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A Floating Antartic Research Station (Fars) A Reality Or Fantasy?

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Abstract: *FARS is a floating mobile unit which can be used as a base mooring in lagoons which occurred near shore as a results of glacial retreat.*

I. Lagoons

The increase in temperature observed in the South Shetland region since 1977 at the Polish Arctowski station 62°09'41''S and 58°28'10''W (Martianov.V., Rakusa-Suszczewski S. 1990) and at the Bellinghausen station since 1968 (Keina 1999) has been accompanied by a retreat of glacial activity. In front of some retreating glaciers young lagoons occur, which are separated from the main part of the bay by shallow underwater ridges or slightly emergent peninsulas of sand and rock representing frontal moraines. Where the sea divides the frontal moraine, lagoons are created by the interruption of tidal and freshwater flows resulting from melting glaciers (Rakusa-Suszczewski 1995, Rakusa-Suszczewski 2002). The mean temperature of the surface of soil in Arctowski Station area was positive during 157 days and fresh water is available year round (Zwolska,I. and Rakusa-Suszczewski, S. 2002). Such lagoons are: Johnso'ns Dock (62^{o}40 S, 45^{o}03'W) on Livingston Island, Yankee Harbour (62^{o}32'S , 59^{o}47'W) in McFarlaine Strait or Monsimet (62^{o}11'S 68^{o}34' W and Herve Cove (62^{o}11'S 58^{o}33'W) in Ezcurra Inlet and the recently formed lagoons such as those in front of Ecology Glacier – West shore of Admiralty Bay (Fig.1).

II. General Description

FARS (Fig. 2) would be considered a "ship" according to the definition of Annex IV art.6 (g) to the Protocol on Environmental Protection to the Antarctic Treaty ". "Ship" means.. a vessel of any type whatsoever operating in the marine environment and includes hydrofoil boats, air-cushion vehicles, submersibles, floating craft and fixed or floating platforms. Article n6 concerns marine pollution and the discharge of sewage which does not apply to ships certified to carry fewer than 10 persons. Annex I. Article 2 states that if an activity is determined to have a minor or transitory impact on the environment that activity may proceed forthwith.
Since FARS is a mobile unit floating on the sea one can use the Law of The Sea at its location and not the land procedures as they pertain to Antarctica proper. This is particularly important because of the reduced number of places suitable for the installation of shore stations.
FARS is a land base for research but it can also be used for oceanographic surveys and marine biology. For short local distances the "barge/ship" can move independently or be towed and transported much further by vessel.

III. Technical Parameters

FARS is envisioned as being a year-round. station for 8 people (for example: mechanic, electrician/electronics, cook, doctor, and four researchers). Surface of one cabin is 2.5m x 2.4m = 6m^2 living room 18m2, workshop 11m2 (Fig.2, Table I). Diesel power plant and fuel is needed (engine 15kW) 4.5l/h x 24h= 108l x 360 days = 38.8 m3 (tank volume). Alternate power supports of a wind plant (10kW - diameter of wings 7.1m) and solar panels on both sides of the ship (1kW) would be needed. Remarks: The fuel and water tanks are divided by placing two tanks on either side of the ship. Pumping on one side would cause the ship to slope and free itself from the ice. Located under the deck (having a width of 0.5m) and between the tank and the bottom of the ship is polyurethane foam for insulation. Considering a 365 day sojourn a team would need dry and frozen foods in the amount of approximately 35m^3, juices 3.5m^3, beer 3.5m^3 ☹ .is limited.

IV. Acknowledgements

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Table I. Dimension and volume of FARS;

Displacement of hull of barge	29m x 6m x 1.0m = 174 m^3
First floor	26m x 6m x 2.1m = 327m^3
Second floor	11m x 6m x 2.0 m = 88m^3
Tanks:	
Fuel - winter diesel	10m x 5.8m x 6m = 34.8m3
Fresh water	10m x 5.8m x 6m = 34.8m3
Fecal and green water	6m x 5.8m x 0.6m =20.9m3
Assuming that	1m3 = 0.05 ton
Gross weight of empty FARS IS	34.tons