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The Aerocrew Mission : Training Space Session at Ny Aalesund Arctic Base

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The Aerocrew mission has been realized in December 2007, in the frame of the International Polar Year, and in cooperation with the Polar Institut Paul-Émile Victor. The team has realized an original 5 days training experience at Ny-Aalesund Arctic Base (79°N) the. The 11 crew members constituted a space crew, including physicians, aerospace crew trainers and engineers, and were implied in a seminar with 4 sessions, dealing with the training capabilities of Arctic Bases. The goal was on one hand to show that this kind of base constitutes a pertinent and affordable facility for space and aerospace teams, and on the other hand that the specific aerospace crew training techniques, could be fruitful for the scientists in arctic bases (glaciologists, geologists, specialists of the atmosphere).

The 4 sessions, given by professionals of aerospace, robotics and medicine, covered the training methods for crews, robotics for outdoor and indoor activities, engineering of embedded systems, and the internal arrangement of crafts. The experience has shown the efficiency of a transverse visiting multidisciplinary team for training, and possible synergies with the resident scientists. In addition, the sessions were enriched by demonstrations such as mini-robot for observation, micro-helicopter for special sites, and also the comparison between EVA Russian glove and Polar Suits.

After this mission, it was possible to conclude that this kind of cooperation could certainly open perspectives with crossed benefits either for space training and arctic research.

1) Scope and general context

In the frame of the International Polar Year, the Alfred Wegener Institut and Institut Polaire Français Paul-Émile Victor have welcome the AEROCREW Mission at Ny-Ålesund, during one week in December 2007. This short mission was nevertheless original in its scope, Organized by Terre&Espace, a French Association devoted to applications of space techniques (www.terrespace.org), after discussion with the Polar Institute.

The AEROCREW mission aimed at training and identify possible spinoff between aerospace crews preparation and techniques on one hand, and scientific research in polar bases on the other hand. One fundamental scope was actually the demonstration of training synergies between arctic and aerospace crews, as the scientific and human challenges are similar : high level scientific team in hostile and isolated medium, with operational scopes.



The AEROCREW

For this purpose, the crew was chosen in function of coherence and complementarity with an actual planetary crew, taking into account the training priority. It gathered eleven members (four women & seven men) with three physicians (one surgeon, one aerospace & sport specialist, one ear specialist), one specialist in life sciences, one specialist in physical sciences, one satellite engineer, one researcher in robotics and command systems, one aircraft crew trainer, one researcher in aerospace embedded systems, and two researchers and professors in mechanics and space techniques.

2) Training sessions

Four technical sessions were realized during the mission, each session dealing with a specific thematic, with a formal presentation by the specialist, and a practical application of proposed protocols. The first one was precisely devoted to Astronaut Training Methodology, and possible applications for the preparation and follow-up of arctic crews. This session was proposed by Delphine Gourdou, former trainer for astronauts and currently trainer for aircraft crews (which also represents an interesting spinoff).

The different procedures were presented, with emphasis on the necessity of rigorous and clear specification for any high level technical training for crews, and also the importance of initial consideration of crew communication protocols for defined tasks. The different approaches of written documents (in particular in US and Russian context) was highlighted.



A practical exercise was then made about Extra Vehicular Activities, with time limited action and standard orders given by the base to the crew member in EVA. This is directly applicable for external worker in polar medium, with the safety and performance stakes. This exercise was made in the context of robotic assistance in EVA, which was developed in other sessions.

It is also necessary to precise that the crew human context was comparable, for training, to the context for space crews : coexistence specialized high level scientists, with major mission scopes, in an exotic context, and transverse crews whose mission is rather technical and organisational. In fact, this matrixial aspect of crew activity must be reflected by the organisation of training strategy and communication method. In fact, the three other sessions were devoted to scientific presentations for all the other crew members : command and autonomy in robotics, system engineering and specification, space mechanisms and long range flights. These sessions aimed at sharing the technical stakes in a international and multicultural team, which is the common case for a polar base.

3) Perspectives

The mission demonstrated clearly the pertinence of aerospace training methodology for polar crews, the challenge and context being similar.. It was also the occasion to demonstrate some particular situations such as a visioconference with training session in France, which also induces analogies with space missions. In any way, the crossed cooperation between aerospace trainers and arctic teams is obviously promising and opens wide possibilities.


