



XXXIII Antarctic Treaty Consultative Meeting
3rd to 14th May, 2010

Punta del Este - Uruguay

IP 54

Agenda Item: ATCM 14, CEP
6b
Presented by: Korea (ROK)
Original: English

The Republic of Korea's contribution to Antarctic science by installing a new permanent station in Terra Nova Bay, Ross Sea

극지연구소



The Republic of Korea's contribution to Antarctic science by installing a new permanent station in Terra Nova Bay, Ross Sea

Submitted by the Republic of Korea

Introduction

After joining the Antarctic Treaty in 1986, the Republic of Korea established the 'King Sejong' station in 1988 and became a member of the ATCP in 1989. In 2006 the Korean government announced a plan to build a new research station in the Antarctic in order to enhance scientific capabilities of Korea and promote collaboration for the development of Antarctic sciences. Aided by Australia, Italy, New Zealand, Russia and the U.S.A. for consultation and transport support, Korean scientists have visited 10 candidate places to choose the most suitable site for the station. Two key areas were identified according to scientific interest: Cape Burks in Marie Byrd Land and Terra Nova Bay, Northern Victoria Land.



Figure 1. Location map of Terra Nova Bay

The intensive field survey was conducted by 22 scientists, onboard *ARAON*, the new Korean icebreaker, from January 12th to February 18th in 2010 in both places. All the activities were carried out under the Initial Environmental Evaluation (IEE) arranged before the expedition. Cape Burks, where the Russkaya station of Russia is located, was visited from January 24th to 30th in 2010. The area is featured by its rugged terrain with a limited outcrop area of 2x1 km exposed from the West Antarctic ice cap, and access to the shore is prohibited because of the ice cliff along the coast. The Terra Nova Bay area, where Italian Zucchelli and German Gondwana stations are located, was visited from February 6th to 10th in 2010. According to a study thoroughly conducted by the Korean team especially at the Mt. Browning area, Terra Nova Bay is considered the most suited for the station. The exact location was advised to avoid serious environmental disturbances.

Criteria for site selection

Researches related to climate change are the prime interest of the Korean program and the site for the new station was selected based on that criterion. Cape Burks was excluded because of its confined space which may discourage scientific pursuit especially in geosciences and coastal biology, the main disciplines to investigate at the new station.

Terra Nova Bay is expected to provide an ideal platform for the research on climate change over the Pacific Ocean side of Antarctica. The winter-over research program will contribute a great deal to understanding the rapid climate change in the region; for instance, a precise year-round

measurement of green house gases will be an asset to the science community of the region. A climate observatory, which Korea is planning to establish to participate in the global atmosphere watch (GAW) program in Terra Nova Bay, will provide a useful, long-term database regarding the atmospheric composition. The nearest regional GAW station is located at McMurdo, 300 km away from Terra Nova Bay. The climate-monitoring program in Terra Nova Bay, the new Korean project, will also provide valuable data about climate change on the Pacific side of Antarctica.

The Ross Sea continental shelf represents a unique habitat: for example, the food web, in this region, is substantially different from other areas of the Southern Ocean because of the extreme seasonality, numerous polynyas and extensive ice shelf. This ecosystem is also subject to physical changes occurring in the area.

The Ross Sea, along with the Weddell Sea, is one of the places of extensive bottom water formation in the Antarctica. The Ross Sea is experiencing rapid freshening that may result in change in the rate of bottom water formation and in turn global climate change. While there has been a 10% increase in Antarctic sea ice extent in the Ross Sea region, regional sea ice has decreased in the west of the Antarctic Peninsula and this should have far-reaching consequences. Therefore it is of great importance to identify major oceanographic and atmospheric parameters that are responsible for the freshening and to monitor the variability in the rate of bottom water formation. The observation of sea ice extent and physical processes are also important topics that need to be timely addressed together. Korean scientists plan to establish long-term oceanographic data series that will assist us in detecting the trend with comparison to other regions and predicting the future changes.

Antarctic neotectonics including volcanism is an important subject to understand the geological processes as well as the development of continental glaciations. Mt. Melbourne in Terra Nova Bay is one of a few exposed active volcanoes in Antarctica. The location of Mt. Melbourne and its volcanic activities are associated with Ross Sea rifting and uplift of the Transantarctic Mountains rift shoulder. Because the specific seismicity and physical structures in this area have not been fully studied yet, Korea is proposing to install multifold stations including seismic, infrasound, camera, and GPS systems at Mt. Melbourne to observe microseismic activities caused by its volcanic activities.

Terra Nova Bay is located at geomagnetic latitude of 77°S, which will afford a good view of the site to check out upper atmospheric phenomena including Aurora. Although the upper atmosphere is currently well observed via such tools as ionosonde, MF radar and GPS scintillation receiver, its system is too complicated to fully analyse only with a limited number of measurements. In fact, the system consists of ionosphere, thermosphere and mesosphere, which interact with both the magnetosphere and the lower atmosphere. To understand the system comprehensively and extensively, therefore, a set of simultaneous and multidimensional observations must be surely made. So far, there has been no observation for the thermospheric winds and ionospheric drift velocity, which are crucially important for the study of the coupling between the ionosphere and thermosphere. Korea will install Fabry Perot Interferometer for the thermospheric winds and Digisonde for the ionospheric drift velocity at the new station. In addition to the regular operations for long-term observations, it may also be needed to work with other stations to coordinate observations, different or similar, on specific events such as magnetic storms.

Activities at the Mt. Browning area, Terra Nova Bay

At the Mt. Browning area, Terra Nova Bay, methodical field investigations were conducted in their conjunction with different fields such as geology, ecology, meteorology, glaciology and civil engineering. Automatic Weather Station (AWS) was installed at 74°37.386' S, 164°13.716' E in the

area. Also, an Igloo Satellite Cabin was set up near AWS to measure snow drift during the winter season. An area of 2.5 km² was investigated to select the most suitable site as well as to prepare a draft Comprehensive Environmental Evaluation (CEE) for the new station.

With the new research station, Korea is expected to make significant contributions to the international collaboration and the effective management and conservation of the Antarctic environment. Further information will be provided at the ATCM and CEP in 2011.

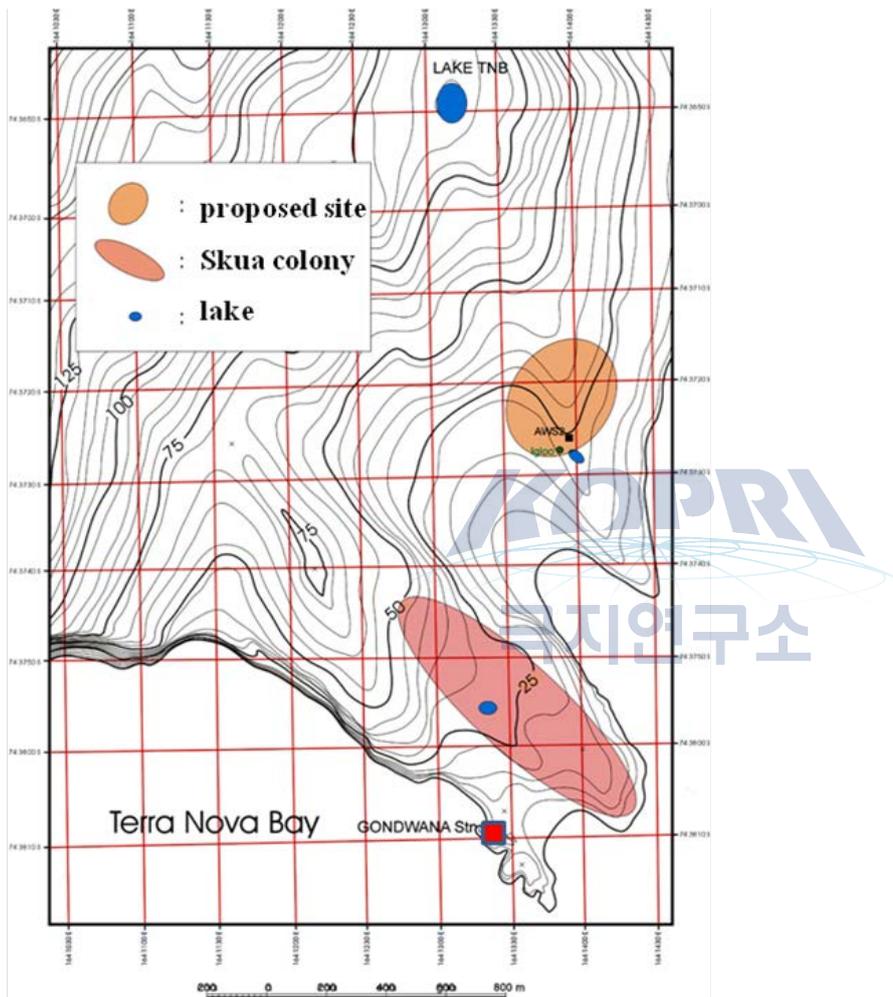


Figure 2. Proposed site at the Mt. Browning area, Terra Nova Bay