2008 IRIS/SSA Distinguished Lectureship

The Incorporated Research Institutions for Seismology (IRIS) and the Seismological Society of America (SSA) are pleased to announce the selection of two experienced speakers from the Earth science research community for the 2008 IRIS/SSA Distinguished Lectureship Series (http://www.iris.edu/services/lectures/iris_ssa.htm). IRIS and SSA will cover all of the speakers’ travel and lodging costs and will also provide free seismology outreach materials to interested venues. The speakers and their topics are:

Dr. Cliff Frohlich
University of Texas at Austin
Deep Earthquakes and the Secrets of Seismology

and

Dr. Uri ten Brink
U.S. Geological Survey, Woods Hole Science Center
Peace and Science in the Middle East

Our speakers are chosen each year for their interesting subject matter as well as their ability to convey scientific ideas to a general audience. This Lecture Series will start in January 2008. Please see the IRIS Web site for more information on both the 2008 and ongoing 2007 series, as well as general information on the Distinguished Lectureship program: http://www.iris.edu/services/lectures/iris_ssa.htm. We provide new speakers each year, so please also keep us in mind in your future planning.

If you are interested in reserving a speaker, please contact:
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About a quarter of all earthquakes originate at depths more than 60 km (40 miles) beneath the Earth’s surface, and some at depths as great as 700 km (440 miles). Since their discovery in 1927, these ‘deep’ earthquakes have been an enigma because pressures and temperatures are too great at these depths for ordinary brittle fracture to occur. Deep earthquakes pose a serious hazard in a few parts of the world, including Romania, parts of South America, and (possibly) in the northwestern United States.

Dr. Frohlich’s talk will address what is known and unknown today about the mechanical origin of deep earthquakes and explain why they have been used disproportionately in studies of the Earth’s interior structure. Frohlich will use familiar items to illustrate Earth structure and explain many principles of earthquake mechanics. Seismology as presented by Frohlich will involve raw and cooked eggs, baseballs, coffee pots, champagne bottles, diamonds, air hockey, and ultrasound.

In every profession there are ‘secrets’, that is, basic information that is known to all who practice the profession but somehow unknown or misunderstood by the public. For example, most people are unaware that seismologists most often focus on understanding earth structure rather than investigating the properties of earthquakes themselves. All who attend Frohlich’s lecture, young and old, will learn a great deal about basic earthquake seismology, including much that all seismologists know but seldom tell.
The ancient cultures of the Middle East and the modern political conflicts there are shaped by a surprisingly diverse and youthful landscape. The landscape of the region is dominated by the rift valley, a 20-30 km wide valley that is sunk between the western highlands of Israel and the Palestinian Territories, and the eastern highlands of Jordan. Much of the rift valley is below sea level, including the deepest point on the Earth surface, the Dead Sea at –420 meters (-1370 ft.).

The topographic barriers were significant enough to help create different kingdoms and cultures, yet not significant enough to prevent interaction among these cultures through commerce and war. The north-south oriented rift valley was also an important migration route for early humans, and is still a migration route for flora and fauna, particularly, birds, from Africa to Eurasia.

What caused this landscape of a rift valley and the uplifted shoulders? The Dead Sea rift is not a true tectonic rift, but a strike-slip fault system or a continental transform that laterally offsets the Arabian tectonic plate against the African tectonic plate. Other continental transforms, such as the San Andreas and the Northern Anatolian faults, do not exhibit a rift-like topography. Therefore, some other forces or processes must be active here in addition to the lateral displacement of two plates. The Peace Treaty between Jordan and Israel, and the Oslo agreement between Israel and the Palestinians opened the door for scientists to cooperate in projects that tackle this question, although the security situation and the occasional conflicts, still pose substantial hurdles.

The talk will describe the planning, execution, and results of three large-scale geophysical projects to study the Dead Sea rift and its surrounding highlands. In the first project, we detonated 16.5 tons of explosives underground and in the Dead Sea and generated acoustic waves that traveled through the Earth crust to hundreds of seismometers in Jordan and Israel and along their common border. In the second project, a Jordanian military helicopter flew back and forth across the border with Israel and measured the magnetic field over the rift valley. In the third project, we merged the databases of the Earth gravity field in and out of the rift valley Jordan and Israel. These projects gave us surprising and important insights into the structure and deformation of the plate boundary and the depth of the Dead Sea basin. Their benefit also extended to exploration for groundwater and oil, to earthquake hazard assessment, to infrastructure projects, such as the Dead Sea-Red Sea Canal, and even more important, truly promoted peace and friendship among the many people involved.