Hemispheric tectonics and magma oceanography of ultrashort period rocky exoplanets

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The dawn of JWST science operations enables spatially resolved observations of ultrashort period rocky exoplanets. Some of these planets orbit so closely to their star that they lack an atmosphere, which gives direct access to their surfaces. I will describe how atmosphere-less rocky exoplanets in a partially or fully molten state open a novel observational window into the tectonic state and geodynamic evolution of rocky planets that are unavailable in the Solar System. Geodynamic simulations of the super-Earths LHS 3844b and GJ 486b suggest that tidally-locked rocky exoplanets undergo a hemispherically-forced tectonic regime, unknown in the Solar System, with volcanic activity focused either on the day- or nightside, driving asymmetric outgassing. The dense sub-Earth GJ 367b likely hosts a day-side magma ocean, enabling inferences on its geometry, mantle evolution, and global melt state. Scheduled observations in JWST Cycle 1 of all three planets will enable to test fundamental theoretical models of planetary tectonics and atmospheric formation.