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Rifting and volcanism: Examples from volcanic rifted and magma-poor margins based on multichannel seismic data

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Great efforts in the research of passive rifted margins in the last decades highlighted also that lots of open questions remain. A considerable controversy exists about the role of the mantle during rifting and the subsequent formation of oceanic crust and about the interaction of mantle and surface processes, i.e. the precise nature of volcanism in the rifting process.
There are two end-member extremes of passive rifted margins. Volcanic rifted margins evolve by a combination of extension, and extensive extrusive flood volcanism over short time periods during breakup, manifested in reflection seismic data as seaward dipping reflectors. These margins are commonly related to mantle plumes; however, in the past years this has been questioned. Magma-poor rifted margins in contrast show wide extensional features as rotated faults blocks and detachment surfaces near the base of the continental crust, but limited magmatism that in addition seems to be delayed to post-breakup.
In this presentation examples from three locations that are less frequently cited in the discussion about (either magma-poor or volcanic) rifted margins will be shown: The Laptev Sea margin in the Arctic Ocean, where the active Arctic mid-oceanic ridge meets continental lithosphere at a high angle, the southernmost South Atlantic with well expressed conjugate volcanic rifted margins in a comparably “simple” configuration, potentially influenced by a mantle plume, the Tristan hot spot, and the South China Sea that may represent an intermediary form of continental extension between the end member extremes.
The role of (hot-spot related) volcanism during break-up will be discussed for the three example margins that evolved in the Early Cretaceous, the Paleocene and the Oligocene, respectively.