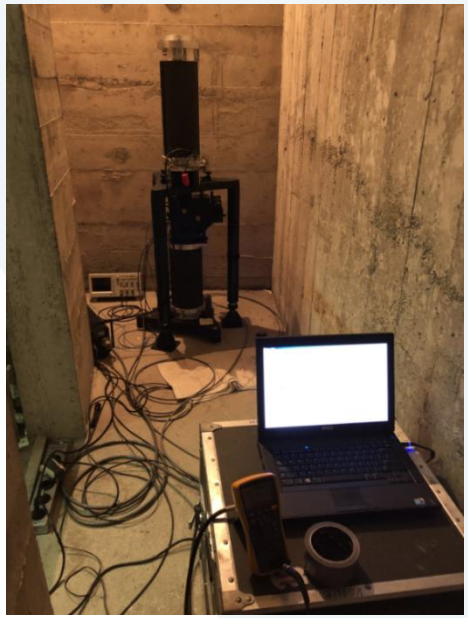
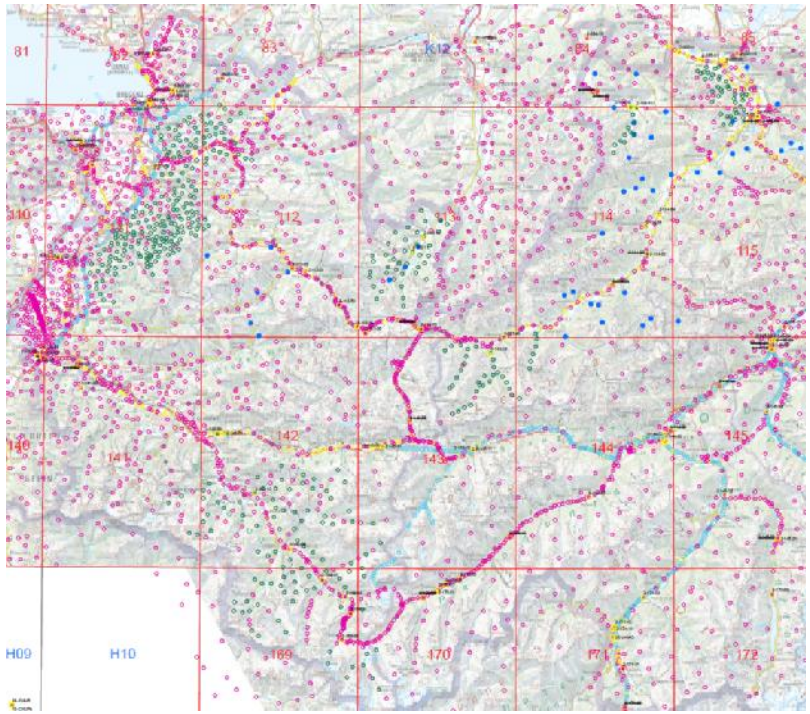
National Report of Austria, EUREF General Assembly 2021, Ljubljana

Helmut Titz, Franz Blauensteiner, David Mayer, Jürgen Otter, Martin Sehnal, Christian Ullrich, Ernst Zahn / BEV

Monitoring of absolute gravity in the Austrian alps

- 2 new combined absolute gravity + GNSS sites (Obergurgl, Kaiser Franz Joseph Höhe)
- Cooperation of BEV, University of Luxemburg and Alpine Research Centre Obergurgl
- Absolute Gravity measurements since 1986
- A new GNSS station has been installed in Obergurgl in November 2019.
- Another GNSS site will be installed at Kaiser Franz Joseph Höhe near Großglockner in Summer 2021. (Highest abs. gravity site in Austria)
- Existing sites of the former ECGN: GRAZ, PFA2, TRF2
- Investigate gravity changes due to glacier retreat



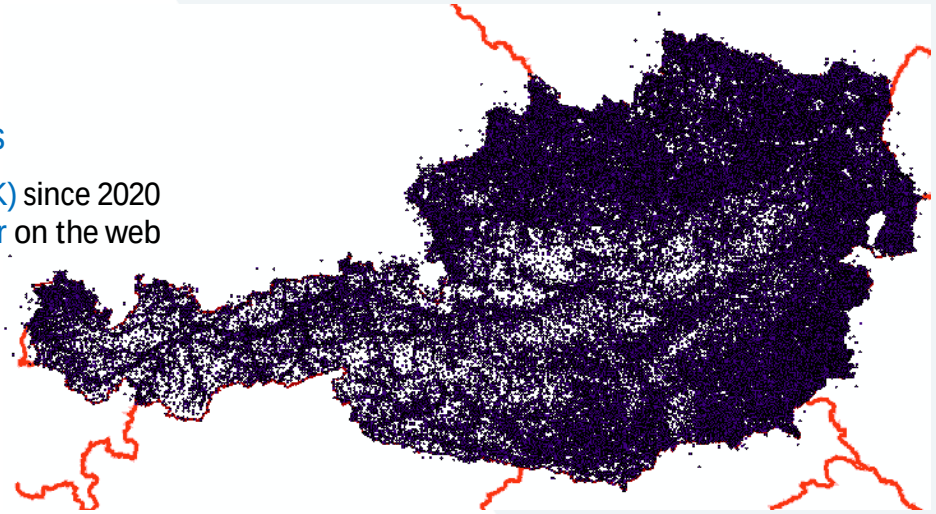


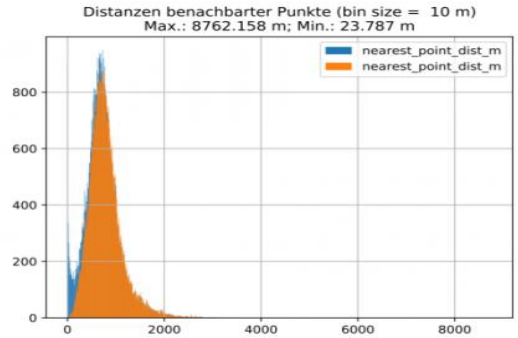
Revision and densification of gravity information

- DACH Geoid project started in 2017
- 700 new gravity measurements were performed in Vorarlberg and Tyrol. Point distance: approx. 1 point/ 1.5 km²
- Technology: APOS and Scintrex CG-5
- The DACH Geoid has been extended to a European Alps Geoid (EAlpG) project

New Transformation GRID of Austrian Control Points

- All 63.000 controlpoints are available in ETRS89 and MGI(GK) since 2020
  and have been incorporated into the BEV Transformator on the web
- Mean distance between control points is 300m
- The analysis of local inhomogenities is nearly finished
  Currently data preparation and testing
- EU Guideline Public Sector Information (PSI)
  All controlpoints will be free of charge by Juli 2021
- To avoid many different user solutions of transformation GRIDs
  calculated by customers a new official GRID will be
  released and made available free of charge by Juli 2021
- The improved BEV GRID will be available in NTv2 Format and also in realtime
  via the RTCM 3.2 Transformation Message of APOS
- The heigth component of the upcomming APOS GRID is based on the
  improved 2008 heigth GRID

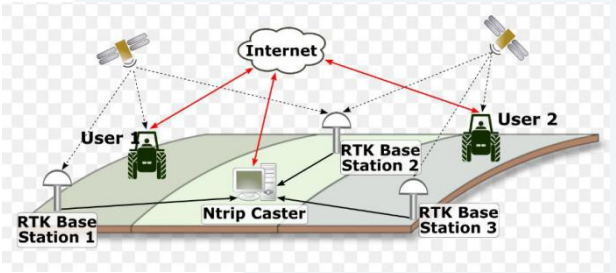


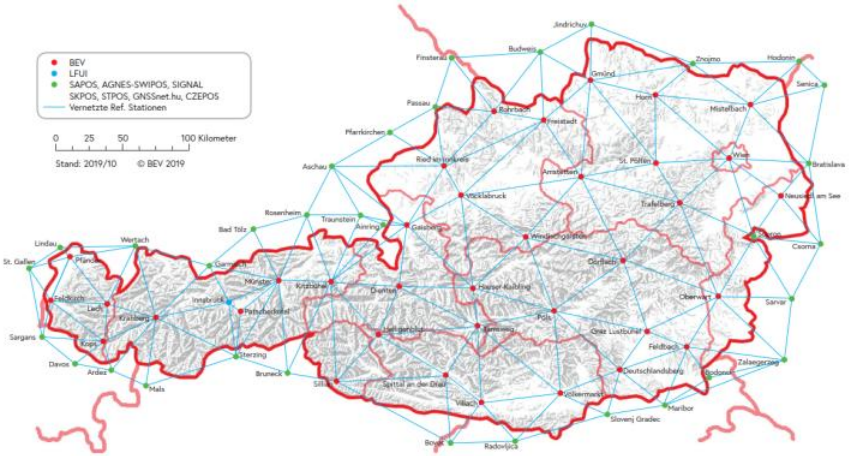


Distances [m] between neighbouring control points used for the GRID calculation

APOS Free RTK for Precise Farming

- Operational since February 1, 2021
- Cooperation of Agricultural Market Austria and BEV
- Machine guidance now officially supported by BEV
- Virtual References Stations (VRS) concept implemented
- First step to APOS mass application
- Future goal: APOS as state infrastructure for all customers free of charge! (by the end of 2021)





Austrian Positioning Service - Network

- 71 permanent GNSS Reference stations
  - 37 (in Austria) – 1 x IGS + 3 x EPN
  - 34 (from neighbouring countries)
- Official virtual ETRS89 – realisation

EUREF related activities

- BEV RDC: New secure REST API vie SSL/TLS has been implemented in addition to the FTP service
- BEV LAC: Galileo processing since 2019. Currently searching for shift in troposhere solutions
- BEV EPND AC: Activities stopped in September 2017 with the retirement of Günter Stangl (Weeks 1966 – now missing)
  Reprocessing of the years 2010 – 2021 in progress, routine delivery of weekly solutions planned for late 2021
- ETRS89 Austria 2002.56 national coordinate solution is outdated since 2017.
  A new solution is in preparation and will possibly be presented at the 100 year anniversary of the BEV 2023.
  Solutions will be submitted to the EUREF WG „European Dense Velocities“
- EPOS: RINEX files of the APOS sites are not freely available and cannot be part of EPOS at the moment.
  It is possible that the 4 EPN sites (GRAZ, PFA3, SBG2 and TRF2) will be included into EPOS soon

ITRF2020 related activities

- Local Ties GRAZ: measurement campaign on March 17, 2021. SLR + GNSS techniques. New space debris telescope included
- Austrian Centre for VLBI: cooperation of the TUW (Vienna) and the BEV. A contribution to the IVS solution has been delivered
- TUG (Graz) is running an IGS repro3 AC
- Vienna Mapping Function is now produced by TUW supported by BEV

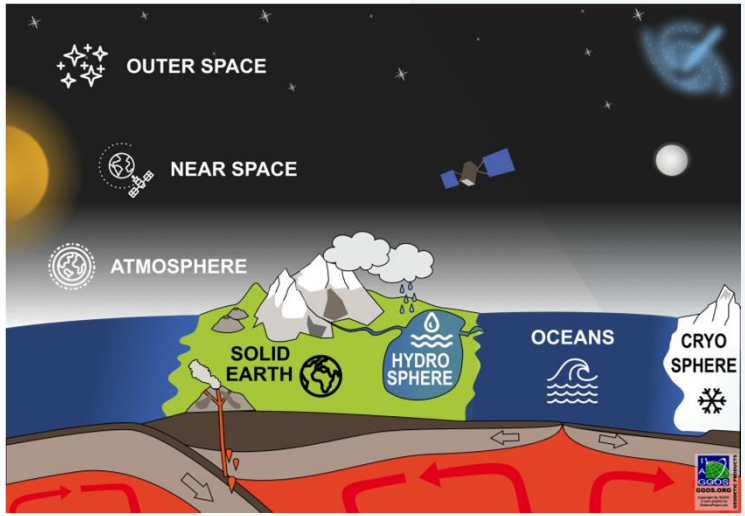
IUGG

GGOS
Global Geodetic
Observing System

GGOS (Global Geodetic Observing System) - New Website

- The GGOS website ggos.org has been refreshed and enhanced
- Focus is now more on GGOS as an „Observing System“ than on the „Organization“
- Development of an interactive Information Portal about products and observations
- GGOS Coordiating Office is operated by BEV since 2016

Startpage



GGOS Products – Classification Overview

Session 4

National Report of Austria

Helmut Titz[1], Franz Blauensteiner[1], David Mayer[1], Jürgen Otter[1], Martin Sehnal[1], Christian Ullrich[1], Ernst Zahn[1]

1. Federal Office of Metrology and Surveying (BEV), Schiffamtsgasse 1-3, A-1020 Vienna, Austria

helmut.titz@bev.gv.at

ABSTRACT

The main interests and priorities are moving from the horizontal to the vertical direction. The D-A-CH geoid project initiated in 2017 will be extended to the European Alps Geoid (EAlpG) project. In cooperation with the University of Luxemburg two additional multi technique stations supporting absolute gravimetry, GNSS and meteorology have been installed or are in preparation (Obergrugl 11/2019 and Kaiser Franz Josef Höhe 2021). These alpine sites will also be able to be used as GNSS realtime monitoring stations for the APOS (Austrian Positioning Service).

The work on a homogenious 3D reference frame consisting of 60.000+ ETRS89 markers has been completed in 2019. Based on the comparison with the traditional Gauss-Krüger coordinates a new 2D horizontal GIS-GRID is currently under calculation and will be made available on the BEV website and also in realtime via APOS starting in Summer 2021. The height component will also be improved and will be based on the 2012 calculated improved Height-GRID.

APOS is now 15 years in operation. 37 Austrian permanent reference stations together with 34 stations from the surrounding neighboring countries provide GPS, GLONASS and GALILEO services for the geodetic society since May 01, 2006. On February 01, 2021 a new mass market service supporting machine guidance and high precision agriculture has started. Within two and a half month of operation more than 1000 users have subscribed to the new realtime service.

EUREF related activities: The BEV RDC has been upgraded and supports now secure file up- and downloads using a REST API via SSL/TLS in addition to the FTP service. The BEV LAC is processing GALILEO since April 2019. The support of the EPN densification (EPND) stopped with the retirement of Günter Stangl in September 2017 and is now being restarted. The missing solutions of the weeks 1966 – 2053 (now) will be provided until Autumn 2021 and the automatic routinely delivery of SINEX-files is in preparation. As the Austrian national ETRF89 2002,56 solution is not sufficient any more for future requirements, a new solution will be prepared based on a reprocessing of the Austrian Monitoring Network (AMN, former AMO network) which is also part of the EPND. The calculated positions and velocities will be submitted to the EUREF WG "European Dense Velocities", the SINEX files will be made available for the EUREF WG "Euref Densification". RINEX-Files of APOS/AMN-Sites are not freely available and cannot be part of EPOS. As a first step we plan to include the Austrian EPN stations into EPOS.

IAG/ITRF2020 related activities: On March 24, 2021 the local tie measurement at GRAZ has been done by the BEV to check the old 2005 3D vector between SLR and GNSS. Further Austrian contributions to the ITRF2020 are: Calculation of the IVS combined solution and preparation of the VMF for GNSS solutions in cooperation between the TU Vienna (TUW) and the BEV. The TU Graz (TUG) is running an IGS repro3 AC and submitted a ITRF2020 contribution to the IGS.

The IAG/GGOS coordinating office (CO) operated by BEV since 2016 has developed a new GGOS website based on a Wordpress implementation. A new working group on Digital Object Identifiers (DOI) has been installed in the GGOS CO too.

Keywords: EAlpG, GIS-GRID, APOS, ITRF2020, GGOS-CO