uppermost mantle. A high velocity body is also imaged underlying this low velocity region striking approximately N-S with an E dip and may be attached to the lithosphere to the west of the aforementioned seismicity. Explanation of these velocity anomalies and the seismicity distribution in terms of a subduction model requires that the Betic system has behaved as a crustal sliver overthrusting Iberia and burying the plate boundary. An attractive alternative model requires that delaminated lithosphere has peeled back from east to west beneath the Alboran and the edges of the Iberian and African plates. An intriguing hypothesis is that crustal thickening and limited subduction may have initiated delamination which then progressed westwards beneath the Alboran region.

T52A-6 1330h POSTER

Two Belts of Collisional Granite in the Himalaya?

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The collisional granites within the Himalayan orogen exclusive of the syntaxes have generally been described in terms of two belts, the High Himalayan granites and the less intensively studied North Himalayan granites. Some workers have suggested that these belts may be both temporally and petrogenetically distinct. In the vicinity of 90° E, the existence of two distinct belts is arguable. In this area granitic bodies of probable anatectic origin crop out sporadically northward from the crest of the Himalaya to within a few kilometers of the Yarlung-Zangbo suture. From south to north these include: The High Himalayan Gaowu granite (ca. 23 Ma U-Pb monazite [Wu et al., 1998] and 22.4±0.6 Ma [13 232Th-208Pb ion microprobe analyses of 11 monazite grains]); High Himalayan Wagye La granite (ca. 12 Ma U-Pb monazite [Wu et al., 1998]); Kangmar granite (crystallization age undetermined but lies along strike of North Himalayan belt granites that have yielded U-Pb monazite ages of ca. 15 and 10 Ma [Scharer et al., 1986], granitic porphyry dikes in the vicinity of Gyangze (10.8±0.3 Ma [207Pb-235U age of two monazite fractions] and 10.3±0.1 [10 232Th -208Pb ion microprobe analyses of 9 monazite grains]; Kari La granite (40Ar-39Ar muscovite and biotite cooling ages of 10.9±0.1 and 10.5±0.1 Ma respectively [Copeland, 1990]), and Renbu granite (7.2±0.2 Ma [age based on overlapping concordant 206Pb-238U dates of multigrain and single xenotime and zircon crystals, and 207Pb-235U date of single monazite crystal]).

The Renbu granite is both the most northerly and youngest leucogranite so far dated in the central segment of the Himalayan orogen. The Kangmar, Kari La, and Renbu granites are all two mica tourmaline granites similar in gross aspect to the High Himalayan leu- cogranites. The observation that granites are spread across the Tethyan belt and that they generally young northward accords with the conventional view that the High Himalayan and North Hmalayan granites were produced by the same process of partial melting within the Himalayan thrust wedge. It additionally suggests that granite formation is a continuous and probably ongoing process within the central segment of the Himalayan orogen.

T52A-7 1330h POSTER

The Complex Relationship Between Plate Convergence and Foldbelt Geometry: Examples from Pakistan

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Mountain belts are commonly lobate in map view, and a variety of mechanisms have been proposed to explain their salients and recesses. At a wide range of length scales, these include the sphericity of the earth, the inherited geometry of the margin, basement topography that provides 'pinning' points that become reentrants, and evaporite basins that facilitate overthrusting.

At a convergent margin with inherited irregularities, strain partitioning can causea large part of the oblique component of convergence to be accommodated on structures well behind the frontal thrusts. It is possible for sizeable thrust belts to grow with strikes essentially parallel to, and shortening normal to, the plate convergence direction. To the degree that this can occur, it presents a serious challenge to the interpretation of exhumed ancient mountain belts.

We have used sandbox modeling to study how plate convergence with or without a mobile terrane can influence the geometry of the resulting mountain belt. Our results support those of studies suggesting that irregularities in margin geometry can explain some foldbelt lobes, at least until the mountain belt grows to a width that is large compared to the length scale of the plate boundary irregularities.

Our sandbox modeling also indicates that, depending upon its size and shape, a mobile terrane between the two plates can have a very large effect on the geometry of the resulting foldbelts. In fact, large thin-skinned foldbelts can grow in a manner nearly indistinguishable from that expected for plate convergence norm to that which is actually occurring.

Our results match closely the geometry of the contractional belts of Pakistan, and the distribution of seismic strain as indicated by teleseismic waveform modeling of earthquakes in the Sulaiman Lobe and Sulaiman Range of Pakistan. Sandbox models produce strain fields that correspond closely to the predictions of very different techniques, including both thin viscous sheet strain modeling and finite element calculations for such plate geometries.

T52A-8 1330h POSTER

Evidences of Mechanical and Temporal Decoupling of the Higher Himalayan Crystallines by 2D Thermal Modelling.

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The Higher Himalayan Crystallines is a major structural feature of the Himalayan belt characterized by a typical collisional structural and metamorphic evolution from Eocene to Miocene. We use 2-D thermal modelling to examine the geometry, the velocity and the duration of the different phases of metamorphism. According to our calculations the Eocene eo-Himalayan metamorphism is not a simple consequence of the burial of the whole Indian plate below the upper Himalayan wedge. The temperature increase records at a depth of 35-40 km imply a decoupling of a minimum of 10 Ma of the Higher Himalayan Crystallines from the Indian crust that continues to subduct below the future Main Central Thrust at a rate of about 15 to 20 mm per yr. The preservation of high temperature and inverted thermal gradient during the exhumation of the Higher Himalayan Crystallines along the MCT during the earlier Miocene imply a relatively high exhumation rate of about 3 mm per yr. during a short period of duration between 2 and 8 Ma, i.e. two to seven times less than the time difference recorded by geochronology. Finally, the preservation of inverted thermal gradient at the base of the Higher Himalayan Crystallines occurred as a result of heat advection and ductile deformation in the Main Central Thrust zone.

T52A-9 1330h POSTER

Paleomagnetic and Fission-Track Evidence for Rock Uplift and Unroofing of the Kyrgyz Tien Shan Mountains, Central Asia

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At present, as much as 40% of the Indo-Asian convergence is being absorbed by deformation within the Kyrgyz Tien Shan. The initiation of this large scale intracontinental shortening has remained in doubt, however, due to poor age constraints on thrust motion and synorogenic deposition. To provide a clearer definition of the initiation, rate, and duration of growth of the northern Tien Shan, a total of 488 paleomagnetic samples were collected from two coarsening- upward stratigraphic sections of 1.6 and 1.2 km thickness in the northern foreland basin (Chu) and adjacent intermontane basin (Kochkorka). Preliminary results indicate that the sampled Chu Basin strata record deposition spanning Middle to Late Miocene through Late Miocene time, and the Kochkorka section spans Early Pliocene (4.5 Ma) to Early Pleistocene time (1.5 Ma). Sedimentation rates increase markedly in Chu Basin between 6 and 7.5 Ma, corresponding with a increase in sandstone abundance, but preceding significant conglomeratic deposition which began ~1 Myr later. After a latest Miocene interval of slow, evaporitic deposition, sediment accumulation rates gradually accelerated to ~300 m/Myr through much of the Pliocene. The Kochkorka Basin experienced younger peak sedimentation, as an influx of massive conglomerate derived from the denuding Ukek range to the south flooded the basin by ~2 Ma. Ongoing analysis of magnetic declination anomalies and provenance indicators, combined with both detrital and bedrock fission-track samples, will provide more information for the uplift and erosional history of the northern Tien Shan.

T52A-10 1330h POSTER

Preliminary Constraints on Pliocene Shortening Across Naryn and At Bashi Basins, Southern Kyrgyz Tien Shan

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The Tien Shan, in central Asia, are the result of crustal shortening related to the India-Eurasian collision, and provide an excellent contemporary example of intracontinental mountain building. Recent GPS measurements across the northern Tien Shan reveal north - south shortening at a rate of 12 2 mm/yr. Geologic estimates of magnitude and timing of Cenozoic shortening in the southern Tien Shan are sparse. There, the Naryn and At Bashi basins, inferred to have once been contiguous, are now separated by the en - echelon Bayabache Too and Kara Too ranges. This area provides an excellent example of the evolving style of deformation and accompanying basin evolution.

Paleozoic and Mesozoic bedrock underlie a regional, late Mesozoic to early Tertiary unconformity, which has been exhumed over extensive areas during renewed uplift that began in late Oligocene to early Miocene time. The deformed unconformity provides an important structural marker through much of the Tien Shan, and the exhumed surface is remarkably well preserved in Naryn basin. Up to 3 km thick Neogene terrestrial deposits locally overlie the unconformity on the margins of Naryn and At Bashi basins, along the flanks of the Bayabache Too and Kara Too Ranges, which have elevations in excess of 4000 m. Preliminary field studies suggest that prior to the Pliocene, the Naryn and At Bashi basins were a single basin, subsequent shortening of the basin occurred along a series of axial south vergent en - echelon thrust faults. The exposed unconformity dips approximately 20° to the north in the upper plate of the south - vergent fault of the Kara Too range. In the lower plate, apparently in - sequence imbricate thrust faults structurally thicken the Neogene section. Farther south, an active, south - vergent thrust fault places Neogene over modern fluvial deposits.

T52A-11 1330h POSTER

The Karo-La Decollement, southern Tibet; an extensional structure associated with emplacement of the Late Miocene Karo-La Granite

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Geologic mapping along the route of the INDEPTH seismic line in southern Tibet reveals a 25x30 km dome exposing dark phyllites at the Karo La massif (Noijingkang - 7191m), immediately W. of Yamdrock Tso. The phyllites are >2km thick, lying structurally below the Triassic and younger Tethyan sedimentary rocks affected by regionally W-E trending, north-dipping, south-vergent folds and thrusts. Kinematic fabric of foliation-parallel quartz veins/sheets, and mineral stretching lineations constrain clear top-to- north displacement upon discrete horizons within, and at the top of, the phyllite unit. In addition, mapping/TM interpretation show that the regional W-E fabric terminates and soles into the phyllite unit upon the N, S, and E sides of the dome. Despite the clear top-to-north sense of shear, we infer that much of the strain within the phyllites was accumulated during "thin-skinned" south-directed fold- thrusting of the Tethyan sequences, and that the phyllite layer has acted as a decollement horizon; the Karo La decollement (KLD), that has enjoyed both north- and south- directed hangingwall displacement. The updoming of the phyllite and the conditions for quartz veins and new mineral growth are likely related to the emplacement of a large leucogranite (the Karo La granite) that is exposed in several places in the core of the dome. The leucogranite intrudes (cross-cuts) the phyllite, and may provide a minimum age for displacement on the KLD. The Karo La dome is cut by a major graben-bounding N-S normal fault (part of the Yadong-Gulu rift system - YGRS). New apatite fission track data from the Karo La granite give an age of 4.7 ±1Ma, and prior geochronology (Copeland, 1990) gives bi and mu Ar/Ar cooling ages of 10.5 ±0.1 and 10.9 ±0.1, respectively. These ages imply exhumation of this segment of the YGRS hanging wall between ~10-5 Ma, consistent with general opening of the YGRS at this time (e.g. Nyainqentanglha. We have mapped similar phyllite decollement layers in (e.g.) northern Nieru, and as part of two other nearby domes (Kangmar, Mangda Kangri), and we suggest that the phyllite marks a regional, originally N-dipping extensional structure that later acted as a barrier to magma ascent.

T52B CC: HALL C Fri 1330h
Compressional Systems: Taiwan and the Western Cordillera Posters
Presiding: D J Anastasio, Lehigh Univ

T52B-1 1330h POSTER

Detailed images of the Northridge fault structure (California) from local earthquake tomography

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The three-dimensional velocity image of the Northridge fault zone, southern California, has been obtained by the inversion of local earthquakes P-wave arrival times from the Caltech data set. The use of data relative to only the best located aftershocks recorded on both permanent and temporary seismic stations allows to improve the definition of the subsurface structure in the epicentral area, enhancing details of the fault geometry at depth. A complex structure of conjugate thrusts and related folds is revealed by the P-wave velocity model. The Northridge blind thrust is defined as a high-velocity body beneath the Santa Susana Mts. The lateral extent of the Northridge up-thrust is controlled by lithological heterogeneities. A broad low-velocity region in the northwest, East Ventura basin, limits the 1994 thrust segment. The area where slip was concentrated during the 1994 earthquake corresponds to a high-velocity patch along the fault, whose geometry is consistent with the extent of the mainshock rupture. The geometry of the main ramps and growth folds present in the Transverse Range region is reasonably defined by tomograms, allowing us to recognize the faults associable with future large events in the San Fernando-Los Angeles basin.

T52B-2 1330h POSTER

Diffusional Mass Transfer in the Formation of Banded Gneisses:Examples From the Sierra Pampeanas of Central Argentina

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Progressive formation of compositionally banded bi-sil(cord gar)-gneisses and migmatites with increase in metamorphic grade is well-illustrated in metapelites and meta-psammites of the Cambrian accretionary prism and arc system in the Sierras Pampeanas, central Argentina. Initial deformation, preserved in phyllites, and low grade meta-psammites, involved volume loss by diffusional mass transfer to produce a penetrative, cm-scale cleavage that is axial planar to upright folds. 5 cm cordierite poikilitic porphyroblasts and 10 cm-long ellipsoidal qtz/musc aggregates (pseudomorphs after andalusite) grew during cleavage formation. Early-formed bedding-parallel quartz veins

depth. The case of Tonga is slighly more complicated because of fewer events in the oceanic plate. Instead, we substituted shallow events in the slab that occurred just after subduction for these oceanic events. The Tonga results are essentially the same as for the other two zones, with a similar well defined fault-orientation pattern shared by shallow and deep events. Below 450km depth, however, the fault orientation distribution becomes highly scattered, indicating additional complexities in stress field and/or slab geometry. Our study suggests that patterns of fault-plane orientations are roughly the same for shallow faulting in the oceanic plate and deep faulting in the subducted slab. This result is consistent with the hypothesis that pre-subduction shallow fault systems may be reactivated within the subducted slab.

T51B-9 0830h POSTER

A New Method for the Advection of Material Discontinuities in Convective Flows

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Accurate modelling of multicomponent viscous flow involving sharp material discontinuities requires a numerical technique that prevents non-physical, numerical diffusive and dispersive errors at material interfaces. Among the advanced techniques used in geophysical research are high order upwind field methods combined with numerical filters to eliminate spurious dispersion, and Lagrangian methods that represent material heterogeneities by uniform tracer distributions. We adopt a field method based on the monotonic second order upwind scheme (MSOU) developed by Sweby (1984) which completely eliminates, by employing a flux limiter, the oscillatory dispersion errors that result from the advection of discontinuities, while maintaining the numerical diffusion error at a minimum level. The method is conservative and does not require the specification of an artificial diffusion parameter.

We compare the results of our method with those of Lenardic and Kaula (1993) who used a second order upwind method with a numerical global filter. Their test problems include the isoviscous and nonisoviscous Rayleigh-Taylor (RT) instability and the stable compositional layering in a flow field. Our results show that the accuracy of the MSOU method in terms of local diffusion error and nodal resolving power is comparable to the filter based scheme. We also compare our results with those of van Keken et al. (1997) who used tracer and marker chain Lagrangian methods as well as a field method combined with Lenardic and Kaula's filter to model the Rayleigh-Taylor instability and the entrainment of a dense layer by thermal convection. In case of RT instability problem and for initial growth rate of instabilities and root-mean-square velocities, our results are in close agreement with all of the methods studied by van Keken et al. In the case of intrainment problem, there is good agreement between our results with those of other methods for the initial overturns. As time proceeds the difference between our results and those of the Lagrangian methods grows, nevertheless our model has the same accuracy of the field method throughout the convection proccess. In comparison to Lagrangian methods the MSOU scheme is computationally less costly. Moreover the flux limiter feature eliminates the need for an optimal artificial diffusion parameter, while the diffusion error is of the same order of that of filter based schemes. In view of these advantages we regard the MSOU as a very useful field method in modelling convection problems.

T51B-10 0830h POSTER

The Development of Slabs in the Upper Mantle: Insight from Numerical and Laboratory Experiments

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We performed numerical and laboratory experiments to simulate the formation and evolution of the subduction of oceanic lithosphere in the upper mantle underneath an upper resistant continental plate.

In the numerical experiments, we use the two-dimensional, Cartesian finite element code for thermal convection ConMan with a purely Newtonian material. In the laboratory experiments, we use a stratified lithospheric rheological profile with sand representing the brittle behavior of the upper crust, Newtonian silicone putty modeling the viscous behavior of the lower crust and mantle lithosphere and glucose syrup simulating the asthenosphere. The following parameters which are thought to be important in controlling the style of subduction are tested : the velocity of convergence, the density contrast and the viscosity contrast between the oceanic plate and the upper mantle, the presence of mantle flow and slab anchoring at depth. For each set of experiments, we analyze the state of stress of the slab and of the upper plate, the velocity and the dip of slab and the trench migration as a function of the dynamical equilibrium between acting and resisting force, here expressed in the form of dimensionless number F.

The style of subduction is similar in the two model approaches. Slabs nucleate in the form of an instability, first growing at a low rate and then sinking into the mantle obtaining the form of a slab, exponentially increasing their velocity and their dip in a span of time of tens of Myr before reaching the $670km$ discontinuity.

The negative buoyancy of the oceanic plate represents the main acting force in the system, as expected, whereas the viscous bending of the oceanic plate at the subduction zone represents the major resisting one. The competition between those two forces exerts a major control on the style of subduction in the upper mantle, the trench migration and the state of stress in the upper plate.

T52A CC: HALL C Fri 1330h
Compressional Systems: Alpides, Taurides and Himalayas/Tibet Posters
Presiding: **F Gomez,** Cornell Univ

T52A-1 1330h POSTER

Influence of Serpentinization on Seismic Anisotropy of Peridotites : Preliminary Results from Oman Ophiolites

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Shallow refraction profiles (~100 m) at two locations in Wadi Khafifah, Wadi Tayin massif, Sultanate of Oman have been complemented by fabric study and acoustic velocity measurements in lab on peridotites. The studied rocks are harzburgites with a high-T flow fabric, and 50-70% serpentinization comprising a network of chrysotile veins and lizardite mesh with magnesite and iron oxide trails. The observed serpentinization level is normal for ophiolites and oceanic rocks. The serpentine network shows a fractal organization related to olivine fabric and its influence is reflected in measurements from mineral aggregate to the scale of the field experiment.

Lab measurements on oriented samples made at room temperature and at pressures up to 200 MPa yielded $V_p$max (6.05-6.40 km/s) and $V_p$min (5.9-6.0 km/s). These velocity values are much lower than P-wave velocities (7.5-8 km/s) calculated from mineral lattice fabric, assuming no serpentinization. Measured anisotropy shows a large variability (0-7.5%) but becomes stable beyond 50 MPa. The refraction measurements at each site were made along roughly orthogonal profiles, oriented approximately along and perpendicular to the lineation. Refraction velocities are even lower, ranging 4.5 - 5.5 km/s, and show a slight increase with depth. Velocity is apparently lowered when a large fraction of wave path lies within serpentinized fractures. There is no consistent evidence of anisotropy. No anisotropy is observed at one site and a reversal at the other. Seismic anisotropy in serpentinized peridotites seems to be defined by a geometrical combination of the lattice preferred orientation of olivine aggregate (intrinsic anisotropy) and serpentine network orientation. We interpret the variability of measured anisotropy in the lab as well as in field as resulting from this geometrical combination.

T52A-2 1330h POSTER

Structure and Origin of the Kizildag Ophiolite (Turkey)

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The Kizildag ophiolite in southern Turkey is a remnant of the Neo-Tethyan oceanic crust and displays well-preserved magmatic and tectonic structures of seafloor spreading origin. The ophiolite consists of two structurally distinct massifs that are separated by the NW-striking high-angle Tahtaköprü fault. The main massif to the west contains a serpentinized peridotite core overlain on the southeast by the normal fault-bounded plutonic sequence and sheeted dike complex in a structural graben. The dike-gabbro boundary within this graben is in places faulted along a low-angle detachment surface and is locally marked by a transition zone with mutual intrusive relations between the dikes and isotropic gabbros and plagiogranites. This igneous boundary contains numerous proto-dike intrusions marking a well-preserved root zone of the sheeted dike complex. Mineralized oceanic faults within the dike complex form two major subsets: dike-parallel normal faults form horst and graben structures and locally flatten with depth acquiring a listric geometry; dike-perpendicular faults display steep dips and subhorizontal slickenside lineations, suggesting their oblique- to strike-slip nature. The second massif east of the Tahtaköprü fault consists mainly of serpentinized peridotites directly overlain by lava flows, rotated dike blocks, and gabbros. Sulfide mineralization along some fault planes in the extrusive rocks indicate that hydrothermal systems were spatially and temporally associated with magmatic and tectonic extensional processes. Stratigraphic relations and the structural architecture in this massif suggest that the Kizildag oceanic crust underwent crustal denudation and unroofing of the upper mantle as a result of tectonic extension at a spreading center. The Tahtaköprü fault separating the two massifs is an accommodation zone that permitted differential movements between the adjacent ridge segments during generation of the Neo-Tethyan oceanic lithosphere. The general structure of the ophiolite suggests its evolution through seafloor spreading and an asymmetric simple shear extension along a slow-spreading center.

T52A-3 1330h POSTER

Modelling of Deformed Chromite Pods in the Maqsad Diapir, Southern Oman Ophiolite: A Proposed Study of 3-D Diapiric Flow Dynamics.

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Results from finite element modelling of a rigid (elastoplastic) inclusion deforming in a weaker (visco- plastic) matrix have suggested that at a fixed strain rate, there exists a narrow window of matrix viscosities which can produce plastic failure in the stronger inclusion. This window is defined by the contrast in stress distribution between the inclusion and the matrix. Modelling is currently underway to see how this window changes if matrix and inclus- ion rheologies are fixed, while boundary conditions (applied velocities and their orientations) are varied. For example, if the orientations of the velocity vectors are fixed, only a narrow range of strain rates should produce the obeerved/ inferred rheology contrasts between the pebble and matrix, and the obeerved deformation in the inclusion. Thus, models run to simulate observed deformations suggest a range of strain rates and/or degrees of pure and simple shear (2-D vorticity) needed to produce that deformation. Geometry of deformation and strain rate are essential elements in constraining the mechanics and kinematics of deformation in this two phase system. I propose to apply this approach to chromite pods in the Maqsad Diapir, Southern Oman Ophiolite. The pods act as strain markers, passively deforming in dunite envelopes in the diapiric flow of peridotites below the Moho. Modelling will focus on the interractions of the dunite and chromite. Flow laws used in the models are chosen by comparing obeerved deformation mechanisms in the natural dunites to experimental- ly produced microstructures. Chromite is less well understood, but experiments are proposed to estimate failure strengths. Several models at different scales will be combined to characterize the dynamics of deformation for each pod. Results from adjacent pods potentially define strain rate gradients and constrain the kinematic analysis. The aim is to build a 3-D dynamic image of this diapir constrained by the mechanical models, and then use it to study the stresses generated in the lithosphere by the diapiric flow.

T52A-4 1330h POSTER

Are the Middle Atlas Mountains of Morocco an Example of Vertical (as well as Horizontal) Strain Partitioning?

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Located within the African foreland of the Alpine collisional belt, the Atlas Mountains of North Africa represent a broad zone of deformation accommodated by reactivating zones of crustal weakness inherited from a past episode of rifting. In the case of the NE-SW trending Middle Atlas Mountains, the reactivated zone is obliquely oriented with respect to the Late Cenozoic regional stress field, resulting in a "transpressive" mountain belt of 2-3 km elevation, approximately 250 km long and 50 km wide. In the central Middle Atlas region, where folding is confined to a 20 km wide belt, fault kinematic data and other field evidence suggests that oblique deformation is partitioned into strike-slip faulting and orogen-normal shortening. We further suggest that partitioning deformation between the upper and lower crust may be necessary to reconcile crustal thickening and horizontal shortening within the fold belt. Cross-section balancing demonstrates approximately 4.5 km of horizontal shortening, and the analysis of geophysical data suggests that this shortening has not produced a significant crustal root beneath the folded Middle Atlas. Furthermore, estimates of Mesozoic crustal thinning (based on syn-rift stratigraphic data) are inconsistent with the possibility that the lack of a crustal root simply reflects the subsequent thickening of a rifted crust. It thus appears that crustal thickening does not accommodate all of the shortening. We suggest an alternative solution: The upper crust shortens by thickening (faulting and folding) whereas the lower crust responds by deforming laterally. This model also predicts asperities at the ends of the system which, in the case of the Middle Atlas, may correspond with the enigmatic Neogene Guercif basin. On a broader note, other reactivated zones of continental transpression (e.g., the Palmyrides of Syria) may also present evidence for vertical strain partitioning.

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Velocity Tomography Constraints on Geodynamic Models for the Alboran Region of the Western Mediterranean

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The Alboran Sea and the bounding Spanish Betic and Moroccan Rif mountain belts form part of the diffuse plate boundary between Africa and Iberia. Despite being situated in a region of continental convergence throughout the Cenozoic, the Alboran basin underwent significant extension and subsidence during the Miocene concurrently with thrusting in the external zones of the surrounding mountain belts.

In an effort to provide additional constraints on proposed geodynamic models, P and S waveform data and readings produced by seismic stations in Morocco and Spain were used to perform a combined regional and teleseismic tomographic inversion. Preliminary results indicate that a N-S line of intermediate depth seismicity located along 4.5 W extending from crustal depths north of the Betic coast to depths of 100 km beneath the center of the Alboran coincides with a W to E transition from high to low velocities imaged in the

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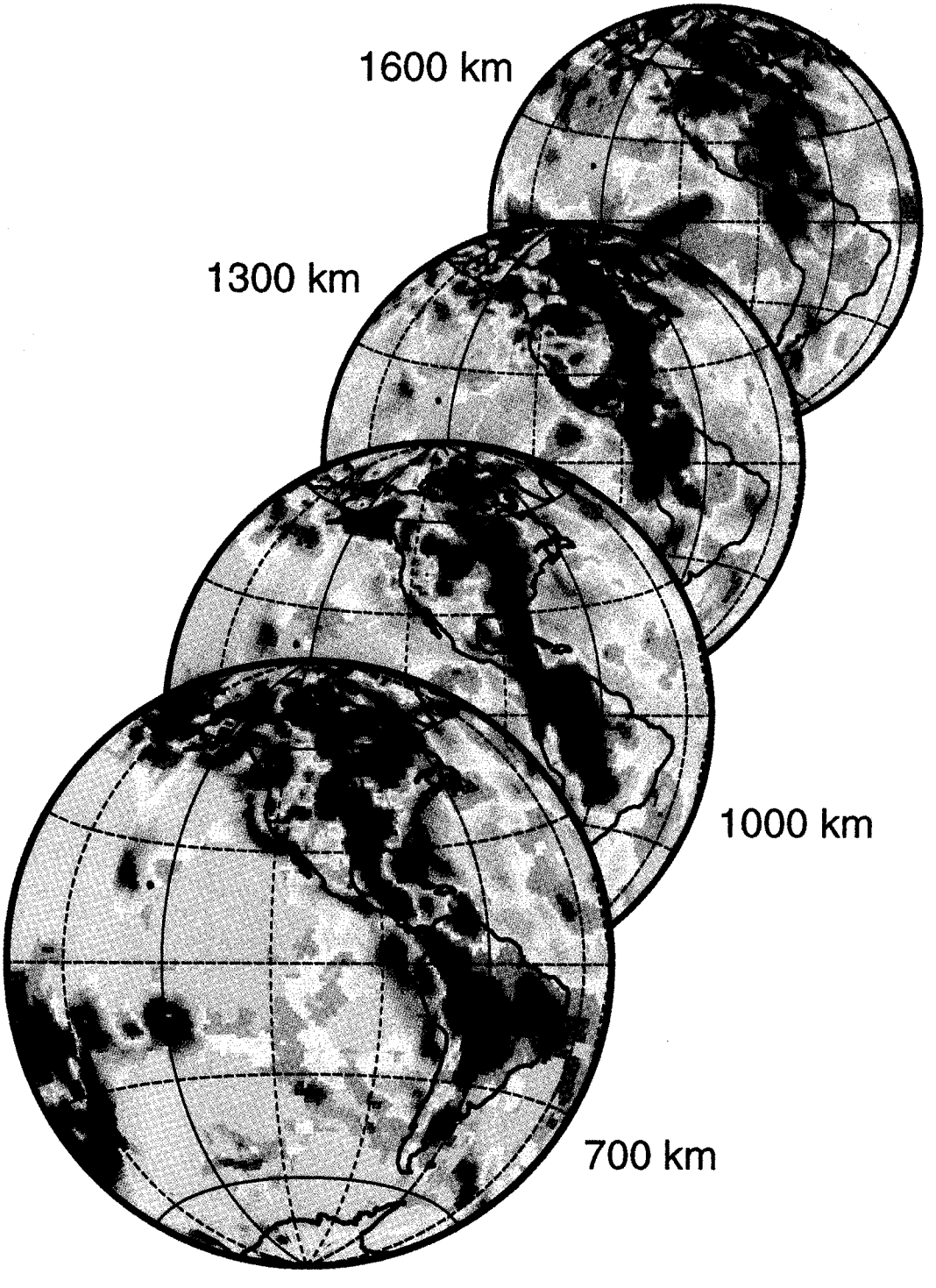

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