



40th Anniversary of the

First German Research Satellite – AZUR (GRS-1)

The 40th anniversary of the launch of the AZUR satellite being lifted into orbit by a Scout-B rocket from Vandenberg/California on 8th November 1969 not only signifies the launch of the first German built research satellite, but also the beginning of a long lasting successful co-operation with NASA as well as the start of on-line operations activities of the German Space Operations Center (GSOC) on the premises of DLR, Oberpfaffenhofen.

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For this event GSOC as an organization was created 21 months before, in March 1968. During those 21 months the control center team, finally amounting to approximately 40 engineers at the end of 1968, had to be built up from scratch, the satellite testing had to be supported, the construction of the brand new control center building to be specified and supervised followed by the installation of the control equipment, facility testing and personnel training as well as assurance of compatibility of the satellite not only with the NASA network but also with Germany's own brand-new command and control antenna at Weilheim-Lichtenau, close to Oberpfaffenhofen had to be accomplished.

Due to the high inclination of the satellite (102,975 deg) a world wide ground network for real time and dump-data reception also at high earth latitudes was arranged and consisted of the German ground network (stations at Weilheim, Kevo/Finland, Reykjavik/Island and Fort Churchill/Canada), the European network provided by ESRO - a predecessor of ESA, with stations at Redu/Belgium, Ny Alesund/Spitzbergen, Fairbanks/Alaska and Port Stanley/Falkland Islands as well as the NASA STDN network. With this network it was possible for the first time to receive the data measured by the satellite while passing over the North Pole in real time. In fact this arrangement was so successful that the American satellite INJUN V (University of Iowa) was reactivated to facilitate additional data reception from this satellite.

The network also proved to be of utmost importance for the ultimate success of the mission since only five weeks after launch the on-board tape recorder failed and the data could only be received in real time thus reducing the data return by approximately 80 % of the original planned data flow.

Despite the unexpected total loss of communications with the satellite after only 6 months into the mission, possibly caused by the satellite's susceptibility for spurious commands, the mission was judged as a complete success by the German ministry for research and technology, the scientists, industry and project management.

AZUR was the first co-operative project between USA and Germany. The scientific objectives of this mission were to study the inner radiation belt, the auroral zones of the Northern Hemisphere, and the spectral variations of solar particles during solar flares. The total weight was approx. 70 kg and GSOC was responsible for mission execution as well as network co-ordination and operation.

The Project was approved in 1964 following a proposal from "Boelkow" GmbH under the management of the "Gesellschaft für Weltraumforschung" (GfW). Since Germany had no launch capability NASA offered the launch vehicle and its tracking capabilities while Germany developed the satellite and the ground segment under the no exchange of funds rule. The total cost was 80 Mio DM, approximately 30 Mio US\$ (!).

For the German space industry under the prime contractorship of Munich based aerospace company MBB-Boelkow the project was demanding from a technological point of view. According to the legendary Ludwig Boelkow the industry was "barely prepared" for this task, therefore had to procure practically all electronic parts from the US.

But honing its technological, managerial and operational skills and using the project AZUR as "trailblazer" the German industry as well as GSOC could acquire extensive know-how and qualified for even more ambitious co-operations: as a follow on project the NASA proposed to develop jointly a sun-probe, named HELIOS. The first HELIOS probe was launched in December 1974, operated under GSOC responsibility and approached the sun as close as 0.3 AU (50 Mio km), establishing a record for "closest approach" to the sun not broken up to this date.

