Heterogeneity of Synoptic Hydro-Meteorological Conditions Linked With Flooding Disasters in the Hindu Kush-Himalaya (HKH) Region

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Abstract. Hindu Kush-Himalaya (HKH) region expands for 3500km from Afghanistan in the west to Myanmar in the east covering eight Asian countries in total. It has many important watersheds that serve around 1.3billion people – one fifth of the world's population. Hydro-meteorological extremes leading to flooding disasters are a significant concern for this region that affects a large number of downstream populations living in this region, particularly in the central and eastern Himalayas. Although there are numerous natural and anthropogenic factors involved that translate an extreme precipitation event to a flooding disaster, a detailed scientific understanding and record of the hydro-meteorological precursors are far from complete. Although there remain many open science questions that cannot be answered in the absence of additional data and heavily multidisciplinary research, this study takes a baby step forward to address the overarching goal of detecting the ensembles of synoptic meteorological parameters generally being active during extreme precipitation events in a disaster location. To do that we first identify all the reported flooding disasters from the EM-DAT database Starting from the middle of the 20^{th} century (1950) and until the recent time (2013) we identified 200 significant flooding disaster events in the eight surrounding countries of HKH. Those disaster timings and locations are recorded, which help us understanding the extreme precipitation patterns and associated ensembles of synoptic meteorological conditions, which later translate into a disaster. This study is important for several reasons: One, this research contributes to our basic understanding of hydro-meteorological factors associated with extreme precipitation events leading to a disaster, which is far from complete for this heavily understudied region. Two, with more and more remote sensing and re-analysis data becoming available, we are getting better equipped to cross that barrier that further leads to better predictability of a disaster and be better equipped with prior response plans to help mitigate the disasters.