# Spotting “Black Swans” from speleothems

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Nassim Nicholas Taleb, a former Wall Street trader popularized the term “Black Swan” to characterize an ‘event’, which is (1) unpredictable (i.e., beyond normal expectations); (2) has major societal consequences (when it does occur); (3) and is explainable in hindsight (as if it was predictable all along). The ‘Global Famine’ of 1876-78—perhaps, the most severe and widespread climate anomaly during the instrumental period, was triggered by a series of droughts that affected vast parts of Monsoon Asia, Africa, and South America and may have killed an upwards of 50 million people, is a case in point. Climate historians have long drawn connections between such ‘black swans’ (i.e., extreme climate events) and transformative (typically disruptive) societal changes throughout the recorded human history. Indeed, textual evidence spanning the past few millennia across Monsoon Asia points to numerous instances of catastrophic monsoon failures, droughts, famines, and mass mortalities. For example, written historic accounts from India speak of spatially extensive multi-year monsoon failures including a catastrophic twelve-year monsoon drought between 1397 and 1408. Robust and objective comparisons of ‘historical climatology’ with high-resolution and hi-fidelity proxy reconstructions can, however, lead to identification/verification/ of ‘black swans’, which can then serve as key targets for climate model simulations. Speleothems hold the (largely untapped) potential to contribute towards this endeavor particularly considering the recent advances in our understanding of the climatic controls of oxygen isotopes in precipitation together with the landmark developments in high-precision dating techniques. The speleothem-based approach for *spotting* the past ‘black swans’ is particularly ripe for exploitation in South Asia and the Near-East where the climate sensitivities of speleothems to precipitation variability, particularly in response to extreme changes in hydroclimate, are relatively well-understood and chronologically well-constrained historical documentary sources are present. In this talk, I will highlight a few case studies from India, Madagascar/Mauritius, Iraq, and time permitting from other places, which demonstrate how existing and emerging speleothem records from these locations, when combined with the written historical accounts, are revealing both historically *known* and *unknown* black swans.