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Quantifying the impact of climate change on crop water requirement in the arid Tarim River Basin

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Agricultural water use shares more than 95% of the total water consumption in the extreme arid region of the Tarim River Basin. Understanding the variation of crop water requirement (*ETc*) and quantifying its attributions are therefore vital for irrigation management and water resources management in this highly water-deficit region. In this study, we examined the spatial-temporal variations of *ETc* by using the Penman-Monteith equation combined with the crop coefficient approach and then quantified the contributions of meteorological factors and planting structure to *ETc* variation. Results indicated that *ETc* decreased during 1960-1988 at a rate of 2.408 mm/a and then started to increase at a high rate of 9.73 mm/a during 1989-2015. For the first periods (1960-1988), wind speed (*uz*), maximum humidity (*RHmax*) and sunshine duration (n) were the most important factors leading to the decreasing *ETc* while for the second period (1989-2015), the evolution of planting structure was the most significant factor resulting in the rapid increase of *ETc* (20.93%), followed by the minimum temperature (*Tmin*) (16.36%) and *uz* (13.89%).