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Our Celestial Rosetta Stone: Exploring our Family of Planets to Understand Processes Across the Cosmos

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In the past 30 years, telescopes in space and on the ground have discovered thousands of extrasolar planets, providing us with a representative sample of the worlds that orbit other stars in our galaxy for the first time. However, our knowledge of these planets is limited to no more than a few datapoints for each one by the vast distances that separates us. Yet, though these places live mainly in our mind's eye, we can construct remarkably accurate pictures of the processes which dominate their environments. We can do this because of our understanding of planetary processes that we have gained through 62 years of robotic solar system exploration. This hard-won experience, like a celestial Rosetta Stone, allows us to translate our sparse information about the exoplanetary realm into the language of our familiar solar family of planets. However, unlike the famous artifact, we can still write new chapters to the translation. Exoplanets tell us about the full diversity of worlds and their circumstances while robotic space exploration missions consider a single representative world from that set up close. Thus, exoplanetary astronomy and solar system exploration are disciplines in dialogue. By deeply interrogating our nearest neighbors we can expand our understanding of planets everywhere.

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