The search for extrasolar habitable worlds

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Until recently, the existence of extrasolar planets had remained speculative. Thanks to remarkable progress that has taken place during the last decade, observations have now revealed that more than 5% of the nearby Sun-like stars do host (at least) one planet. In addition, the use of space observatories (HST and Spitzer) allows us to probe the physical and chemical properties of some of the ~250 known planets and to infer their radius, mass, temperature and the presence of atmospheric constituents.

Most of these exoplanets are giant planets, significantly more massive than the Earth, but we now stand ready to explore the distribution and the properties of terrestrial planets, with a mass lower than 10 M_{Earth}. In particular, we can target terrestrial planets orbiting within the Habitable Zone of their star: the circumstellar region where liquid water can exist at the surface of a planet. This search for habitable worlds has already started with the launch of the mission *CoRoT* (CNES, ESA), and ground-based radial-velocity surveys that recently permitted the detection of the first terrestrial planets around the nearby low-mass star Gliese 581. These achievements open the path for a fantastic expansion of comparative planetary sciences and astrobiology, until now restricted to the solar system.

The next generation of instruments, like *Darwin* and *Terrestrial Planet Finder*, are already in an advanced stage. The major scientific objectives of these observatories will be to detect and characterize terrestrial planets at habitable distance from nearby stars, to assess their habitability, and to search for signatures of life. The scientific study of the distribution of life in the Universe is thus about to succeed to millenia-long philosophical deliberations