

AN INTERNATIONAL RESEARCH STATION IN ANTARCTICA

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Many people, including Wernher von Braun, have drawn an analogy between the manned exploration of the solar system and scientific stations in Antarctica. Some of the Space/Antarctic parallels are quite obvious, such as the necessity to select small groups of highly trained individuals who can work together in isolation for extended periods, or in the case of the Moon/Antarctic comparison, the long day/night cycle. However, the parallel can be carried considerably further to include the types of science to be done, and, in some cases, there is even a strong similarity in environmental conditions. It may be worth while to build a new Antarctic station just to learn more about how to do planetary exploration.

An even stronger motivation to build a new station high (above 4000 m altitude) on the East Antarctic plateau is provided by the unique scientific opportunities that such a site could provide. As one example, the low water vapour content of the atmosphere, coupled with the low temperature, means that the atmosphere is more transparent and quieter from the infrared through the millimetre wavelengths than from anywhere else on Earth. This may make it the best place on Earth for some kinds of astronomy, and in some cases better than space, since one can build large structures and arrays.

Politically Antarctica is the perfect place to build an internationally owned and operated laboratory. The Antarctic Treaty, to which most of the major nations subscribe, strongly encourages cooperative projects for peaceful purposes, and cooperation has been a hallmark of relations between nations in Antarctica up to the present. Existing international corporations, such as Intelsat, might serve as organizational models.

This station would be located on the East Antarctic ice sheet at an altitude above 4000 m on Dome A near 82°S, 72°E. The wintertime pressure altitude would be over 5000 m (16000 to 17000 feet), so high that it would be desirable, and possibly even necessary, to pressurize the station. This would certainly be the coldest and lowest water vapour observatory on Earth, which would make it highly desirable for infrared, submillimetre and millimetre astronomical measurements.

The environmental conditions can be reliably extrapolated from other sites in East Antarctica such as South Pole, Vostok and Dome C. The precipitation would be very low (1-5 cm/year?) with generally clear skies and consequently an abundance of solar energy in the sunlit period. The wind speed would be very low, averaging about 3 meters per second (7 mph) for the windiest month. The coldest temperatures would be near -90°C (-130°F). This site would be nearly equidistant (about 800 km) from South Pole and Vostok and could be logistically supported by ski equipped aircraft or overland traverse from McMurdo, South Pole or Vostok.

Clearly this station could closely emulate a lunar base. It should be pressurized and make use of solar power and the science would focus on astrophysics, space physics and geology, which would certainly be major activities on the moon. The low precipitation and low average wind speed should minimize problems with accumulation and drifting, especially if the highest point is chosen for the station.