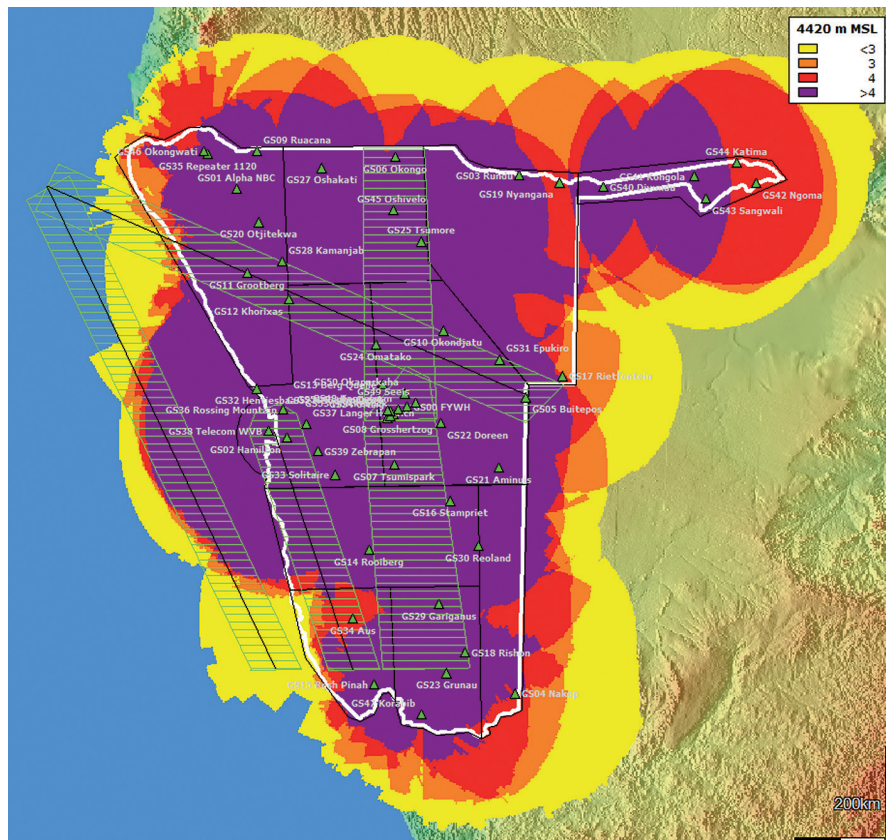




MULTILATERATION (MLAT) & WIDE AREA MULTILATERATION (WAM) FOR ANSPs AND AIRPORTS

Austro Control has been a pioneer in using MLAT and WAM and thus today is one of the first ANSPs worldwide having a reliable nationwide WAM system in operations since years. Austro Control now has more than 20 years of experience in planning, implementing, operating and maintaining MLAT and WAM systems from various industry partners and has gained a thorough overview of their products.

Internationally many ANSPs and airports are interested in and are utilizing the Consulting Services of Austro Control's WAM experts.



From 2010 to 2016 Austro Control has proven the safety of **Namibia's** new surveillance system by an **Operational and Technical Safety Case for the world's largest countrywide WAM System.** The availability of the surveillance in this country has been upgraded to European standards by the consulting of Austro Control.

From 2010 to 2012 Austro Control established the **Technical Safety Case of the TMA Cape Town in South Africa.**

Receiving signals for Namibian WAM at FL145 verified by flight trials

Since 2016 Austro Control's WAM experts are **supporting Avinor, the ANSP of Norway,** and its MLAT manufacturer with the optimization of NORWAM, the Norwegian WAM system. In 2018 **Skyguide** has signed a **5-year-consulting-contract** with Austro Control in order to build a **nation-wide WAM in Switzerland.** Other European countries are very interested and soon will follow.

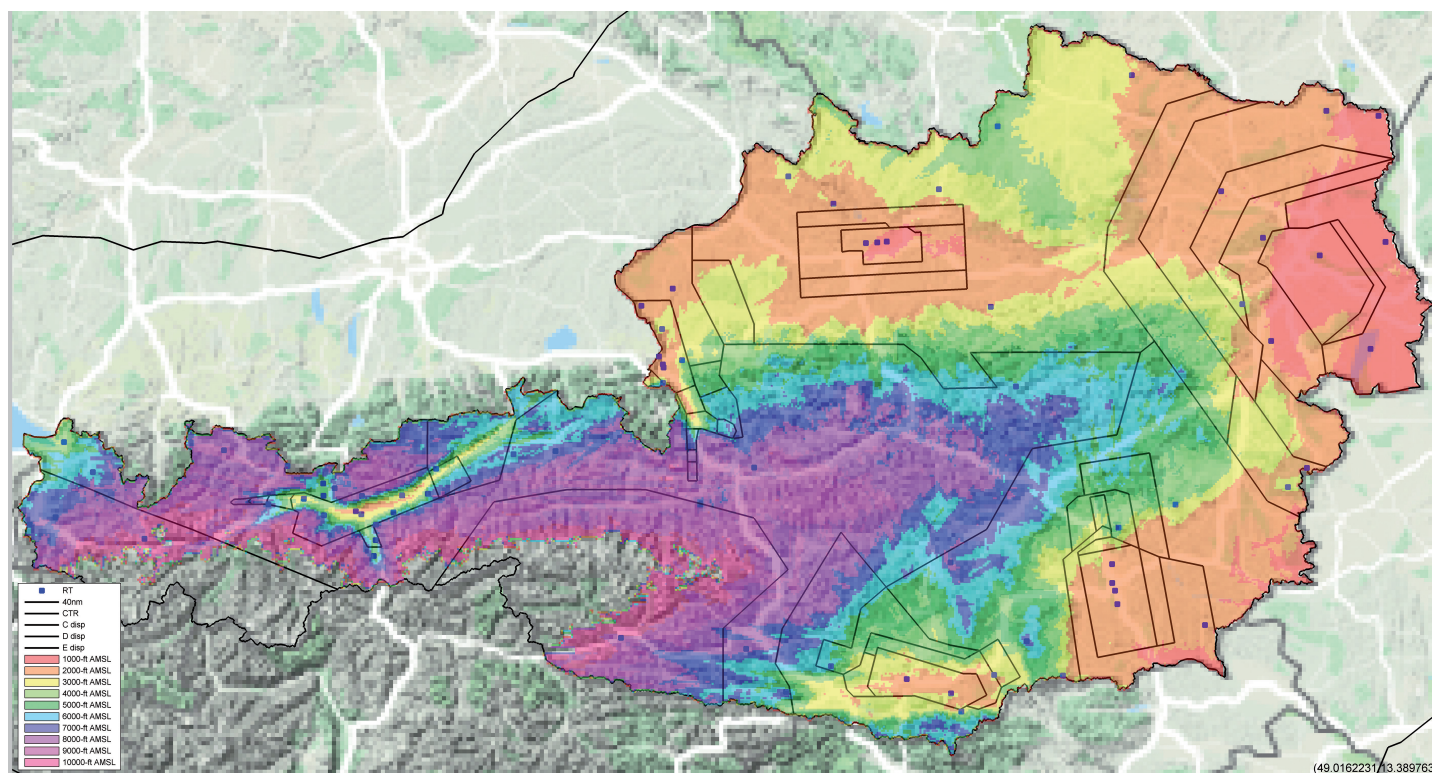
MLAT AND WAM HISTORY OF AUSTRO CONTROL

Already in 1997 Austro Control started to work with **MLAT together with Eurocontrol** on the HMU (Height Monitoring Unit) Linz Project. The HMU is intended to verify the accuracy of airborne altimeters in support of the RVSM (Reduced Vertical Separation Minimum) Safety Case in Europe. Linz was the first of three HMUs (incl. Nattenheim in Germany and Geneva in Switzerland) being operational.

In early 2001 Austro Control launched two MLAT projects, the MLAT based A-SMGCS (Advanced Surface Movement Guidance & Control Systems) for the Vienna International Airport and the SSR (Secondary Surveillance Radar)-like surveillance project for the WAM in the TMA (Terminal Manoeuvring Area) of Innsbruck Airport. The **Vienna International Airport A-SMGCS** went operational in 2002 being **one of the first MLAT applications in Europe**.

The WAM system for the **TMA Innsbruck** was **the first alternative technology worldwide, used operationally as a replacement of an SSR in difficult terrain**. Austro Control has proven the substitutability of SSR by WAM and developed certification procedures according to applicable European Rules. From an operational point of view, the application „**ATS in Non-Radar Airspace using Wide Area Multilateration**“ has been introduced. Surveillance by WAM was set operational in November 2004.

In 2013 Austro Control placed into operation the **nation-wide WAM System**. With its 68 sensors, this system is certified for operational use in six Terminal Manoeuvring Areas (TMAs) and the entire Austrian FIR up to 40 NM beyond the FIR border. It provides highly reliable and accurate surveillance data for this high-density airspace with a one-second update rate to the Austrian Air Traffic Management System. The Austrian WAM complements and replaces the existing SSR infrastructure by a significant reduction of the operating costs and prepares for the future use of ADS-B. In 2017, another new MLAT surface system has been certified and set into operation at the Airport of Salzburg.

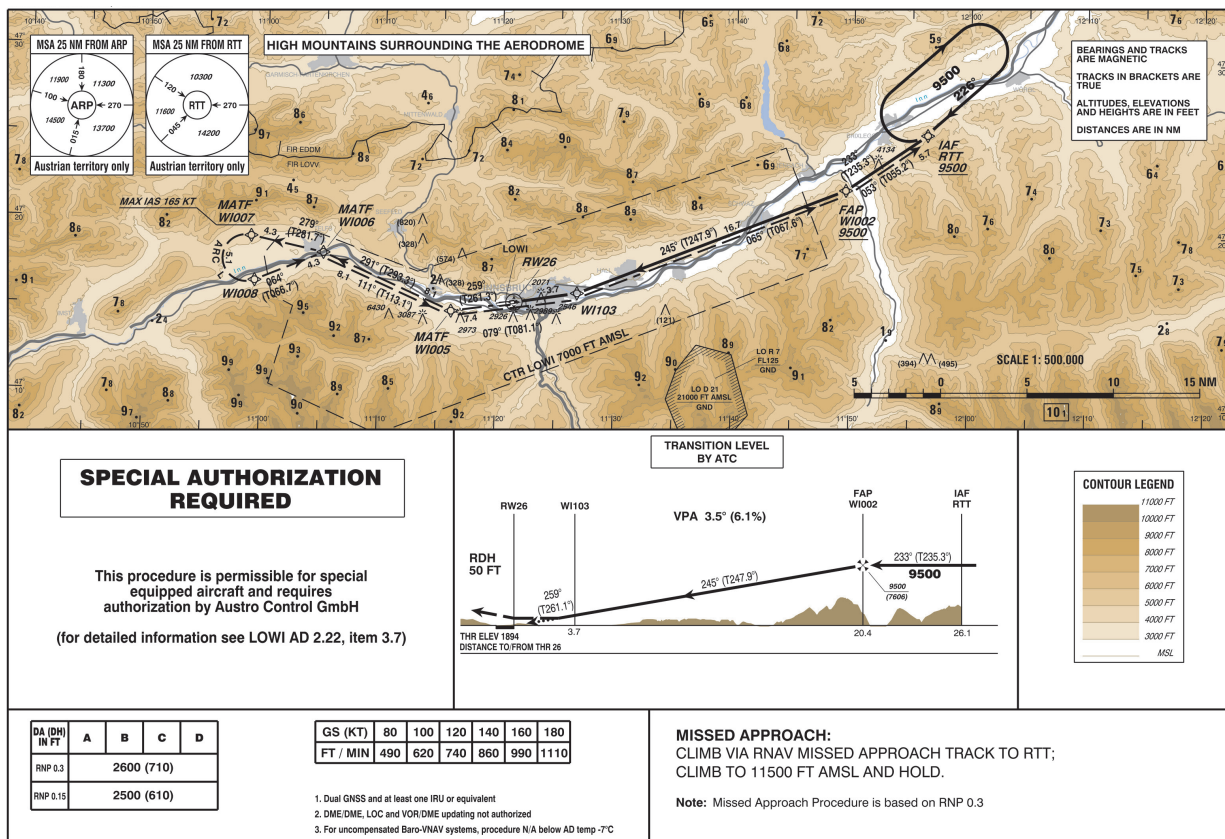


AUSTRO CONTROL OFFERS:

Austro Control is proud of being **one of the most experienced ANSPs in MLAT and WAM technology**. We have been the inventor and promotor of the 3D application of the originally only (2D) surface MLAT at Innsbruck airport. We gladly invite you to contact us and to make use of our know-how for the development and implementation of MLAT and WAM technology in your country.

Austro Control offers technical and operational consulting in:

- **Strategic approach and validation of business cases** for development for WAM solutions, services and concepts of operation
- Initial collection of operational and technical needs
- Design of possible system architectures, infrastructures and options
- **Coverage analyses and site identification**
- Transition and implementation scenarios
- **Preparation of tendering requirements**
- Establishment of dedicated implementation projects
- **Project Management** and/or technical coordination
- Support in tendering and supplier selection process
- Deployment and commissioning of infrastructure
- **Integration into the legacy ATM system**
- **Safety assessments**, validation and acceptance of integrated solutions
- Transition into operational use until stabilization and finalization of the WAM project
- Maintenance
- Training



TECHNICAL ADVANTAGES OF WAM IN COMPARISON TO SSR:

- MLAT is considered as cooperative surveillance like SSR
- No on board retrofit is required (no additional costs for airlines) since MLAT is using standard transponder replies (A/C/MODE S)
- **Increase of safety** (less wrong position reports, less non-compliance with clearance, more situational awareness in general)
- Reduced spacing (higher throughput paired with safety increase)
- ICAO Deviation Report: Safety compliance with IFR procedure in terrain critical environment
- All sensors are **ADS-B DO-260B transponder compatible**
- Performance equal to or better than MSSR (Monopulse Secondary Surveillance Radar)
- **High accuracy:** certified for 200m (99% target reports 70m or below)
- Dramatic life cycle costs reduction possible in comparison to MSSR
- High liability and stability
- Built-in redundancy (**24/7 availability, downtimes almost 0**)
- No moving parts (e.g. rotating antenna)
- **Update rate is one second** (or faster if required): no time lag in display, early turn detection
- Quick overall implementation time, easily expandable
- Security increase (small antennas in comparison to radar systems)
- Better distribution: many small sensors instead of one large SSR
- No operational changes necessary - no big bang for controllers
- **No change in radar procedures necessary**



Site Selection -
Mountain "Hohe Salve",
Austria

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