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Water in the Mekong Delta - tracing its origin

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The Mekong is one of the largest rivers on Earth. During the Asian summer monsoon, its annual flood waters feed the farming in the lowlands of Laos, Cambodia, and Vietnam. Especially in the Mekong Delta the water of the Mekong, including the annual floods, is the basis of the livelihood of more than 17 Million people. However, extremes in the annual floods pose also the major risk in the delta, and given the expected climate changes these risks are likely to increase. Therefore it is vital for both risk mitigation as well as development plans to have a thorough understanding of the flood generating processes and the origin of the waters in the Mekong basin. Accordingly, we monitored a variety of hydrological parameters including stable isotopes in the delta in order to identify the origin of the waters by a data driven approach. We present time series of river water electrical conductivity and δ^{18}O and δD data, collected between 2009 and 2010 in the Mekong Delta in Vietnam and correlate them with time series of river water levels. All these time series show a pronounced seasonality with enriched isotope composition during the dry season and depleted isotope composition during the wet season, and respectively lower conductivity during the high flow compared to low flow, while conductivity and isotope values correlate well. Heavier dry season isotope composition results from evaporation and/or recycling in this tropical region. Lighter wet season δ^{18}O and δD values are a combined signal of several factors, including the amount effect, high-altitude meltwater input, and rainout processes. Although the major source of precipitation and thus the annual floods is the SW monsoon, it is torrential rain from sporadic typhoons from the western Pacific that causes additional short termed flood peaks and negative spikes in the isotope and conductivity records; e.g. the collected time series trace the flood peaks caused by the typhoon Ketsana in 2009. We further correlated the electrical conductivity time series with satellite based spatial distributed precipitation estimates (RFE) in order to get additional information about the source regions of flood waters arriving in the delta and their travel times. The derived information about source regions gained in this study are useful in the discussion and planning of flood risk management in the delta and dam construction in the basin as well as for flood warnings for the delta.