



Observation of flashflood-related morphology changes in arid areas with the help of optical satellite data – Case study Al-Batinah plain in Oman

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Intense precipitation events in the Hadjar Mountains of Oman cause severe flashfloods in the northern Al-Batinah plain. These flashfloods are characterised by a short duration and extreme magnitudes of discharges. As a result the geomorphology of the braided-river-type wadi is significantly altered, which can be observed by spaceborn satellite sensors.

Optical satellite sensors allow observing large scale morphologic developments within the Al-Batinah watersheds over the last 40 years. If satellite scenes are compared which were taken before and after a flood event it is possible to visualize fluviomorphologic changes due to the water impact. The degree and kind of morphologic change display the stream power of the flood event. Changes affect for example network linkages, effective width and sinuosity of the braiding wadi channels. These specific changes can be correlated with ground based discharge measurements to develop a model for discharge estimation via satellite technology. Additional field work in Al-Batinah wadi delivers a detailed catalogue of fluvial structures and hydrologic data to support the hydraulic model building.

In the presentation we intend to: (1) describe the hydrology of the Al-Batinah area especially regarding flash flood development. For flash flood origin, factors like geology of the Hadjar Mountains, soil properties of the Al-Batinah plain and occurrence of precipitation will be discussed. (2) present examples of satellite observed flash flood-induced morphology changes of the last four decades. In this context also the impact of the newly constructed groundwater recharge dams on the hydrology of the Al-Batinah plain will be shown. (3) compare satellite sensors of different spatial and spectral resolution regarding applicability in arid areas. The data pool for this study covers spy satellites from the 1960ies, Landsat scenes from the 1970ies until now and various scientific and commercial sensors of high resolution. (4) show the workflow of satellite data analysis with reference to fluvio-morphologic changes. (5) introduce the intended methodology for discharge estimation. The newly created parameter MAI (Morphologic Activity Index) will be presented which contains information about general river patterns, river energy and the behavior of the river system. (5) discuss requirements for application of the intended methodology in ungaged arid river systems.