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The regulation of in-hive humidity is key to the development of bee brood and the overall health of the colony, nevertheless, there are still gaps in our knowledge about the delicate balance between water uptake and water loss in arid environments. Here we report how managed colonies of *A.m. scutellata* responded to summer weather in the Arizona desert. We tracked the daily changes of temperature and relative humidity across different areas of the hives and over three summers using temperature and humidity probes. The brood nest was kept at stable temperatures (35 °C) throughout the day, even when ambient temperatures reached over 40 °C. The average RH in brood frames was maintained within acceptable minimum levels of 50 -55%, while the RH on the honey frames was more variable. Nest humidity exhibited distinct diurnal patterns, with elevated RH levels during the daytime, when ambient humidity fell sometimes below 20%. At night, regulation of the nest humidity was limited to the resources already stored within the colony, and the occasional drop in nocturnal RH resulted in an increase in the brood temperature. Behavioral responses to drought and excessive temperatures were more obvious late in the day and at night. We confirmed a strong water foraging activity in late afternoon by adding a non-toxic fluorescent dye to a water feeder and recording how bees filled large numbers of cells across multiple frames with water. Fanning outside the hive to dissipate heat is a common thermoregulatory strategy of honeybees, however, due to the high ambient temperatures during the summer of 2020, ventilation of the hive occurred at night. Using a heat sensitive camera, we recorded the changes in temperature of fanner bees, bees passively cooling on the front of the hive, and the body of the hive. The temperature of fanner bee aggregations dropped only slightly during the night from 30.4 °C at 8 to 9 pm to 28.7 °C at 4 to 5 am, while the hive body dropped from over 43 °C to 21 °C, and the bees resting outside reduced their temperature by 4 to 5 °C.