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Climate Change Tower Integrated Project (CCT-IP) A scientific platform to investigate processes at the surface and in the low troposphere

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To improve parameterization and reduce uncertainties in climate models, experimental measurements are needed to deep the knowledge on the complex physico-chemical process that characterize the Arctic troposphere and the air-sea-land interaction.

Svalbard Islands, located at the northernmost margin of the southern warm current of the Atlantic Ocean, lies in an ideal position to study the combined effects of climate change affecting the atmosphere, as well as the ocean and land. Furthermore, Ny-Ålesund represents a unique site, where international cooperation among countries can allow the monitoring of a greater number of key parameters of the Arctic physical and chemical systems.

Based on these remarks, since 2008, CNR Earth and Environment Department sustained and funded the Climate Change Integrate Project (CCT-IP) in the Kongsfjorden area, aiming to setup a scientific platform at the Italian station "Dirigibile Italia", in Ny Alesund. This platform will be able to complement research activities provided by other national (MIUR-PRIN07) and international research programs. In the framework of this project, it was planned obtaining a comprehensive data set of physical and chemical atmospheric parameters, useful to determine all components of the energy budget at the surface, their temporal variations, and role played by different processes involving air, aerosol, snow, ice and land (permafrost and vegetation).

Key element of such platform is the new 32 m high Admundsen-Nobile Climate Change Tower (CCT) that will allow to deeply investigate energy budget and the atmospheric boundary layer dynamics and exchange fluxes (heat, momentum, chemical substances) at the surface. A first set of instruments to measure the radiation balance, surface albedo, the vertical profile of meteorological parameters and the heat flux at the air –snow interface has been installed in September 2009. The on-site measurements are continously running and the data are sent in Italy via a internet connection and stored in a comprehensive database

A six months intensive field campaign will start in March 2010 to measure physical characteristics and chemical composition of the aerosol and snow, the down and upwelling mass fluxes of aerosols and gaseous substances and short-lived pollutants (SLPs). These measurements will improve our knowledge on the processes controlling sources, transport processes and atmospheric transformation of chemical compound in snow and aerosol, useful as environmental and climatic marker, and will highlight the importance of local surface processes with respect of large scale transport processes.