

School of Rock 2009 – Cores, CORKS and Crust on the Juan de Fuca Ridge: A Hands-on, Research-based Expedition for Earth and Ocean Science Educators aboard the JOIDES Resolution during the IODP 321T Expedition - June 23rd to July 5th

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Hélder Pereira, a Earth Science teacher at Loulé High School, recently participated in a two week educational program for teachers called School of Rock 2009 (SOR09) sponsored by the IODP-USIO and the Consortium for Ocean Leadership/Deep Earth Academy.

The purpose of SOR 2009 was to bring an international group of teachers from the US, France, Japan and Portugal together for 13 days to travel aboard a world class drilling ship called the JOIDES Resolution (The JR) as she sailed from San Diego, CA to Victoria, B.C. during the Integrated Ocean Drilling Program's (IODP) Expedition 321T and allow us to become familiar with the science that goes on aboard the ship.

The JR is a large ship. She is 143 meters long has a seven store high unit that houses the scientific facilities, and has a drilling derrick that rises 62.5 meters above the water line. The derrick is capable of drilling in waters from around 90 meters to 8200 meters deep and can hang a total of 9000 meters of pipe. Drilling it is conducted to extract cores of sediment and rock from the seafloor that are brought aboard and used for a variety of scientific studies dealing with Earth's climate history, movement of water through Earth's crust, how the Earth's plates move, and many others. No drilling was conducted during the SOR09; however the derrick was used to lower a pipe string about 2760 meters down to the seafloor to repair two permanent monitoring stations, embedded in boreholes in the seafloor. These stations had been installed at an earlier date but were not functioning properly due to leakage of seawater into the boreholes. The repair involved inserting the pipe string into the boreholes (a huge task at such a depth) and pumping cement from the ship into the boreholes to seal them.

This year's SOR curriculum "Cores, CORKS and Crust on the Juan de Fuca Ridge" focused on the sub-seafloor observatories called Circulation Obviation Retrofit Kits (CORKS) in Holes U1301A and U1301B and the hydrogeologic, monitoring and sampling experiments conducted there.

The SOR09 was based on data-rich, hands-on, learner-focused, inquiry techniques. Teachers worked in teams to access and analyze data, sample cores, conduct authentic scientific investigations, and discuss their conclusions in exactly the same way scientists do on IODP expeditions.

During transit periods and also while accompanying cementing operations the teachers were involved in activities devoted to meeting with the scientists, learning what sort of research projects are carried out, and developing ways to enhance their science teaching back home. The teachers made ship tours, attended lectures, participated in a wide variety of hands-on work with seafloor cores in the various laboratories, discussed teaching strategies and spent time producing materials to be used for teaching science process and seafloor research.

The teachers have chronicled their experiences aboard in [photobook](#) essays and narratives taped near the beginning and end of the expedition, as well as the [blogs](#) they posted on the [JR webpage](#) to communicate with students, family, and co-workers at home. A video conference was also conducted between The JR and Japanese classrooms where two classes in session were the recipients of an impressive live ship-to-shore interaction to both schools at the same time.

Just like scientists leaving an expedition, every teacher walked off the ship with a disc of the data they collected and entered into the database, the science presentations and pertinent publications; and all the smear slides, microfossil and sediment samples that they might need to construct powerful learning experiences with their students.

SOR09 participants came away from this experience at sea with a tremendous amount of information and a new appreciation for how world class, cutting edge science is conducted. In the future they can use the things they learned in SOR to enhance the teaching of science in their schools, conduct in-service presentations to share ideas with other teachers, and encourage their students to explore the wide variety of opportunities that are out there in the world of scientific exploration.

The teachers were also asked to adapt or develop learning activities tailored for their student or museum audiences, and/or to contribute new material for the ship's website. And each participant is required to share their SOR09 experiences and methods with their colleagues through at least one local or regional professional development event.

I truly think that my participation in the SOR09 educational program has contributed to improve my teaching strategies allowing me to take "real science" into the classroom.

Hopefully a post-expedition event will take place at the 2010. And I also think that the establishment of a European version of the Deep Earth Academy's School of Rock would be an invaluable addition to the ECORD Public Education and Outreach Program.

I would like to acknowledge Ocean Leadership/Deep Earth Academy and IODP-USIO that have funded the program. I would like to thank ECORD for accepting my application and selecting me as one of the two European teachers invited to participate in the SOR09. I would like to thank Fundação para a Ciência e Tecnologia (FCT) and IODP Portugal for their kindly financial support. I also thank Fátima Abrantes for supporting my application. And particularly I would like to thank Leslie Peart, the SOR09 Instructors and my fellow teachers, the science party and all the crew members of the expedition 321T, for their support, encouragement and teachings.