

Development of Astrobiology with Exoplanet Explorations

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Recent exoplanet researches have advanced significantly. More than 5000 exoplanets including promising candidates have been reported. Large telescopes like the Subaru Telescope have enabled the direct imaging observations of Jovian planets. As a result, it has been shown that various types of stars have various types of planets around them. In particular, the transit observations by the NASA's Kepler mission and the long-term radial-velocity monitoring from the ground have discovered many super-earths and Earth-size planets. However, those planets discovered by the Kepler mission are mostly too far to be followed-up; the low-mass habitable planets around nearby stars have not yet been explored well. In order to study the universality of life under various environments, we study (1) to construct a dedicated facility for long-term planet searches around red dwarfs (M-dwarfs) and (2) to conduct a large-scale survey for Earth-mass habitable planets around red dwarfs using the newly developed spectrometer IRD. Those habitable planets are the best targets for a study of life under non-Earth-like environments (around low-luminosity and with high stellar activities) using the TMT 30 meter telescope (expected FL in 2022).

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