

National Report to SCAR for year:

2011-2012

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A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS*:

Geological-Geophysical sciences

Geomagnetic observation, seismic monitoring, radon emanation registration are presented. Monitoring observations of geomagnetic field components were carried out at Vernadsky magnetic observatory within the framework of the INTERMAGNET Protocol. Ultrahigh energy cosmic rays were registered by radio physics methods with the help of Antarctic ice as well as radon signal from the Earth crust.

Hydrometeorological sciences

Hydrometeorological and ozonometric (Dobson spectrophotometer) observations took place. Investigations of large-scale atmospheric processes of the southern hemisphere troposphere and low stratosphere regularity, deep water forming processes in the Antarctic Peninsula shelf and modeling of Weddell sea regional circulation and current situation of climatic system and also extension of a long-term weather forecast method for Antarctic Peninsula were conducted.

Geospace sciences

Ionosphere radio sounding, VLF-SLF observations and Stanford University experiment data (SLF) are presented. Studies of electromagnetic displays of geospace and weather disturbances in Antarctica were carried out.

Biological sciences

Biodiversity studies of terrestrial and marine ecosystems, climate impact assessment of terrestrial ecosystems of the coastal Antarctica, investigations of Antarctic microorganisms' resistance to the extreme conditions (ultraviolet radiation) took place at Vernadsky station. Investigations of Antarctic Peninsula's biodiversity and biota adaptation strategy were conducted. Pinnipedia and cetacean of coastal waters of the Graham Land western coast (species composition, number, structure of population, morphological features) were studied. Studies of *Deshampcia antarctica* and *Colobantus* growing sites in the area of Argentina Islands Archipelago were carried out. Investigation of Chizhevsky-Welhover bio-astronomic effect in Antarctic conditions was conducted.

During the summer season 2011/2012 researches on designation of Marine Protected Area in the area of Argentina Islands Archipelago (Ukrainian Antarctic Vernadsky station) were started. More than 40 research submergings to the depth up to 50 meters were conducted during the indicated period for the purpose of phyto- and zoobenthos sampling, estimation of species diversity, qualitative and quantitative composition of benthos cenoses, biomass of separate species and also for photo and video filming. The research was based on the NaGIS Protocol (Natural Geography in Shore Areas). Two test polygons were created at the seacoast of Galindez Island (Vernadsky station). It was suggested designating Skua Creek at the first stage of designation of Marine Protected Area.

Anomalous Antarctic summer impact to avifauna population was also studied. As a result of scientific research there were discovered four new species of tardigrade. About eight new species of ground nematode (for Antarctica fauna) are described. Experiment on modelling of climate warming impact to reaction of local invertebrates was started. Besides, a suitable place was found where two DataLogger devices designated for multi-year experiment on modelling of climate warming at Galindez Island and Uruguay Island were installed.

Owing to unfavourable ice conditions in the area of Argentina Islands Archipelago, all water area was covered with ice that resulted in high mortality of gentoo penguins' population (*Pygoscelis papua*). So, anomalous Antarctic summer has significantly undetermined *Pygoscelis papua* population in the area of Argentina Islands Archipelago.

Medico-physiological studies

Studies of disregulation mechanisms of psychophysiological functions are presented. Monitoring of individual dynamics of adaptation changes of winterers' organism functional systems during a long-term Antarctic expedition at Vernadsky station was fulfilled.