Arctic change, and its impacts and feedbacks, through scientific observations and monitoring, multidisciplinary research, and by enhancing international scientific cooperation. This policy is stated in the Italian Arctic Strategic and is implemented by Consiglio Nazionale delle Ricerche (Italian National Research Council, CNR), in collaboration with universities and research organizations, including the Italian Space Agency (ASI), Istituto Nazionale di Oceanogafia e Geofisica Sperimentale (OGS), Istituto Nazionale di Geofisica e Vulcanologia (INGV) and the National Agency for New technologies, Energy and Sustainable Economic Development (ENEA). Italy's overarching Arctic research goal is to obtain the necessary knowledge and understanding of climate change in order to mitigate its impacts, to increase resilience, and to enable sustainable, ecosystem-based management of resource development in the region.

Main Arctic Research Funders

Italian Ministry of Education, Universities and Research (MIUR, http://www.istruzione.it) supports research and innovation in the polar regions. This involves scientific research in the Arctic and Antarctica, such as observing and monitoring the atmosphere, sea ice, snow, and glaciers, and modeling of climate change and its impacts on terrestrial and marine ecosystems.

Consiglio Nazionale delle Ricerche (CNR) – The Italian National Research Council (https://www.cnr.it/en) supports research activities carried out at the CNR Arctic Station *Dirigibile Italia*. These include atmospheric and climate change studies, geology and geophysics, marine and terrestrial ecosystems, and paleoclimate and marine environment studies in the Kongsfjord, in the Svalbard Islands (Norway).

Agenzia Spaziale Italiana (ASI) – ASI (http://www.asi.it) uses various satellite constellations, including the COSMO-SkyMed, to support observational research that focuses on environmental monitoring and on surveillance applications to manage and respond to natural and anthropogenic hazards.

Ministero degli Affari Esteri e della Cooperazione Internazionale (http://www.esteri.it/mae/it) supports international collaborative research projects in the Arctic.

Istituto Nazionale di Oceanogafia e Geofisica Sperimentale (OGS) supports Arctic oceanographic research and operates the *R/V OGS Explora*.

Major Arctic Research Initiatives

CCT-IP. The Climate Change Tower Integrated Project investigates Arctic atmospheric boundary layer dynamics, surface energy budget and fluxes, and the roles played by complex coupling processes involving air, aerosols, clouds, snow, ice and land (permafrost and vegetation).

MELT. Using an internationally cooperative approach, and as an element of a pan-Arctic observing network, the scientific objectives of the project *Monitoring and InvEstigating Arctic Change along a Longitudinal Transect* are to strengthen and integrate Arctic observations, and to enhance understanding of complex processes involved in climate change.

PERMASAR conducts remote sensing of ice, snow and permafrost using DInSAR techniques. The objective of this research is to increase knowledge about the effects of global warming on permafrost, and to monitor small ground displacements and their effects on infrastructures in support of risk management.

ARCA. The project *ARctic present Climate change and pAst extreme events* is funded by MIUR and aims to develop a conceptual model of the mechanisms

responsible for the release of large volumes of fresh, cold water from melting ice caps. The processes in this complex system are investigated by using both paleoclimatic and modern observations.

DRAFT *(Damping Role of Arctic Fjords in the climaTe change)* and SNOW *(Sensor Network for Oceanography in Shallow Water)*. The major aim of these CNR projects is to collect time series of oceanographic data in *Kongsfiord* using permanently mooring arrays to understand how climate change is affecting fjord systems, and how the effects of this change may be mitigated.

UVASS. The objectives of the CNR project *Unmanned Vehicles for Autonomous Sensing and Sampling* are to develop and use unmanned marine vehicles and drones to perform *in situ* measurements in areas that are difficult or dangerous to access, such as glacier fronts.

GULP. The main goal of the *Gruvebadet Atmospheric Laboratory Project* is to assess Arctic aerosols, to understand local sources and long distance transport, and to increase knowledge of the complex processes that characterize the snow-air interface.

MOSSCO. The project *Morphological and chemical evolution of the Svalbard snow cover,* led by CNR and University of Venice, studies Svalbard snow cover and documents snowpack changes in glacial and periglacial areas.

Arctic Research Infrastructures

CNR Arctic Station 'Dirigibile Italia'. The Arctic station (http://arcticnode.dta.cnr.it/welcome), located at Ny-Ålesund, Svalbard, is a multidisciplinary research station operated by CNR. It can host up to seven scientists working in laboratories and offices. Active since 1997, it is named after the Umberto Nobile's airship Italia expedition of 1928.

The CNR Arctic Station Dirigibile Italia – Ny-Ålesund, Svalbard (Photo: Giuseppe Pellegrino, Ca'Foscari University, Venezia).

The Amundsen-Nobile Climate Change Tower is a CNR-operated facility connected to the Italian Arctic Station in Ny-Ålesund. The tower is 32 m high and is equipped with instruments to investigate surface radiation and energy budgets, planetary boundary layer dynamics, spectral surface reflectance, and greenhouse gas fluxes.

The Amundsen-Nobile Climate Change Tower during maintenance (Photo: Fabio Giardi, University of Firenze).

SIOS *(Svalbard Integrated Arctic Earth Observing System)*. Italy participates in SIOS, within the European Strategy Forum on Research Infrastructures (ESFRI) in support of a pan-Arctic observing system. SIOS coordinates and develops existing and new research infrastructure in Svalbard. The SIOS objective is to increase knowledge about climate change and develop climate scenarios. SIOS also coordinates open data, transnational access, logistics and training.

Gruvebadet Atmospheric Laboratory, also connected to the Italian Arctic Station, and operated by CNR and the University of Florence, is a modern laboratory with atmospheric and aerosol instruments.

COSMO-SkyMed is an ASI satellite constellation consisting of four medium-size satellites equipped with a microwave high-resolution synthetic aperture radar (SAR) operating in X-band.

R/V OGS Explora is a polar capable, research vessel equipped for geophysical and oceanographic research.

Italian All-Sky Cameras For Auroral Observations. In a cooperative effort, cusp auroras are studied with two cameras, operated by INAF (Italian National Institute for Astrophysics), and located in Ny-Ålesund and in Daneborg, on the northeastern coast of Greenland.

Italian Arctic Data Center. This digital center manages Arctic data and observations. The center is operated by CNR in cooperation with all other Italian research Institution.