

Water Loss from Terrestrial Planets (invited talk for S12)

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Surface liquid water is widely regarded as the definition of planetary habitability. A habitable planet must not only form with sufficient water, but some of that water must also remain at the surface of the planet, rather than being hidden in the planet's interior or lost to space. And the water must remain liquid, rather than forming a vapor atmosphere or remaining locked in a permanent ice sheet. These factors tend to be coupled, e.g., the amount of water sequestered in the mantle alters plate tectonics, which in turn controls degassing rates; atmospheric water vapor and ice sheets are influenced by—and themselves influence—a planet's climate; atmospheric loss is influenced by the current climate state, and in the long run water loss alters that climate. Understanding the evolution of water is more urgent for planets orbiting M-dwarf stars, as these are the only potentially habitable exoplanets we can hope to characterize in the near future. I will review some early studies exploring the phenomena and feedbacks controlling water on, and in, M-dwarf planets.