

Impact of Climate Change on the MAGIC and CTAO Sites

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The Observatorio del Roque de los Muchachos (ORM) will host the northern site of the Cherenkov Telescope Array Observatory, in an area about 200-m below the mountain rim, where the optical telescopes are located. The area hosts the MAGIC Telescopes, which have gathered a unique series of 20 years of weather data. We use advanced profile likelihood methods to determine seasonal cycles, the occurrence of weather extremes, weather downtime and long-term trends correctly taking into account the data gaps. We find significant differences with respect to the mountain rim in terms of the behaviour of wind and relative humidity. The impact of climate change is observed through an increase in temperature, the diurnal temperature range, and relative humidity, accompanied by a decrease in trade wind speeds. The occurrence of extreme weather, such as tropical storms and long rains seems to remain constant over time. We find a significant correlation of temperature with the North Atlantic Oscillation Index and multifractal behaviour of the data. No hints are found of a degradation of weather downtime under the assumption of a linear evolution of environmental parameters with time.

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