



Combined seismic and radar investigation to define ice properties and structure of a cold alpine site

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The cold alpine saddle Colle Gnifetti, Monte Rosa, Swiss-Italian Alps resembles very much polar and subpolar ice masses in terms of glaciological conditions. It has been the site for several ice-core drilling campaigns over more than 20 years to determine paleoclimatological and glaciological conditions. To investigate the feasibility of geophysical methods for improved characterization of ice masses surrounding borehole and ice-core sites, a combined active reflection seismic and ground-penetrating radar pilot study has been carried out in summer 2008. Aims are the characterization of density, internal layering, seismic and radar wave speed and attenuation, identification of anisotropic features (like crystal orientation or bubble content and shape). Here we present the overall setup and first results. Seismic and GPR profiles were centered on an existing borehole location covering the full ice thickness of 62 m. Active seismics was carried out with 24-channel 3-m spacing recording, using a Seismic Impulse Source System (SISSY) along two profiles parallel and perpendicular to the ice-flow direction. The same profiles were complemented with GPR measurements utilizing 250, 500 MHz frequencies. Additionally, circular profiles with 250, 500 and 800 MHz were carried out circumferencing the borehole to detect anisotropic features.