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Magnetic susceptibility (MS) reflects para- and ferromagnetic mineral content in sedimentary rocks and is often applied as a correlation tool and, integrated with geochemical methods, as a useful palaeoenvironmental proxy. Field gamma ray spectrometric measurements determine the content of radionuclides: ^{40}K, ^{238}U and ^{232}Th. Integrated MS and spectral gamma ray (SGR) logs are presented from several marine pelagic sections of Tithonian – Berriasian age from the Carpathian area of Poland (Tatra Mts, Pieniny Klippen Belt) and the Pannonian Basin (Transdanubian Range, Mecsek Mts). All sections are reliably dated by calpionellid stratigraphy. Sections in the Tatra Mts, and the Transdanubian Range are additionally calibrated with magnetostratigraphy. MS in the Polish sections correlate well with K, Th, Al, Ti and other lithogenic elements and therefore might be used as a measure of lithogenic influx into basins. MS low that occurs in the lower to middle Berriasian (magnetozones M18r to M17r) correlates with high sea level, while MS highs in the upper Tithonian/lowermost Berriasian (M20r to M19n2n) and upper Berriasian (M16n) match the low sea level. High sea level coincides with a slight oxygene deficiency evidenced by elevated U/Th ratio. Some second order changes might be interpreted as climatic events; for example subtle MS increase within M17n which might represent humidity increase. The same interpretation might be applied for the section studied in the Mecsek Mts (Tisza unit) which encompasses most of the Berriasian. Sections in the Transdanubian Range reveal a different MS pattern without significant MS contrasts around the Jurassic/Cretaceous boundary. These results suggest that instead of the eustasy, the climatic conditions might have been the main factors controlling MS and SGR signal in the studied sections.

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3D Modeling of the Fribourg Area - Western Swiss Molasse Basin

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This study focuses on the structural style of the western Swiss Molasse Basin near Fribourg (west of Bern, Switzerland). We are elaborating a 3D geological model with Move Software (Midland Valley) covering an area of 1700 km2 around the city of Fribourg. Based on 2D seismic line interpretations and deep borehole data (SOMMARUGA et al., 2012) three dimensional seismic horizons are built. Horizons correspond to the following stratigraphic boundaries: Near Base Tertiary, near Top Late Malm, near Top Early Malm, near Top Dogger, near Top Lias, near Top Trias, near Top Muschelkalk and near Base Mesozoic. Surface bed dip data from the Geological Atlas 1:25'000 (swisstopo) are included so as to improve orientations of geological strata. Fault surfaces in Tertiary and Mesozoic cover as well as in Pre-Mesozoic basement rocks are constructed based on seismic interpretations (SOMMARUGA et al., 2012), geological cross-sections (Geological Atlas 1:25:000, swisstopo) and hypocenter positions (VOUILLAMOZ & ABEDNEGO, in prep.). Due to the lack of continuous seismic reflectors in Tertiary Molasse sediments, an appropriate mapping of fault structures in the latter is difficult. As a consequence Mesozoic fault surfaces are extrapolated through Tertiary Molasse sediments based on mapped surface fault structures (Geological Atlas 1:25'000, swisstopo; IBELE, 2011). 3D seismic horizons are depth converted based on a 3D heterogeneous P-velocity model of the Fribourg area (ABEDNEGO, in prep.).

The model shows a kinematic decoupling of Tertiary and Mesozoic units along a detachment horizon in Triassic evaporites. A second decoupling can be observed along the base Tertiary horizon in the south of the study area, probably linked to the thrust front of Subalpine Molasse. East of the city of Fribourg, several N-S-striking, en echelon type normal faults in Mesozoic and Tertiary units can be observed. Faults form a zone of 20 km length from N to S. The zone is called the "Fribourg zone". Faults root in listric bends within middle Triassic evaporites forming a graben or half-graben structure. Triassic evaporites show an important thickening beneath the Fribourg zone. Mapping of fault structures at surface give evidence for left-lateral reactivation of the Fribourg zone under the NW-SE compressional stress field in Neogene times. Correlation of mapped structures does not indicate the presence of large scale fault surfaces exceeding a length of 1 – 3 km (IBELE, 2011). The location of fault traces between 2D seismic lines is speculative in the central part of the Fribourg zone due to a gap of seismic data. Recent studies on present earthquake activity show an enhanced recurrence of low magnitude earthquakes (ML 0 to 4.3) along the Fribourg zone (VOUILLAMOZ & ABEDNEGO, in prep.; KASTRUP et al., 2007). It is therefore proposed, that the Fribourg zone is formed by an assemblage of multiple small scale fault surfaces rather than a few large scale faults. The Fribourg zone forms the eastern border of a N-S striking, low amplitude syncline, called the "Fribourg structure". The N-S-alignment of the Fribourg structure deviates from the overall NE-SW trend of fold axis in the region. Triassic evaporites show a thinning beneath the Fribourg structure.

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The Gran Paradiso massif: an upside down lower crust?

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At the structural top of the Gran Paradiso (GP) orthogneiss dome, on its W- and NW-margins, seemingly layered or, at any rate, strongly flattened formations comprise greenstones, quartzites, as well as Al-rich whiteschist seams (BERTRAND, 1968). From their peculiar mineral assemblage, including margarite and magnesiochloritoid, CHOPIN (1977) inferred a premonitory estimation of ~1 GPa peak-pressure for the Alpine metamorphism of a part of the Internal Crystalline Massifs (ICM), i.e. Monte Rosa and GP. Soon after (CHOPIN, 1984), his seminal discovery of >3 GPa coesite in Dora Maira (DM, next ICM massif to the S) was from a chemically similar rock, again associated to metagranites, alike the GP whiteschist layers. In both cases, from the Al,Mg-rich chemistry those authors invoked a sedimentary origin, either as a bauxite or as an evaporite level. However this hypothesis of an upper crustal origin has been questioned. SCHERTL & SCHREYER (2008), based on geochemical investigations, have proposed instead that those whiteschists would have been leucophyllite shear zones inside the granites, secondarily metasomatized at depth.

Underlying DM coesite-units to the E, the conglomeratic Pinerolo unit is analogous by its position and by its rock-types to the conglomeratic Money unit that underlies the GP orthogneiss dome. Both metaconglomerate units were unaffected by eclogitization. Overlying DM as well as GP, eclogitized metamafic units (VZSFO = Mt.Viso and Zermatt-Saas-Fee Ophiolite) comprise subordinate calcschists. VZSFO are in their turn tectonically overlain by Combin-type units composed of dominant calcschists and subordinate ultramafic rocks. All