Besides the volcanic horizons, characteristic sedimentary layers, such as a micritic lacustrine limestone bed with desiccation cracks and a cellular limestone layer, occur over the whole area, below a distinct grey ignimbrite bed. Strongly cemented gastropod limestone beds, as well as thin diatomites, are also widely exposed. In poorly sorted sheet flood deposits below a typical basalt horizon, a tooth of an *Australopithecus* cf. *afarensis* and some primate remains accompanied by a rich vertebrate fauna, have already been detected.

The tectonic situation, typical for a continental rift system, shows a "horst and graben" structure, formed by NNE-SSW striking normal faults, related to c. ESE-WNW extension. This young fault system, which dissected the Pliocene deposits of the Galila Formation, esentially follows the main tectonic trend of the Hertale Graben and was formed during the uplift of the rift shoulder.

In-situ neutron diffraction of reaction kinetics of 1.13 nm tobermorite

K.T. Fehr, S.G. Zürn, M. Huber

Dept. of Geo- and Environmental Science, University of Munich, Germany

Calcium-Silicate-Hydrates (CSH-phases) are formed during the hydrothermal treatment (autoclaving) of ground quartz sand, quicklime and water to produce steam cured building materials. 1.13 nm tobermorite is the predominant CSH-phase in aerated autoclaved concrete (AAC) with semi-crystalline CSH I and CSH II as minor components. The major aim of our investigations was to determine in-situ reaction mechanism and kinetics of the formation of 1.13 nm tobermorite. Neutron diffraction has the capacity to collect data of the reaction progress in-situ. An autoclave cell has been designed (Fehr et al., 2002) for performing time-resolved neutron diffraction analyses (1 minute) of the dynamic processes during the hydrothermal reactions. Experiments were conducted at 190 to 210°C under saturation pressure and within a time-range of 6 hours. In the experiments the amount of quartz decreases with time. The fraction of poorly crystallized CSH-phases rises to a maximum of 36 wt% in 3½ hours and decreases with the time by continous crystallisation of 1.13 nm tobermorite. Tobermorite is not formed initially but by the reaction of poorly crystallized CSH-phases with quartz. The precursor CSH-phases are more Ca-rich and vary in their Ca/Si in the range of 1.1 to 1.3, characteristic for poorly crystalline phase C-S-H (I) displaying no constant Ca/Si due to its disordered structure. The primarily crystallized tobermorite display (hk0)-reflections only, implying the existence of ab-planes. With increasing time the ab-planes of 1.13 nm tobermorite are forming stacks along the c-axis, indicated by the existence of a (002)-reflection. The mechanism of the reaction can be described by the reaction conversion of quartz according to Chan et al. (1978). In this early stage of the hydrothermal hardening process the reaction is determined by the solution of quartz. The reaction kinetics can be described according to an Avrami equation and the reaction rate can be calculated to k= 0.1017(52) at 190°C.

Palaeozoic tectono-metamorphic development and geochronology of the Orobic Chain (Southern Alps, Lombardy, Italy)

J. Feijth[1], G. Franz[1], F. Neubauer[2]

[1] *Fachgebiet Petrologie, Institut für Angewandte Geologie, Technische Universität Berlin, Germany*
[2] *Institut für Geologie and Paläontologie, Universität Salzburg, Austria*

In the Orobic chain an almost monoclinic east-west striking 'Orobic fold nappe', overlying a parautochton, has been identified. This fold, interpreted as a Variscan structure and forming the greater part of the exposed basement, consists of two structural units. The lower unit, which contains schists and metabasites of volcanic origin, was affected by a pre-Variscan event, probably the Early to Middle Ordovician 'Sardic' metamorphic- and deformation phase, and contains slightly peraluminious granodioritic augengneisses, which protoliths are of Late 'Sardic' age. The Middle- to Late Ordovician volcano-sedimentary upper sequence, with rhyolites, was deposited onto 'Sardic' metamorphic basement of the lower unit.

The main metamorphic phase jointly affected both sequences. The combination of monazite-xenotime thermochronometry, geothermobarometry of rock-forming minerals and phase relationships indicate that the