



Stepping stones towards a unique archive in the Danakil Basin: Afar Dallol Drilling - ONset of sedimentary processes in an active rift basin (ADD-ON)

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The Danakil Depression is the northern portion of the Afar triangle, bordered to the west by the Nubian Plateau and to the East by the Danakil Horst, and characterized by active rifting since Oligocene times. The sedimentary record of the Danakil Depression bears witness of the past connection to the Red Sea during the Middle to Late Pleistocene. Multiple episodes of marine flooding and desiccation led to the deposition of diverse carbonate units surrounding the margins of the Danakil Depression. The deposits are ranging from open marine corallgal reefs to hypersaline microbial reefs deposited in lacustrine environments. The basin center is characterized by the deposition of a more than 1000 m thick evaporitic succession. Seismo-stratigraphic interpretations based on industrial seismic sections, core and borehole data evidence the presence of evaporite units till the depth of about 900 m below the Dallol salt pan. However, to date, not any sedimentary core records below those depths are available from the central part of the more than 3 to 4 km deep rift basin.

The ADD-ON drilling proposal aims to understand the sedimentary facies evolution in an initial active rift setting paced by global environmental fluctuations and their interplay with tectonic and magmatic events. The Afar Dallol Drilling would provide the first unique and continuous paleo-environmental record going beyond 230 ka and giving new insights into (1) the intermittent and incipient basin dynamics in an initial extensive continental rift basin on its way to a potential future ocean, (2) East African climatic changes and Hominin evolution, (3) the limits of the deep biosphere in extreme hypersaline environments and (4) natural fluid flow in an active geothermal system targeting the quest for low-enthalpy geothermal consumption in remote areas.