

# Theoretical prediction of the amounts of water obtained by terrestrial planets in the habitable zone around M stars

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Near-future exoplanet survey will target M-type stars, which are less massive than the Sun, and atmospheric components and water volumes of those exoplanets will be investigated. Before that, it is important to theoretically predict the abundance of habitable planets around M-type stars and to be ready for making statistical comparison with observational results. According to the theoretical prediction made by previous population synthesis models, terrestrial planets with Earth-like water contents can hardly be formed around M-type stars. Rather, extremely dry planets or water-dominated planets are formed. The previous study considered only the water brought in by planetesimals. However, in fact, it is also possible for planets to acquire water from the gas contained in the protoplanetary disk. In this study, we have newly developed population synthesis models, considering water originating from the protoplanetary disk and investigated the distribution of water content of terrestrial planets formed in the habitable zone around M-type stars. As a result, we have found that terrestrial planets with water contents comparable to the Earth's are dominant in the habitable zone, which is opposite to the conclusion from the previous study. This conclusion, however, strongly depends on the handling of the cooling process of the atmosphere, for which more detailed investigation is required.

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