

## MARTAS - Real time data acquisition and data transfer

Leonhardt, R., Mandl, R., Bailey, R., Kornfeld, R., and Egli, R.



Figure 1: Connection box with mobile MARTAS system, unbreakable power supply (battery not shown), lightning protection, remote control.

MARTAS (MagPy's real time acquisition system) is a python software to read data from various instruments, to locally store/buffer this data on any provided storage medium, and contemporary broadcast data in real-time based on state-of-the-art IOT (Internet Of Things) techniques for remote usage. MARTAS consists of a core which handles storage, broad-casting, treatment of data objects, and a library which contains communication routines for supported instruments. MARTAS is designed as an universal acquisition routine, running on basically every hardware, from very lightweight, low-power systems like backbone, raspberry pi, up to full server-grade network integrated computers.

MARTAS supports basically every network environment from single local installation without or only periodical internet access, towards fully de-centrally organized networks in which MARTAS broadcast data to an external broker which in turn is accessed by an independent data collector. Data broadcasting is performed by the MQTT

### Authors:

Roman Leonhardt, Richard Mandl, Rachel Bailey, Richard Kornfeld, Ramon Egli

Zentralanstalt für Meteorologie und Geodynamik, Hohe Warte 38, 1190 Wien, Austria

protocol, supporting handshaking (all quality-of-service levels), authentication and SSL encryption. Data acquisition, broadcasting and its collection/analysis can be split up on multiple hardware systems, but also run on a single IPC. Altogether four process groups supported by MARTAS can be distinguished.

1. Acquisition: MARTAS collects data from e.g. serial connectors, converts the data to a general data object, buffers the data on a storage medium (e.g. SD) and publishes data via MQTT to a broker using a defined topic.
2. Broker: The broker handles authentication and data access.
3. Collector: A collector receives that data stream in real-time and e.g. stores the data objects in files or databases.
4. ANALYSIS: analysis processes access data streams and perform automated/manual analysis like outlier detection, delta value calculation, and many more.

MARTAS is easy to install, simple to configure and, for developers, easy to extend. A full MARTAS system comes along with an UPS, lightning protection, completely independent monitoring based on NAGIOS (cite), remote configuration possibilities and as web-based graphical visualization of data. All components are optional. Furthermore, basic collection routines are included. MARTAS can interact with MagPy which allows for automated processing and analysis.

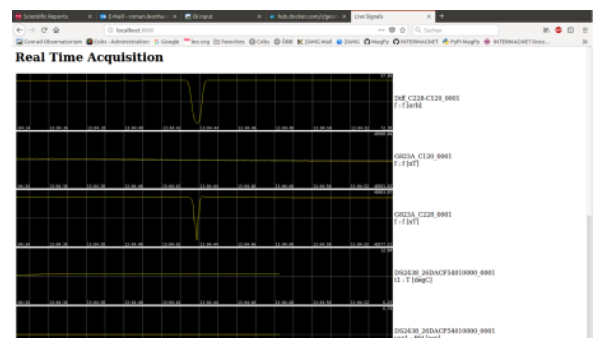


Figure 2: The collector routine, coming along with MARTAS, can be used to subscribe to topics on multiple brokers and organize and visualize incoming data.

Currently MARTAS supports the following geomagnetic instruments: GEM systems GSM19 GEM systems GSM90 overhauser GP20S3 potassium mag Geometrics G823A Caesium mag Quantum POS1 overhauser mag LEMI L025, L036 and other variometers)

### Corresponding author:

Roman Leonhardt  
Conrad Observatory  
Zentralanstalt für Meteorologie und Geodynamik  
Hohe Warte 38, A-1190 Wien  
Tel.: +43 1 36026 2507  
e-mail: roman.leonhardt@zamg.ac.at

