

**Society of Economic Geologists (SEG) Distinguished Lecturer, 2008**

**Dr Cornel de Ronde  
GNS Science, Lower Hutt, New Zealand**

**When: Monday, 13<sup>th</sup> October 11:00 to 12:00**

**Where: Room 456, Biological Sciences Building, University of New South Wales**

**Contact: Ian Graham, UNSW [i.graham@unsw.edu.au](mailto:i.graham@unsw.edu.au) 9385 8720**

**The Kermadec arc, New Zealand: a 10 year odyssey of discovery along the world's  
most hydrothermally active intraoceanic arc**

C.E.J. de Ronde  
GNS Science, Lower Hutt, New Zealand

Research cruises dedicated to seafloor hydrothermal activity along the Kermadec arc first began with the *Sonne-135* expedition in 1998. This was followed by the world's first systematic survey for venting along an arc during the 1999 *NZAPLUME I* expedition. Since then, cruises dedicated to mapping plumes along the Kermadec arc include: *NZAPLUME II* (2002), *NZAPLUME III* (2004) and *ROVARK* (2007). In addition, the manned submersible cruises *SWEEP Vents* (2004) and *NZASRoF* (2005) utilized the *Shinaki 6500* and *Pisces V*, respectively, to sample in detail select hydrothermal systems for mineralized samples, rocks and vent fluids. The *ROVARK* (2007) cruise was the first to deploy an autonomous underwater vehicle (ABE) along the arc which surveyed Brothers volcano at a far greater resolution than had been done previously by ships on the sea surface. While these expeditions have largely been lead by GNS Science, together with its collaborators from NOAA/PMEL, significant contributions have been made by other groups from various nations, exemplifying the global interest in seafloor hydrothermal activity associated with intraoceanic arcs.

The completion of the *NZAPLUME III* cruise in 2004 meant that the entire Kermadec arc, northwards into the southern part of the Tofua arc (~1,680 km), had been systematically surveyed and sampled for hydrothermal plumes. The incidence of venting associated with volcanic centers of the Kermadec intraoceanic arc increases northwards, from ~67% for the southern Kermadec arc, to ~83% for the mid-Kermadec arc, to 100% for the northern Kermadec arc into the southern part of the Tofua arc. This makes the Kermadec arc the most hydrothermally active intraoceanic arc on Earth, more active than either the Mariana, Tofua or Izu-Bonin arcs. Venting associated with the Kermadec volcanic centers ranges from relatively high temperature (~300°C), metal-rich fluids through to lower temperature, gas-rich and metal-poor fluids. Some vent sites show evidence for contributions from magmatic sources.