# CCT Integrated Project

Svalbard is located at the northernmost margin of the warm sea current coming from the lower latitudes of the Atlantic Ocean (the West Spitsbergen Current). It lies in an ideal position to monitor 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 much greater number of key parameters of the Arctic physical system. In that respect, it thus represents one of the ideal sites to deepen the knowledge on the complex processes and interactions connecting the different components of this system (atmosphere, cryosphere, lithosphere, biosphere, hydrosphere) and, this way, provide an important contribution to improve their parameterization in climatic models.

Processes at the surface and ABL characteristics are strictly connected. For example, the atmospheric significance of the snow photochemistry phenomenon depends on the potential to emit the photoproducts to the overlying boundary layer. This means that proper interpretation of the atmospheric chemistry measurements requires an understanding of the processes that control boundary layer mixing, as well as an understanding of the snow photochemistry. Aerosols characteristics and depositional processes are also largely determined by ABL characteristics. On the other hand, ABL processes and dynamics are the result of complex interactions between turbulence and radiation and than largely influenced by the presence of clouds, haze and sea ice variation. In order to deepen our knowledge of all these processes and ameliorate parameterisation schemes, the Climate Chage Tower Integrated Project will create an experimental platform to investigate arctic ABL energy budget, and role played by different processes involving air, aerosols, clouds, snow, ice and land (permafrost and vegetation). Key element of this integrated platform will be the 30 m

height Amundsen-Nobile Climate Change Tower (CCT), located Sud-Est the village at a distance of about 1200 m. The tower has a rectangular base of 1.8x1.2 m and 17 levels. It is equipped with a stair which allows to reach different levels also in winter. The CCTower duplicates a similar structure installed at the Italian-French station of Concordia. on the Antarctic Plateau.

The accurate measurement of radiation fluxes as well as those of sensible and latent heats will allow an accurate evaluation of both radiation and energy balance. The research activities on the permafrost will allow to monitor and evaluate the transfer of energy dozens of meters deep and how climatic changes on surface affect the lower strata, while ABL measurements will permit to extend the study of energy transfer processes to levels of hundreds of meters. Monitoring of aerosol physico-chemical characteristics, cloudiness and surface properties will allow to determine their role in modulating balance at the surface and influence starting of snow-melting process in spring. Measurements of down-welling and up-welling mass fluxes (aerosols, gaseous substances) and measurements of more important Short-lived Pollutants (SLPs) will permit to improve our knowledge on chemical and physical processes controlling the dynamic of trace elements (and their species) in the arctic snow and and highlighting the importance of local surface processes with respect to long-range transport processes.