The application of dinoflagellate cysts for biostratigraphic purposes in the Miocene of the Central Paratethys is promising due to high productivity and occurrence of many marker taxa. A new dinoflagellate cyst zonation for the Miocene of the Western Central Paratethys, is under construction. This zonation is based on biostratigraphic information from several surface outcrops and exploratory drill holes from the Styrian Swell, Vienna and Molasse basins, including some stratotype sections of regional stages. The new zonation is based on the first occurrences (FO) and last occurrences (LO) of selected dinoflagellate cyst species such as *Nematosphaeropsis downiei, Cousteaudinium aubryae, Tityrosphaeridium cantharellus*, *Exochosphaeridium insigne, Cannosphaeropsis passio, Sumatradinium soucouyantiae, Sumatradinium druggii, Cerebrocysta poulsenii, Palaeocystodinium striatogranulosum, Distatodinium paradoxum, Labyrinthodinium truncatum/modicum, Unipontidinium aquaeductum* and *Selenopemphix armageddonensis.*
This zonation is tied to the chronostratigraphic framework by other biostratigraphic data and by correlation with magnetostratigraphy and sequence stratigraphy of the Central Paratethys (Piller et al. 2007). It is correlated to well constrained dinoflagellate cyst zonations in the Mediterranean (Zevenboom 1995), Northwest Atlantic (De Verteuil & Norris 1996) as well as global (Williams et al. 2004).

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Extensional Tectonics at Tendaho Dam and Irrigation Site; Afar Depression, NE Ethiopia

Solomon, N.[1], **Pischinger, G.**[2], Klima, K.[2] & Kieffer, S.[2]

[1]Department of Earth Science, Addis Ababa University, P.O. Box 1176, Addis Ababa, Ethiopia;
[2]Institute of Applied Geosciences, Graz University of Technology, Rechbauerstrasse 12, 8010, Graz, Austria;
nehimsol2002@yahoo.com, gerald.pischinger@tugraz.at, k.klima@tugraz.at, kieffer@tugraz.at

The Afar depression is known for its tectonic regime and typical extensional triple junction of the Red Sea, the Gulf of Aden and the Main Ethiopian Rift. Stretching and opening in the area was due to a far field stress exerted as a result of the convergence of the Eurasian and the Arabian Plates along the Zagros Orogenic Front and an upwelling mantle plume over the past 30 million years. Extension commenced with the separation of the Arabian-Nubian plate, the Arabian-Somalian plate and the Nubian-Somalian plate. Then rifting of the Red Sea propagated towards the center of the Afar depression by cutting across the Main Ethiopian Rift. The Gulf of Aden Rift propagated towards NW along the Manda Inakir rifting axis. The propagation of these two active rifts forms a 15,000 km^2 wide overlapping zone referred to as the East Central Block (ECB). The Tendaho, Dabbahu, Dobi, Karbahi, Immino, and Guma grabens are part of this block and provide an indication of recently active tectonic structures.
Interpretation of remote sensing data (LS-ETM+ satellite image and aerial photography) significantly aided the present study, by suggesting the extent of different lithological boundaries and geomorphological structures. Lack of vegetative cover and spare soil development provided an advantage for the interpretation. Brittle tectonic structures including fault zones, open joints and fissures and their associated kinematic indicators were mapped in the field.
The NE-SW trending Main Ethiopian Rift (MER) structures are cross cut by the younger NW-SE trending Red Sea Rift structures which strike toward the SE along the Tendaho Goba'ad Discontinuities (TGD). A basaltic dyke intruded at the center of the Gesye graben during extension of the MER. The Tendaho graben is an impressive rift structure within the ECB, of extension in the range of 2-3 mm/year. NW-SE trending structures, recent fissural basalts and Quaternary sedimentation are the major features found in the graben.

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Advanced multi-sourced structural 3D modeling in unconsolidated sediments (Vienna basin, Austria)

Spahic, D.[1], Exner, U.[1], Behm, M.[2], Grasemann, B.[1] & Haring, A.[3]

[1]Department of Geodynamics and Sedimentology, University of Vienna, Austria; [2]Institute of Geodesy and Geophysics, Technical University of Vienna, Austria; [3]Institute of Photogrammetry and Remote Sensing, Technical University of Vienna, Austria;
darko.spahic@univie.ac.at, ulrike.exner@univie.ac.at, Bernhard.Grasemann@univie.ac.at, mbehm@mail.tuwien.ac.at, ah@ipf.tuwien.ac.at

Along a W-E striking outcrop wall, in a gravel pit 5 km SSE of St. Margarethen, several generations of conjugate sets of WSW and predominantly ENE-dipping normal faults are exposed in unconsolidated sediments. These sediments are represented by meter-thick successions of conglomerates and sand layers which were deposited during the Sarmartian and Pannonian (Sauer et al. 1992). The investigated area is part of the Eisenstadt-Sopron Basin, a sub-basin of the Vienna pull-apart basin. The Vienna basin developed during the Oligocene/Miocene extrusion of the Eastern Alps towards the Pannonian region in the east. The extraction took place along sinistral NE-SW trending strike slip faults and roughly N-S trending normal faults. Part of this regional geodynamic setting is recorded in extensional tectonic in unconsolidated sediments of the researched area. The length of the faults range from several decimetres to several tens of meters - investigations included nearby major fault structure, trending NNE-SSW. Measured offset of marker layers along exposed faults ranges from centimetres up to several meters. Three different types of host rock deformation due to normal faulting can be observed: (i) Normal fault drag, (ii) Reverse fault drag and (iii) tilting of blocks between closely spaced normal faults or conjugate sets of normal faults.
To combine several data sources (geological maps, field observations, topography, etc) we started with the preliminary data compilation in ArcGIS. Further we used GPR to collect shallow subsurface data. Several tens of GPR sections were

measured parallel and perpendicular to the exposed W-E striking wall and nearby a major fault structure by using different transmitter antennas of 20, 40 & 80 MHz. The precise geographical position of the GPR sections was recorded with a differential global positioning system (DGPS). Finally, in order to construct a high precision 3D structural model, the datas were integrated in a combined 3D model (Gocad).
A complex three-dimensional structural model includes surface and shallow subsurface geological data. A 3D model is based on: (i) GPR recording of coulisse sections (processed radargrams imported in 3D model); (ii) DGPS recording of the GPR sections (iii) Terrestrial laser scanning of an outcrop wall and (iv) Field mapping of the outcrop. In addition, a 3D multi-sourced structural model is supported with the ArcGIS geo-database of wider region of an investigated area. The integrated 3D structural model can be further analyzed by calculating and contouring geometric parameters like curvatures, fault dip and displacement magnitude and gradients.

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Fernüberwachung der Messwertequalität am Beispiel von Pegelmessungen

Stadler, H.[1], Kollmitzer, C.[2], Skritek, P.[2] & Klock, E.[1]

[1]Joanneum Research, Institut für WasserRessourcenManagement. Hydrogeologie und Geophysik. Elisabethstrasse 16, A-8010 Graz; [1]Fachhochschule Technikum Wien. Elektronik/Wirtschaft, Telekommunikation, Höchstädtplatz 5, A-1200 Wien; hermann.stadler@joanneum.at, erich.klock@joanneum.at; christian.kollmitzer@technikum-wien.at, paul.skritek@technikum-wien.at

Wasserstandsmessungen gehören zu den wichtigsten Messungen im Bereich hydrologischer Untersuchungen. Kommen dabei In-situ Messgeräte zum Einsatz, ist die gängigste Messmethode die der Differenzdruckmessung. Die dabei verwendeten piezoresistiven Sensorelemente liefern zwar ausreichend genaue Messergebnisse, es können jedoch verschiedene Fehler durch Probleme mit der Druckausgleichskapillare, starke Sedimentführung von Oberflächengerinnen bei Hochwässern, Vereisung und Grundeis, sowie Alterungseffekte des Sensormaterials, auftreten. Im Rahmen der Messstellenbetreuung werden daher auch derzeit manuelle Kontrollmessungen durchgeführt, um eine Qualitätssicherung des In-situ Messsystems zu ermöglichen.
Das in Zusammenarbeit von Joanneum Research und Fachhochschule Technikum-Wien entwickelte System ermöglicht eine automatisierte Kontrollwertgenerierung durch digitale Bildverarbeitung und Mustererkennung. Die Messwerte und die Kontrollwerte des Pegelstandes werden in nahezu Echtzeit über ein Satellitensystem an einen zentralen Server übertragen. Dort stehen sie zur weiteren Verarbeitung, aber auch zur Visualisierung im WWW zur Verfügung. Dieses System zur Qualitätssicherung von Wasserstandsmessungen hilft die Ausfallzeiten der Messsysteme durch optimierte und bedarfsorientierte Betreuung deutlich zu reduzieren.
Durch dieses Übertragungssystem sind ohne terrestrischer Infrastruktur Messdatenübertragungen auch aus engsten Gebirgstälern möglich. Aufgrund des niedrigen Orbits der Satelliten werden keine hohen Anforderungen an Antennen und Stromversorgungssysteme gestellt. Einfache Stabantennen und Solaranlagen mit 25 bis 50 W Leistung sind für eine Standardinstrumentierung bei Übertragungsintervallen von 15 Minuten durchaus ausreichend.
Das System zu digitalen Pegelerkennung arbeitet mit einer intelligenten Kamera, in der die gesamte Bildbearbeitung durchgeführt wird. Diese Kamera bildet mit der Pegellatte eine konstruktive Einheit. Nach dem Einbau erfolgt vor jeder Messung eine Kalibration zur Helligkeitskorrektur. Damit ist gewährleistet, dass die Kamera auch bei unterschiedlichen Lichtverhältnissen und bei Kondensation von Wasserdampf am Objektiv noch auswertbare Bilder liefert. Die Erkennung des Wasserspiegels an der Pegellatte, erfolgt in einem mehrstufigen Verfahren. Dabei wird zuerst eine Groberkennung mit 2 cm Auflösung durchgeführt und anschließend im entsprechenden Bereich mit Millimetergenauigkeit der Wasserspiegel detektiert und ein Messwert generiert, dem Datensammler übergeben und mit den anderen Messwerten über das Satellitensystem übertragen.
Als weitere Entwicklungen sind die Übertragung der Pegelbilder und die Entwicklung von Algorithmen und Messmethoden zur berührungslosen Wasserstandsmessung ohne Pegellatten geplant.

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Geodetic control networks for the geodynamics of the Eastern Alps 1992-2008

Stangl, G.[1], Höggerl, N.[2], Aichhorn, C.[3] & Krauss, S.[3]

[1]Bundesamt für Eich- und Vermessungswesen, c/o Institut für Weltraumforschung, Schmiedlstrasse 6, 8042 Graz; [2]Bundesamt für Eich- und Vermessungswesen, Schiffamtsgasse 1-3 1025 Wien; [3]Institut für Weltraumforschung, Schmiedlstrasse 6, 8042 Graz; guenter.stangl@oeaw.ac.at, norbert.hoeggerl@bev.gv.at, cornelia.aichhorn@oeaw.ac.at, sandro.krauss@oeaw.ac.at

Since the late seventies of the 20th century GNSS techniques for positioning are used in Austria. From the beginning the intention was to monitor the movements of the Eastern Alps and their forelands. The network AGREF (Austrian Geodynamic Reference) was established and measured 1990-1992 for the first time. Containing about 100 special markers in Austria and the neighbour countries it covers the whole region plus a densification in Carinthia to find the Periadriatic Lineament. In 1996 civil engineers added 250 points on conventional triangulation markers (AREF, Austrian Reference). Both, AGREF and AREF form now a second order control network which is superseded by the 80 permanent GNSS stations APOS (Austrian Positioning System). Those networks are analysed concerning their geokinematic behaviour by the international analysis centre OLG according to the international guidelines. Due to lack of manpower AGREF/AREF was re-measured at only random occasions whereas the permanent stations are analysed at a weekly basis. Therefore station velocities are available of almost all permanent stations, but not from the secondary network, where only few stations with local movements of more than 10 mm/year have been detected (gliding slopes). A real geokinematic analysis of AGREF/AREF is still missing because manpower is needed for a homogenous reprocessing and partial re-measurement. Applications for research funds have not been successful until now.
The station velocities of the permanent sites can be presently estimated with a precision of 1 mm/year lateral and 3 mm/year vertical. From the results the region of the Eastern Alps shows different regional movements at the level of 1-3 mm/year. Considering the Eurasian Plate as „stable“ the Bohemian Massif