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Reconstructing a flash flood record from the late Holocene in sediment cores from the Gulf of Aqaba-Eilat (Red Sea)

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Episodic rainfall over the hyperarid desert may cause flash floods in ephemeral rivers surrounding the Gulf of Aqaba-Eilat. These floods constitute an essential factor in the region's ecology but may also damage infrastructure and risk lives. Some floods reach the head of the Gulf of Aqaba and their sediments deposit on the shelf where they play an important role in structuring the ecosystem, such as limiting the distribution of coral reefs. Much of these sediments are later transported further offshore to the deep basin. To date, there is no continuous record of flash floods that may provide a long term perspective of the frequency and magnitude of flash floods in this region and their shifts over time; anticipation of future risks caused by local flash floods (or prolonged droughts) is therefore largely speculative.

This ongoing study aims to reconstruct to the best possible resolution a late Holocene flood record in the GOA and trends therein. The methodology includes chemical and physical characterization of the flood deposits and to recognize them in the microstratigraphy (1 cm intervals) of dated cores from the shallow and deep seafloor. Our results show that characteristics of suspended flood sediment, e.g. grain size distribution and elemental composition are distinguishable and recognizable in the stratigraphy of the cores. Flood sediment concentration changes are clearly detectable in 20-40 cm push cores and a 312 cm long pneumatic core from the shelf (at 13 m depth in front of the floods' drainage outlet) as well as in a 80 cm long core from 450 m depth. Flood sediment stratigraphy in a 312 cm long pneumatic core shows recurring fluctuations, but also three more long term environmental shifts that require further explanation. These promising results will be complemented with micropaleontological analysis of the cores as well as additional dating to reconstruct a long term record of floods and related climatic conditions in the area of the GOA making it available to hydrologists, oceanographers, decision makers and the public.