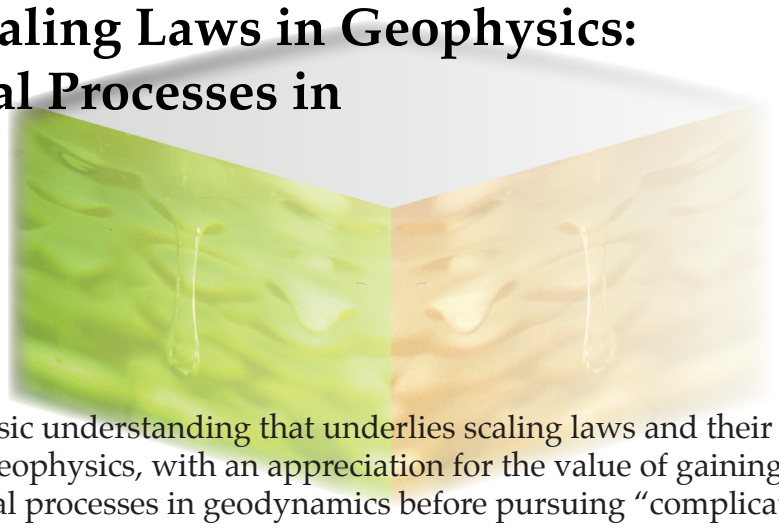
The Abdus Salam
International Centre for Theoretical Physics

United Nations Educational, Scientific and Cultural Organization

IAEA International Atomic Energy Agency

Advanced School on Scaling Laws in Geophysics: Mechanical and Thermal Processes in Geodynamics

23 May to 3 June 2011
Miramare, Trieste, Italy



The purpose of this school is to give a basic understanding that underlies scaling laws and their applications to problems in solid Earth geophysics, with an appreciation for the value of gaining understanding of mechanical and thermal processes in geodynamics before pursuing "complicated / sophisticated / advanced" computational models.

The school is intended for graduate students, post-doctoral fellows, as well as more senior researchers who are interested in these fields.

TOPICS TO BE COVERED:

Brief introduction to basic continuum mechanics: stress, strain rate, constitutive laws, Stokes and Navier-Stokes equation, and the insights given by scaling and fundamental dimensionless numbers.

Isostasy, gravitational potential energy, and thin viscous sheet: scaling of deformation fields to boundary conditions, Argand number, and the exponent n in non-Newtonian viscosity.

Rayleigh-Taylor instability: scaling of growth rates to density, layer thickness, and viscosity, effects of, and scaling for, non-Newtonian viscosity (n), role of low-density crust and its scaling relations.

Advection and diffusion of heat and thermal structure of the lithosphere: scaling of diffusion time with thickness, relations between advective and diffusive transport (Peclet number), and forced convection by downgoing slabs.

Mixing by fluid flow: kinematics, fixed points, role of flow type and rheology, scaling of mixing times and lengths.

Melting and chemical segregation: flow in porous materials, role of interfacial tension (Capillary number), dispersion (Peclet number), phase transitions, and the Stefan number.

Thermal convection: Rayleigh number and scaling of velocity components, heat transport (Nusselt number), planform, and time-dependence.

Flow in media with temperature-dependent viscosity: scaling of heat transfer and boundary layer thickness to the local Rayleigh number.

Affect of compressibility on mantle convection: scaling of internal heating to the temperature scale height or dissipation number.

Effects of chemical differences on flow in the mantle and magma chambers: dependence on the buoyancy and Rayleigh numbers.

PARTICIPATION:

Scientists and post-graduate fellows from all countries that are members of the United Nations, UNESCO or IAEA may attend the school. As it will be conducted in English, participants should have an adequate working knowledge of this language. Although the main purpose of the Centre is to help research workers from developing countries, students and post-doctoral scientists from advanced countries are also welcome to apply.

Limited funds are available for participants, who are nationals of, and working in, a developing country, and who are not more than 45 years old. Such support is available only for those who attend the entire activity. There is no registration fee.

HOW TO APPLY: The application form can be accessed at the activity website
http://agenda.ictp.it/smr.php?2240
Once in the website, comprehensive instructions will guide you step-by-step, on how to fill out and submit the application form.

ACTIVITY SECRETARIAT:

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DEADLINE
for requesting participation

27 February 2011
(if financial support and/or visa are needed)

30 April 2011
(if neither financial support nor visa are needed)