



The significance of deformation and hydration of incoming plates at subduction trenches

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Deformation by bending of incoming oceanic plates prior to subduction was noted soon after the beginning of the Plate Tectonics revolution 50 years ago, however the observations available at the time did not permit any detailed scrutiny. It is only since ~ 15 years ago that we begun to realize the intensity of the processes that modify oceanic plates at subduction trenches, and the potential implications for a broad range of subduction-related phenomena. Albeit the limited number of dedicated studies in the world subduction system, a growing body of observations supports that the physical and chemical nature of oceanic lithosphere created at spreading centres is profoundly modified during their passage of the outer rise and trench. Yet, there is neither consensus for conceptual models of the processes at work, nor robust global averages of the intensity of those changes. To understand the structure and nature of subducting slabs and the implications for material recycling and mantle evolution we need to further study the variability of those processes with new experiments and novel methods. It is likely that as methods improve and research intensifies we will serendipitously discover new still unreported features and phenomena. However, the available data are currently enough to warrant the proposal that the intensity of the physical and chemical modifications imply that incoming plates at subduction trenches are a class of geodynamic setting in their own that requires to be understood to unravel the earth evolution in terms of material and volatiles.