

ENVIRONMENTAL TECHNOLOGY PROJECT - ARQUIANTAR

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The project is aimed mainly at assessing the direct effects caused by the construction of buildings in Antarctica by Brazilians and developing specific technologies for Antarctic buildings founded on the tripod comfort/safety x impact minimization x efficiency. The studies have been divided into ten main approach foci: 1. Corrosion; 2. Acoustics; 3. Landscape; 4. Waste; 5. Territorial planning; 6. Quality of indoor air; 7. Water; 8. Wastewater; 9. Thermal performance; and 10. Energy. Considering the results obtained in 2009, in continuity there is a synthesis of the main results obtained in the specific investigations concerning water, landscape, acoustics, and corrosion which led to making use of these results for developing the SAM – Standard Antarctic Module (*MAP – Módulo Antártico Padrão*).

Water

Since 2007, water consumption has been monitored at the Comandante Ferraz Antarctic Station (EACF) using hydrometers installed in strategic locations in the several specific divisions of the Station. The data was gathered in different at periods between June 2007 and March 2009, occasions at which the Station was used more intensively. The data was treated statistically to enable a detailed diagnosis of the consumption profile related to the different divisions and the main activities developed at the EACF.

Based on the referred diagnosis, it was possible to identify the environments with higher water consumption and allocate the necessary intervention to simultaneously minimize water consumption and direct the studies aiming at the future implantation of a Water Conservation Program – WCP (*Programa de Conservação de Água – PCA*).

Landscape

Aiming at developing a specific methodology to assess the impact on the landscape, we gathered pictures in the summer of 2009/2010 in order to create an initial database (landscape starting point) for continuous monitoring of the Keller Peninsula at pre-established intervals: 2, 5, 10 and 50 years.

The methodology proposed for obtaining the images assumed the definition of georeferenced points (Image Reference Points-IRP) on and offshore (Figure 1). In each IRP, 8 pictures were obtained (clockwise: N, NE, L, SE, S, SO, O, NO), which allowed recording the whole surrounding area (360°).

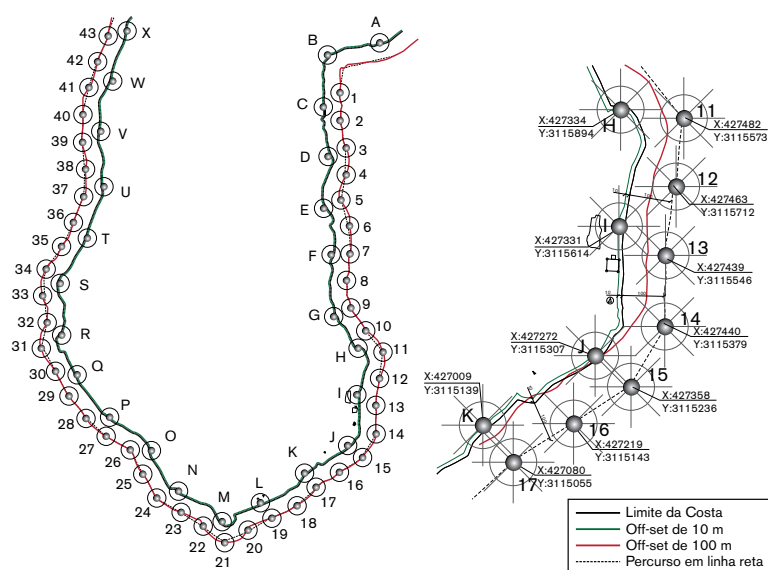


Figure 1. On the left, on and offshore IRP and, on the right, details of the IRP with the image foci orientation.

Acoustics

Since 2003, an impact assessment has been carried out at the EACF in order to identify and control noise. This on-site investigation is based on the methodology developed in a partnership with *Instituto de Pesquisa Tecnológica do Estado de São Paulo (IPT)*. Through this measurement, it was possible to verify that the engine room (generators) and maintenance activities on metallic surfaces were the main source of impact due to the high level of sound pressure from the generators. Inside the Station, however, the poor acoustic insulation of the cabins was identified as the main discomfort factor, both because of the transmission of noise and because of sparse acoustic privacy.

The generators were replaced during the Antarctic Expedition XXVIII (OPERANTAR XXVIII) operation and further measurements were made in order to identify the sound pressure level of the new equipment. The data collected will be treated statistically for future assessment. However, the noise reduction has been already noticeable regarding the new equipment. Interestingly, other machines have taken over the position of discomfort-causing noise makers such as the aquarium compressors, which operate continuously.

Corrosion

In 2002, the assessment methodology for corrosion studies and the procedures for installing Comandante Ferraz Atmospheric Corrosion Station were developed. The corrosion test coupons were monitored until the summer of 2009/2010, when they were removed for final laboratorial tests to be carried out in Brazil. Their assembly supports and residue generated were then removed so as to preserve the integrity of the place.

Monitoring was carried out through quarterly photographic recording, and the results were published annually. All the methodology being in compliance with relevant Brazilian standards.

SAM – Standard Antarctic Module (MAP – Módulo Antártico Padrão)

The basic design for a standard modular unit was created in order to develop solutions based on efficiency, sustainability (environmental, economic, and cultural), safety and available logistics for the future Brazilian buildings to be installed in Antarctica. This basic design was intended for use in both the pre-Antarctic environment – where the Brazilian facilities are currently located – and the environmental conditions of the continent (Figure 2).

The alternative materials to those used in the Brazilian Antarctic Program (PROANTAR) project were previously defined in the basic design. Initial efficiency simulation tests were also carried out. Their improvement, however, will depend on the project progress.

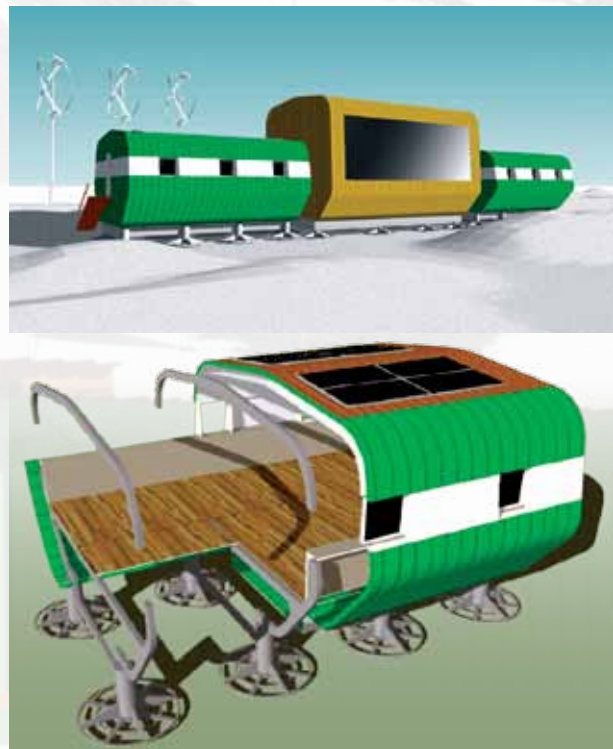


Figure 2. on the left, general view of SAM and, on the right, general scheme of the building system.