

FIELD FORUM SCHEDULED

Significance of along-strike variations for the 3-D architecture of orogens: The Hellenides and Anatolides in the eastern Mediterranean

16–22 May 2010

CONVENERS

Uwe Ring, Dept. of Geological Sciences, Canterbury University, Christchurch 8004, New Zealand, uwe.ring@canterbury.ac.nz

Klaus Gessner, Centre for Exploration Targeting M006, The University of Western Australia, 35 Stirling Highway, Crawley WA 6009, Australia, klaus.gessner@uwa.edu.au

Talip Gungör, Dept. of Geology, Dokuz Eylül University, talip.gungor@deu.edu.tr

Nikos Skarpelis, Dept. of Geology and Geoenvironment, University of Athens, Greece, skarpelis@geol.uoa.gr

Dov Avigad, Institute of Earth Sciences, The Hebrew University of Jerusalem, Jerusalem 91904, avigad@vms.huji.ac.il

Olivier Vanderhaeghe, G2R, Nancy-Université, BP 239 54006 Vandoeuvre-les-Nancy, France, olivier.vanderhaeghe@g2r.uhp-nancy.fr



NASA satellite photo of Samos, Greece.

DESCRIPTION

Along-strike variations are a common characteristic of orogens and have been described in the European Alps, the North American Cordillera, the Andes, and the Hellenide-Anatolide orogen of southeastern Europe. The causes for along-strike variations might be different, but preorogenic paleogeography, continental architecture, and kinematic/geometric variations at the lithospheric scale potentially play an important role. Along-strike changes in orogens have a profound impact on how major orogenic processes proceed in time and space.

For the Hellenide-Anatolide orogen, along-strike variations can be well studied in westernmost Turkey and the adjacent Greek island of Samos. This field forum will focus on the following observables:

- topography;
- structures (from surface structures to geophysical data);
- paleogeographic domains;
- magmatic and metamorphic rock distribution; and
- the geometry of extensional faults and shear zones, associated sedimentary basin distribution and geothermal fields.

From the observables, we will try to infer processes, such as

- the spatial and temporal progression of subduction-zone retreat in the region;
- the dynamics of crustal accretion;
- the thermal-mechanical evolution of the orogenic belt; and
- the dynamics of continental extension.

SIGNIFICANCE

The idea for this broad, field-based international conference is borne of recent transdisciplinary field-based studies pointing out major along-strike variations in the Hellenide-Anatolide orogen that bear strongly on future research directions. These studies showed that differences in preorogenic paleogeography caused the Hellenide orogen of eastern Greece and the Anatolide Belt of western Turkey to evolve in sharply different ways. We believe that better identification and understanding

of those differences will potentially clarify how eastern Mediterranean subduction zones evolved, how preorogenic architecture controls crustal thickening and the subsequent exhumation of high-pressure rocks, and how large-scale continental extension evolves.

Recent geodetic studies and numerical models also address the problem of lateral variations in orogens; however, model assumptions outstrip field-based observations, the latter of which are much more complicated and exceed the capacity of any numerical and scaled analog material simulations, especially in 3-D.

These studies also bear on a number of new and innovative methods for interpretation of geochronologic data for direct dating of deformation and metamorphism. Deciphering temporal aspects of orogenic processes is an important objective in tectonics. The key to successful dating of orogenic processes directly depends on appropriate sampling in the field; therefore, it is crucial that this aspect be discussed thoroughly in the field.

The key objective of this field forum is to bring together modelers and geodetic experts with colleagues from the more traditional, observational approaches of seismology, structural geology, petrology, and geochronology in the field to discuss outcrops in the field. Topics covered will include what conclusions can be drawn from field observations, how critical it is to sample appropriately, and what sorts of information can be retrieved from a certain outcrop. The conveners expect that this mixture of scientists and topics will provide a basis for better integrated research strategies for investigating along-strike variations in orogens, subduction-zone processes, and subsequent continental extension.

The spatial and temporal evolution of the Hellenide-Anatolide orogen is also significant economically because of its key importance to understanding spatial controls on faults and basins for hydrocarbon generation, metallogeny, and geothermal resources.

ITINERARY

Participants will arrive on Sunday, 16 May 2010, on the Greek island of Samos, where the first two days of the Field Forum will take place. Samos is located in the internal zone of the Hellenide orogen, which is mainly made up by the Cycladic Blueschist Unit, the most deeply exhumed unit in the central Hellenides. The forum ends in western Turkey on Sunday, 23 May.

Day 1, 17 May: The first field trip will introduce the participants to the Cycladic Blueschist Unit (CBU) to observe in detail at the contact between the CBU and the underlying Kerketas Nappe. The contact is superbly exposed along a 1–2-km ridge section and then again at the top of the 1400-m-high mountain. The latter is considered part of the Tripolitza Unit, which is well exposed farther south in the External Hellenides but is also exposed in a few windows within the Internal Hellenides (i.e., on Samos).

Day 2, 18 May: This day will be devoted to talks and discussions. Key participants will give ~30-minute overview talks highlighting the problems and consequences of along-strike

variations. We will also ask a few other participants to give ~15-minute talks, and most participants will be encouraged to present posters.

Day 3, 19 May: In the morning, the group will take the ferry from Samos to the town of Kusadasi on the Turkish west coast. In western Turkey, the Menderes Nappes occur structurally below the Cycladic Blueschist Unit. The Menderes Nappes have an entirely different paleogeographic and tectonic history than the Kerketas Nappe in Samos. We intend to overnight in the town of Selcuk, from which critical outcrops can be reached within less than one hour, including outcrops of the Cycladic Blueschist Unit and the Ephesus fault. There will also be an opportunity to visit the ruins of Ephesus at the end of the day.

Day 4, 20 May: We will examine the cross section at Balikaya Tepesi in the Aydin Mountains, where the juxtaposition of the Cycladic Blueschist Unit and the Menderes Nappes is well exposed. The outcrops provide evidence for the thrusting of the Cycladic Blueschist Unit onto the Menderes Nappes. The mylonites have been dated, and field discussions may focus on how mylonitization can be dated directly.

Day 5, 21 May: We will concentrate on the southern margin of the Menderes Massif between Lake Bafa and Selimiye. The Lake Bafa area provides access to the contact between multiply deformed magmatic and metapelitic rocks within the Menderes Nappes. The Selimiye shear zone is a controversial feature, interpreted both as extensional and contractional. This shear zone is of key importance for understanding the emplacement of the high-pressure rocks of the Cycladic Blueschist Unit above greenschist-facies rocks of the Menderes Nappes. We will provide evidence for sustained contractional deformation across the Menderes Nappes.

Day 6, 22 May: This cross section across the Bozdag and Aydin Mountains will wrap up nicely the tectonics of the region. The cross section provides an outline of the geometry of the Alpine nappe stack, including the fabric evolution that was used to define the tectonic units. The section also provides an overview of the low-angle detachments and the high-angle normal faults that define the young extensional history and the topographic evolution of the central Menderes Massif, which is distinctly different from that of the adjacent Greek islands. There may also be the opportunity to visit a geothermal site.

EXPRESSIONS OF INTEREST

Logistical constraints limit participation to 35 people. Participant selection will ensure broad representation by nationality, occupation (i.e., faculty, graduate students, and industry and government scientists), and research interest (i.e., structural geology, metamorphic petrology, isotope geochronology, sedimentology, geomorphology, and geodynamics). Interested individuals should inform the organizing committee by 9 Dec. 2009 of their desire to participate by sending an e-mail outlining how they will contribute to the theme of the forum to Uwe Ring at uwe.ring@canterbury.ac.nz. Registration fees are still to be determined; please check www.geosociety.org for updates.