



## **The Future of Earth's Oceans: consequences of subduction invasion in the Atlantic (Arne Richter Award for Outstanding ECSs Lecture)**

João C. Duarte (1,2)

(1) Instituto Dom Luiz and Department of Geology, Faculty of Sciences, University of Lisbon, Portugal, (2) School of Earth, Atmosphere and Environment, Monash University, Melbourne, Australia

Subduction initiation plays a central role in the plate tectonics theory. There are two types of continental margins: passive margins (Atlantic-type) that form when supercontinents disperse and new oceans are born, and active margins (Pacific-type) that lead to the closure of oceans. The cyclical creation and destruction of oceans is called the Wilson cycle. One of the major enigmas in Earth sciences today is how do passive margins transform into active margins, that is “how do subduction zones initiate?” inverting the Wilson cycle. Observations show that the present-day mean age of the oceanic lithosphere is  $\sim 60$  Ma and that the maximum age barely exceeds 200 Ma. Additionally, observations of past cycles have shown that passive margins had a mean life span of  $\sim 180$  Ma. This suggests that subduction has to initiate at passive margins at time-scales of this order. Calculations imply that subduction initiation at mature margins may only be possible if there is another subduction system nearby (induced subduction initiation) or if another triggering or weakening mechanism comes at play. Currently, two small regions of the Atlantic are known to be already subducting: in the Scotia and in the Lesser Antilles arcs. The Southwest Iberian Margin is another place where a passive margin is just being reactivated, at a stage that might just precede subduction initiation, which therefore can provide crucial clues on how subduction zones are introduced and propagate in Atlantic-type oceans. The initiation of subduction near SW Iberia, together with the assumed constraints for the maximum age of the oceanic lithosphere and passive margins, suggests that the Atlantic and Pacific may need to close simultaneously, within the next few 100 Ma, creating a new supercontinent.