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Germany's Scientific Presence post IGY in Antarctica (Atlantic Sector)

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German research activities in Antarctica after World War II had been quantitatively of secondary importance and were merely based on single personal initiatives rather than on official contacts and support for a longer period – even during the International Geophysical Year (IGY) 1957/58.

On invitation of the Academy of Sciences of the USSR to its East German counterpart in 1959 East German scientists first started to participate regularly as guest scientists in the Soviet Antarctic Expeditions (SAE) – not only in summer campaigns but as well as wintering scientists. In almost logical consequence a first East German research base in Antarctica was established and permanently operated as an annex to the Soviet station Novolazarevskaya at 70°46'S, 11°41'E in the Schirmacher Oasis of eastern Dronning Maud Land. This annex-base was commissioned on 20 April 1976. In 1985 this research base became internationally known when the vertical extension of the ozone hole in the southern polar stratosphere was first recorded by regular balloon-borne ozone observations (GERNANDT 1987, GERNANDT et al. 1989). Finally in 1987, when East Germany achieved the Consultative Status of the Antarctic Treaty this research base became independent and was named Georg Forster Station; it was permanently occupied and successfully used until 1992. The station was then closed-down and removed in the frame of a German-Russian project, which was completed in 1996. Long-term scientific projects were transferred to Neumayer Station II on the Ekström Ice Shelf.

During the mid 1970's – with hindsight most likely as aftermath of the first oil crisis and discussions of the mineral and living resources of the Antarctic – the Federal Republic of Germany started planning towards becoming a consultative member of the Antarctic Treaty system. A number of major scientific expeditions to the Antarctic were carried out at sea and on land such as the 1975/76 Krill-Expedition with FFS "Walther Herwig" of the German Federal Institute of Fisheries (BFA) to the South Orkney Islands area (SAHRHAGE et al. 1976), or the 1977/78 geoscientific expedition with RV "Explora" of the Federal Institute of Geosciences and Resources (BGR) to the continental margin off the eastern Weddell Sea (HINZ & KRAUSE 1982), or in austral summer 1979/80 the first "German Antarctic North Victorialand Expedition" (GANOVEX-I) of the BGR to the Transantarctic Mountains (TESSENSOHN et al. 1981).

At that time, a prerequisite to achieve consultative status of the Antarctic Treaty was by common consent amongst treaty

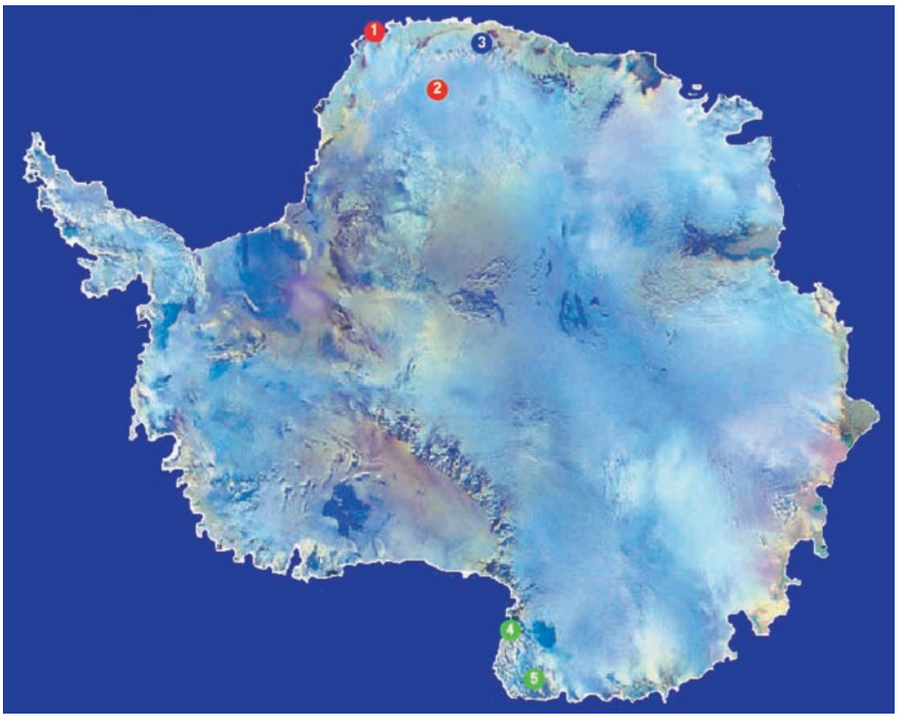

Fig. 1: German research facilities in Antarctica, Atlantic sector: red (1): the currently operated permanently occupied station Neumayer II on the Ekström Ice Shelf at 70°38.00'S, 008°15.80'W; red (2): the summer only Kohnen Station at the inland ice plateau at 75°00'S, 000°04'E; blue (3): position of the former Georg Forster Station in the Schirmacher Oasis at 70°46'S, 011°41'E. Additionally shown are the German research stations in northern Victoria Land (ROLAND & TESSENSOHN 2005), green (4). Gondwana Station at 74°38'S, 164°13'E, and green (5): Lillie Marleen Hut at 71°12'S, 164°31'E. (Multispectral satellite AVHRR image map, image: NASA).

Abb. 1: Lage der deutschen Forschungsstationen auf dem antarktischen Kontinent, atlantischer Sektor: Rot (1): Die ständig besetzte Station Neumayer-II auf dem Ekström-Schelfeis bei 70°38,00'S, 008°15,80'W; Rot (2) Die Sommerstation Kohnen auf dem antarktischen Inlandeisplateau bei 75°00'S, 000°04'E; Blau (3): Die Position der ehemaligen Georg Forster Station in der Schirmacher-Oase bei 70°46'S, 011°41'E. Ebenfalls gezeigt die Lage der Stationen in Nord-Victoria-Land (Roland und Tessensohn 2005), Grün (4): Die Gondwana-Station auf 74°38'S, 164°13'E und Grün (5) die Lillie-Marleen-Hütte auf 71°12'S, 164°31'E. (Multispektrale AVHRR Satellitenkarte, Quelle: NASA).

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members that a consultative nation must operate a wintering-over base in Antarctica and have an active Antarctic research program. This was recognised by the federal government and consequently on 10 October 1978 the decision was reached to establish a national polar research institute.

In consequence of this decision it was also decided to erect a wintering-over base on the Ronne Ice Shelf, to build an icebreaker for research and supply (of the new station) and to set up institutional funding for long term Antarctic research.

It may be worthwhile to define the main considerations behind those decisions, which were:
• The Federal Republic of Germany with its longstanding tradition in science should share in the exploration of the then still widely unknown Antarctic continent and ocean.
• This type of research was seen to offer opportunities for technological development.
• The possibility to expand the scientific cooperation with other nations.

These more politically important aspects by themselves would most likely not have carried enough weight to establish the polar program; in conjunction with the scientific program, which was developed by interested scientists under the auspices of the German Research Foundation (DFG) and not least in various *ad hoc* working groups of the German Society for Polar Research (DGP) it was possible to secure the long term funding commitment.

During the 1979/80 austral summer an expedition was launched to find a suitable site for building the wintering-over base on the Ronne Ice Shelf. That general area was initially chosen because it was felt that by putting the base there most valuable new scientific data could be obtained and in some way the initial data series from the International Geophysical Year (IGY) wintering-over bases "General Belgrano", "Shackleton" and "Ellsworth" could be extended.

It was also envisaged that from a base on the Ronne Ice Shelf glaciological and geophysical expeditions could start to study ice shelf dynamics and their importance with respect to Antarctic ice sheet dynamics and mass balance. Actually such programs were carried out in the later years after Filchner summer base was built on that site in 1981/82. With today's hindsight one must say that the original plans and ideas were quite farsighted because this work greatly advanced our understanding of ice shelf dynamics and the importance of the sub ice shelf cavity for deep-water formation, the driving force of global ocean circulation.

The site survey expedition under the leadership of Heinz Kohnen used the ship "Polarsirkel", reached the area under favourable sea ice conditions without any problems and carried out extensive glaciological, oceanographic and geodetic initial survey work. A location to build the base was selected some 20 km south of the ice-shelf edge. Although this was the primary site the expedition spent about one week in the area of Atka Ice Port (Atka Bay) to do an initial survey for an alternate building site. The reason being that the Filchner-Ronne Ice Shelf area in the southernmost Weddell Sea was known to have notoriously bad sea-ice conditions and there was always the possibility that the area could not be reached.

This turned out to be the case during the 1980/81 austral summer-season, when three ships "Polarsirkel", "Gotland II" and the "Titan" went south to erect the planned German Antarctic wintering-over base. In late December 1980 the ships reached 77°28'S and 43°39'W, where further progress towards the Ronne Ice Shelf came to a halt in heavy pack ice. On 15 January 1981 the decision was reached to abandon the original plans and to use the alternate site on the Ekström Ice Shelf for building the base. Initial construction of "Georg von Neumayer" (GvN) base was completed by 03 March 1981 and the first over-wintering started with a small crew and a small initial meteorological observatory program. Since then there is an ongoing observational program on Ekström Ice Shelf on meteorology and air chemistry and geophysics, providing valuable short- and long-term data sets, which are fed into the various global networks and thereby close a gap in the global coverage. In addition to this global aspect the observatories yield data for local and regional process oriented studies.

The following papers summarise 25 years of construction and operation of German research stations on Ekström Ice Shelf near Atka Bay, of Georg von Neumayer Station (GvN) and Neumayer Station II (NM-II) and planning and development of Neumayer Station III (NM-III) to be built in near future. They present examples of year round observations, of data series and scientific results, which were only possible due to the dedication and hard work of the wintering-over staff, who have made tremendous efforts to keep everything operational to high standards under the quite often adverse conditions.

References

Gernandt, H. (1987): The vertical ozone distribution above the GDR research base, Antarctica.- Geophys. Res. Letter 14: 84-86.

Gernandt, H., Gloede, P., Feister, U., Peters, G. & Thees, B. (1989): Vertical distribution of ozone in the lower stratosphere over Antarctica and their relations to the spring depletion.- Planet. Space Sci. 37: 915-933.

Hinz, K. & Krause, W. (1982): The continental margin of Queen Maud Land, Antarctica: seismic sequences, structural elements and geological development.- Geol. Jahrbuch E23: 17-41.

Roland, N.W. & Tessensohn F. (2005): Lillie-Marleen-Hütte und Gondwana-Station in der Antarktis.- Polarforschung 73: 31-35.

Sahrhage, D., Schreiber, W., Steinberg. R. & Hempel, G. (eds), 1976: Antarktis-Expedition 19755/76 der Bundesrepublik Deutschland.- Archiv Fischereiwiss. 29 (Beih. 12): 1-96.

Tessensohn, F., Duphorn, K., Jordan, H., Kleinschmidt, G., Skinner, D.N.B., Vetter, U., Wright, T.O. & Wyborn, D. (1981): Geological comparison of basement units in North Victoria Land, Antarctica.- Geol. Jahrbuch B41: 31-88.