

Submitted Abstract

ID IMC22-FSAbstr- 586

First Author First Name Last Name	Matthias Aichinger-Rosenberger
Submitting Author First Name Last Name	Matthias Aichinger-Rosenberger
Correspondence	maichinger@ethz.ch
Co-Authors >> E-Mails will be not listed	Moeller, Gregor; Hohensinn, Roland; Rothacher, Markus
Organisations	ETH Zürich, Switzerland
Country	Switzerland
Region	Western Europe
Title	Mpg-Net: A Multi-Purpose Low-Cost Gns Collocation Station Network For Interdisciplinary Hazard Monitoring In The Alpine Region.
Keywords	Gnss, Multi-Purpose Station Networks, Environmental Monitoring, Remote Sensing
Type	List Of Focus Session
Focus Session ID	48

Abstract

Global Navigation Satellite System (GNSS) receivers are very versatile sensors, which have not only revolutionized positioning and navigation applications, but also provide numerous opportunities for environmental monitoring and remote sensing. Beside the monitoring of long-term ground movements and geodynamics, typical applications include the provision of water vapor estimates for numerical weather prediction (NWP) and climate studies as well as real-time applications such as seismic and geohazard monitoring. The rising number and quality of low-cost GNSS equipment, coupled with innovative telecommunication approaches (Internet of Things), allow for an increased and more cost-effective usage of such devices for those monitoring purposes.

An especially beneficial approach is the collocation of GNSS sensors at already existing meteorological or seismic stations. Using available infrastructure for power supply and communication, a sustainable and energy-effective extension of existing monitoring capabilities can be achieved. The different parameters collected on-site can be used for cross-validation or provision of corrections for GNSS positioning. Furthermore, through (close to) real-time availability of observations, such collocated stations can aid early-warning systems for many different types of natural hazards (from extreme weather events to landslides and earthquakes). At the Institute of Geodesy and Photogrammetry at ETH Zürich we develop GNSS instrumentation to equip meteorological stations from the SwissMetNet (SMN). The work is carried out in the course of a pilot study in cooperation with MeteoSwiss.

This contribution shows initial results of the SMN station Zürich-Affoltern (where a first prototype GNSS instrumentation has been installed) as well as from a dedicated station network established in 2021 in the Mattertal, Switzerland. We highlight key capabilities of the network, which include the sustainable enhancement of infrastructure for climate change monitoring in the Alpine region as well as the build-up of early-warning systems for multiple types of geohazards, delivering decision-relevant products to end-users in (near) real-time. The latter might be achieved through the combination of parameters collected on-site with complementary data (e.g. satellite observations or NWP output) using innovative, data-driven approaches. Finally, we showcase examples and the potential of recent and ongoing works using these data-driven approaches.