

## Arosa, Switzerland Excavation in Unstable Slope

In-Place-Inclinometer and Tiltmeters



The Arosa Schafisgade project includes construction of three houses with each six luxury apartments. The houses are located in a potential unstable slope. During excavation work adjacent houses above the new built ones had to be monitored geodetically. Between the new excavation and the existing houses borehole inclinometers had been drilled and monitored to detect level and magnitude of soil deformations long before start of construction work. The excavation was carried out within a shotcrete retaining wall with soil nailing.

For geodetic and geotechnical monitoring the Swiss company Meisser Vermessungen was contracted. Sisgeo International was appointed as a supplier for the geotechnical monitoring systems. Prior to starting

excavation work the two existing houses were equipped with digital Tiltmeters to monitor the houses for change in inclination. Two boreholes with inclinometers, situated uphill of the excavation, were then equipped with in-place-inclinometers. In both boreholes series of six digital and biaxial probes, each 2m long have been installed. The tiltmeters and the in-place inclinometers are connected to Sisgeo's OMNIALog data acquisition system. This unit, equipped with a router and GSM/GPRS-modem, sends the retrieved data regularly to a ftp-server. A project website, especially setup for this application, refreshes the displacement graphs and the alarm status automatically. In addition geodetic monitoring of the houses and the retaining wall is carried

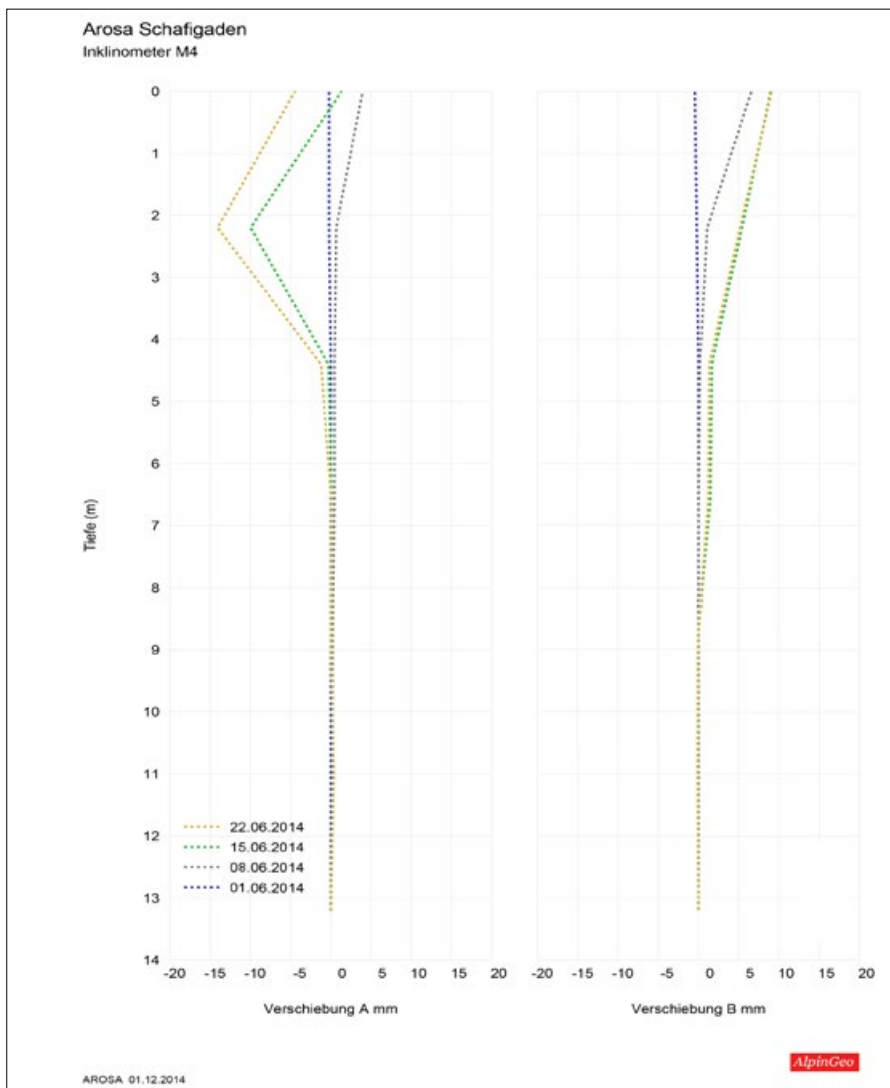
out with a robotic total stations and vibration monitoring was operated during a short critical construction phase. Also these results are included within the monitoring project website. Selection of the instruments for monitoring this project in Arosa has proved to be very effective and reliable. The houses showed so far clear but still small deformations and also the in-place-inclinometers showed clear response to excavation work.

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*Arosa Schafisgaden excavation work*



**LINKS:**

MEISSER VERMESSUNGEN

SISGEO