80/1P16
PLANE CRACK PROPAGATION IN A HETEROGENEOUS MEDIUM

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Numerous results have shown the apparent universality of self-affine properties of crack surfaces geometry. The development of this roughness has shown that the scaling laws developped for stochastic growth models can be used successfully. Moreover recent studies have focused on the theoretical analysis of the effect of heterogeneities in the crack plane on the fracture propagation. Simultaneously, progress have been achieved to describe interface pinning by random impurities in the field of non-equilibrium statistical mechanics. In an attempt to connect between these two problems, we have investigated both numerically and experimentally the propagation of an interfacial crack between two elastic solids in the presence of heterogeneities.

A quasi-static perturbative model is presented here, and solved numerically, allowing to study the development of a non-plane crack front tortuosity.

Experimentally, the propagation of a crack between two Plexiglass plates: *32cm x 14cm x 1cm* is studied. The interfacial fracture propagates into a quenched disorder because of the mechanical bending of one plate. With a microscope we look directly at the roughness of the front during the propagation. A numerical treatment gives an accurate path of the front. We characterize the geometry of the front in terms of self-affinity. A high precision balance provides a force measurement and quantifications of the mechanical parameters. We compare the results with the numerical study.

80/1P17
DEFORMATION ENHANCEMENT RELATED TO DEHYDRATION DURING PROGRADE REGIONAL METAMORPHISM, NW SARDINIA, ITALY

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Relationships between deformation and dehydration have been investigated in Hercynian chlorite- and biotite-zone regional metamorphic rocks exposed on NW Sardinia. Two episodes of prograde mineral growth are recognised: the first at lower-greenschist facies conditions contemporaneous with D1, the second coincided with biotite growth and D2. During both periods of dehydration, deformation was characterised by penetrative axial planar fabrics defined by well-developed phyllosilicate preferred orientations (as determined by x-ray diffraction texture goniometry) and isoclinal folds (with interlimb angles < 40°). This contrasts with deformation in the absence of mineral growth which is characterised by non-penetrative crenulation fabrics, poorly developed phyllosilicate preferred orientations, and relatively open, low-strain folds (with interlimb angles > 40°). Thus, the rocks experienced enhanced shortening coeval with dehydration. Other characteristic features formed during dehydration are mineral-filled hydrofractures oriented parallel to axial planar fabrics. In contrast, when no mineral growth took place, failure occurred by compressional shear fracture. Mohr-failure analysis of these different failure types indicates the rocks had low strengths and supralithostatic fluid pressures during dehydration.

The rocks investigated were transiently weak during dehydration. Subsequently, deformation in these periods is anomalously intense and characterised by pervasive hydrofracturing. Deformation in the absence of mineral growth is less intense because of higher rock strengths and lower fluid pressures. The intimate relationship between the timing of enhanced deformation and the timing of dehydration testify to the significant affect that dehydration reactions have on the mechanical behaviour of rocks during regional metamorphism.

80/1P18
POLYMETAMORPHISM AND MULTIPLE DEFORMATION OF THE AFYON ZONE IN THE MID-WEST TURKEY

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Regional metamorphites of sedimentary origin in Afyon Zone are known as Afyon Metamorphics.

The Lower Metamorphics consist of schists, quartzite and meta-volcanite (porphiroid). The metamorphic unit was first experienced in an orogenic metamorphism (LT / LP) and by three plastic deformation phases (F1, F2, F3) for the superposed folding probably during Cambrian - Early Ordovician.

The Upper Metamorphics made up consisting of meta-conglomerate, phyllite and marble are reason for the second metamorphism (LT / HP). The later was also affected by the polyphase plastic deformation (F4, F5, F6, F7) during the late stage of Caledonian Orogeny.

Afyon Metamorphites are unconformably overlain by Anatolian Carbonate Platform Middle Devonian - Late Permian.

80/1P19
SEISMIC EVIDENCE OF TECTONIC CONTROL ON THE GEOMETRY AND DYNAMICS OF THE RIVER DANUBE

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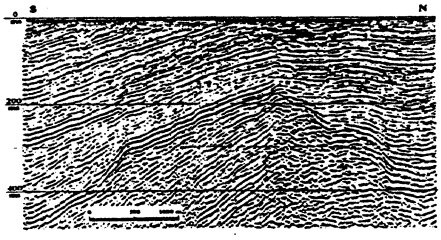
High-resolution multi-channel survey has been carried out along the river Danube in Hungary. Four characteristic structural features were revealed.

The study area is characterized by a regional tilting of Pliocene-Quarternary age which causes the uplift of the western area and the subsidence of the eastern area (central part of the Pannonian basin). The river Danube is in a unique position taking its course along the boundary between the uplifting and subsiding parts of the Pannonian basin.

Seismic interpretation revealed strike-slip faults and tilted blocks formed during the Middle-Late Miocene (Fig. 1). Some of the faults were reactivated during Plio-Quarternary. These reactivated faults influence the local geometry of the river course and the resulted zig-zag shape determines the dynamics of the river.



80/1P20
ELUCIDATION OF FOLDING MECHANISMS IN THE GREAT CAUCASUS TECTONIC ZONES BASED ON MORPHOLOGY OF NATURAL AND EXPERIMENTAL STRUCTURES

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The Great Caucasus is a linear folded structure that lies in the northern part of the Arabian Syntaxis. Flyshoid deposits (8–12 km thick) were folded mainly before Oligocene. Three tectonic zones (total width 60 km) were studied in 12 cross-sections that were divided into 151 domains. Three attributes of fold structure morphology were measured in each domain: inclination of fold axial plane, fold enveloping plane inclination, value of shortening. All these measurements were plotted as points on three "X-Y" scattering diagrams. The outlines of point areas of the three zones structures are almost equal in those parts of diagrams which are occupied by most developed folding. The total folding intensity increases from the north to the south (from Shakhdag to Tfan and Chiaur zones).

Several experimental and theoretic models (based on the same structural attributes and diagrams) were studied. Sliding from a slope of an elevation differs from two kinds of horizontal external compression mechanisms in the structure of its rear part. The duplex-like folding mechanism was also found out in one case. The advection (convection) mechanism and sequence base shortening mechanism show common rotation of the layering but they have different fold shortening. The synthetic model (which combines advection and lateral shortening) is similar to the studied Great Caucasus structures by the contours of its areas on the diagrams.

Most common mechanism of folding for the three zones may be determine as combination of advection (rotation) with nearly twice external shortening. Histograms of the three attributes show that Chiaur zone was deformed by horizontal shearing also (top of the cover is displaced to the south). Part of the domains have duplex (or scale) folding morphology and lay outside of the synthetic model area. These domains have a vergence to the south in the Chiaur zone, divergence in the Tfan zone and a vergence to the north in the Shakhdag zone. They lay near the main boundary thrusts and, also, in some local structure in the middle of the Chiaur zone.

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