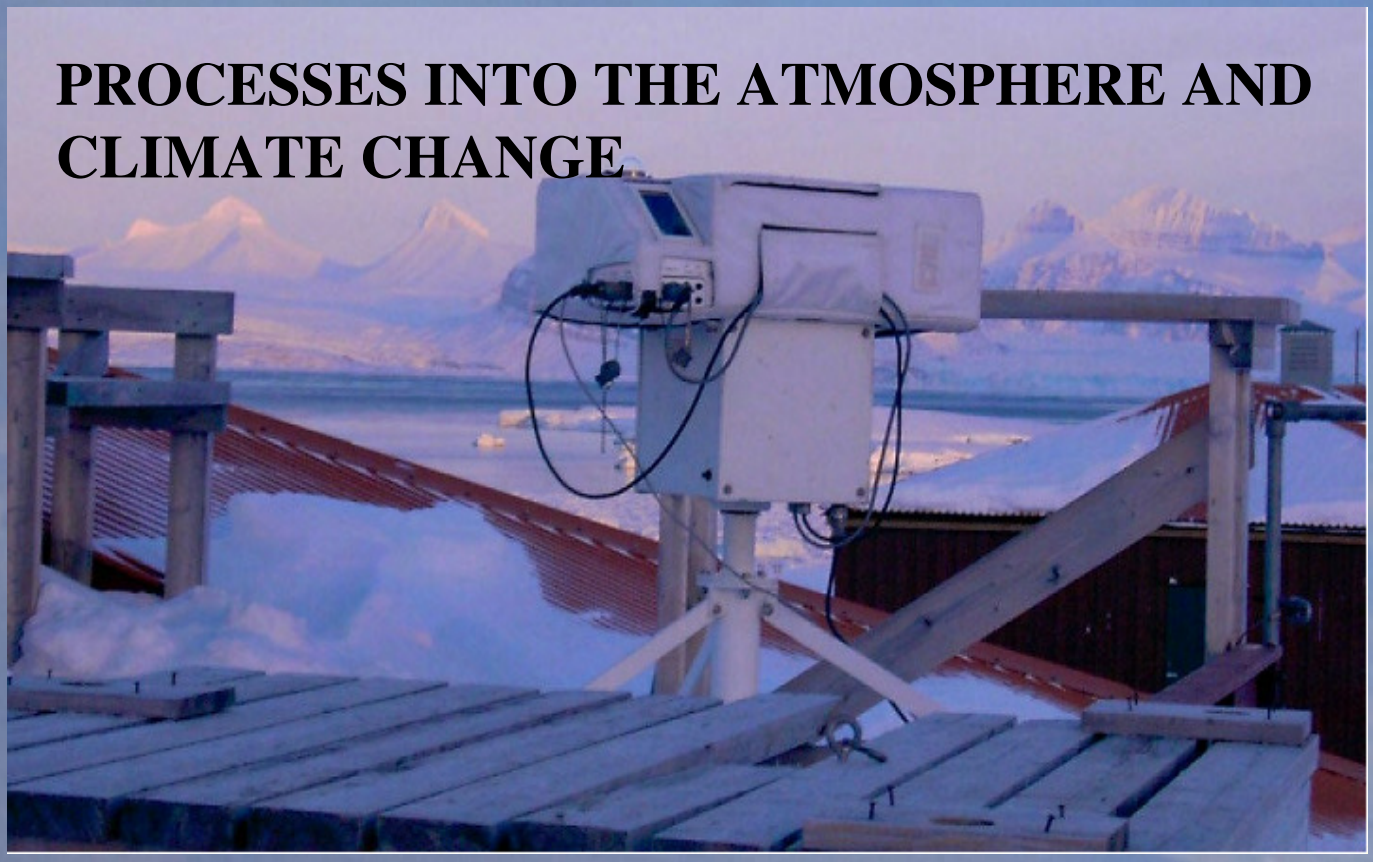
# PROCESSES INTO THE ATMOSPHERE AND CLIMATE CHANGE



The permanent presence of sea ice, ice sheets, snow and continuous permafrost are unique features of the polar regions. The Arctic is further distinguished because it sustains a human population in a harsh environment. These characteristics amplify the impact of global climate change on both the regional physical and societal systems. Changes in the Arctic climate system represent certainly a component of climate changes on a global scale. At the same time, there is also an increasing interaction between the Arctic and the middlatitude atmosphere

In the last years there continues to be consistent signs of a general warming in the Arctic region, most apparent in the relatively small extent of the winter and summer sea ice cover and increased greenness of the tundra. However, the persistence and impact of the moderating conditions occuring on a yearly scale represents an intriguing and significant puzzle with respect to the contemporary global climate system. They represent the most evident sign of the complexity of the climate system and the larger influence of feedbacks processes and environmental conditions in the Arctic region

Scientific community became aware of the magnitude of recent environmental changes in the Arctic around the half of 90'. Since than, a significant development of both observational and modeling activities in the Arctic occurred. Even if research interest and activities in polar regions related to climate changes and atmospheric physics are notably improving at the moment, Ny Alesund till represents one of the best sites to deepen our knowledge on the complex interactions/processes connecting different elements of this system and supply an important contribution to ameliorate their parameterization inside climate models.

Overall goals of research activities at Dirigibile Italia, devoted to investigate atmospheric processes and climate change, are to widen our knowledge on processes determining energy budget at the surface, as well along the whole atmosphere, structure and peculiarities of the Arctic PBL, air-snow-terrain interactions, role of pollutants/aerosols in the Arctic Environment. Research will move through both experimental and modeling activities. All results will provide an important contribution to improve parameterizations and reduce uncertainties in climate models. To pursue such overall goals an intense experimental activity is implementing through the installation of a new observatory at the Italian station "Dirigible Italia". The obtained data set will allow us to better understand the complex relationship between optical properties of the atmosphere, physical and chemical aerosol composition, climate forcing and environmental feedbacks. Modelling activities will make use of these results to define new parametric schemes for climate models. The individuation of the scientific objectives and experimental platform have been made trying to integrate in a wider strategy some of the most important scientific questions for the understanding of the system, the observational gaps in Ny-Ålesund and the expertise of the research groups involved.

The Climate Change Tower integrated project (CCT-IP) is a very important element of the whole strategy. In particular, results of the project will permit to obtain new information on physical characteristics/parameters determining start of snow-melting in spring, their inter-annual variability and dependency from cloudiness and aerosol load. The related research activities on the permafrost and soil characteristics will allow to monitor and evaluate the transportation of energy dozens of meters deep and how climatic changes on surface affect the lower strata, while PBL measurements will permit to extend the study of energy transportation processes to levels of hundreds of meters.
The multidisciplinary approach, the connection of atmospheric physics research with terrestrial and environmental science, as well as in some extent biology will be extremely important to reach general objectives above indicated. As an example, in the CCT-IP Project will able us to obtain a closure of the energy budget at the surface and connect in a better way the most part of processes involved in.