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Introducing WORM!

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The Water-Organic-Rock-Microbe (WORM) Portal, http://worm-portal.asu.edu, is a free online platform that provides a suite of tools for geochemical modeling. Built as an open-source coding project, the WORM Portal is designed to be an accessible and flexible resource for researchers, educators, students, and anyone interested in exploring and modeling thermodynamic consequences of reactions among water, organics, rocks, and microbes.

One of the major strengths of the WORM Portal is that it is free and entirely online, which allows users to quickly perform geochemical calculations without requiring software installations or extensive programming knowledge. To achieve this, the Portal includes a range of pre-built interactive digital notebooks that can be copied and customized to suit the user's specific needs. For example, the Aqueous Speciation notebooks provide an interface for users to calculate how the forms of solutes change depending on temperature, pressure, and chemical composition of the water. Mass Transfer notebooks allow users to predict and visualize which minerals form and dissolve as a rock reacts with a fluid. Reaction Properties notebooks allow users to calculate thermodynamic values like equilibrium constants and make interactive activity diagrams for a range of geochemical systems. For systems where aqueous organic molecules and metal-organic complexes are important, such as in microbial growth media, we offer notebooks that guide the user through the process needed to estimate the thermodynamic properties necessary to include these organic compounds in geochemical models.

At the time of writing, there are eighteen notebooks available to users that demonstrate the topics mentioned above, as well as geothermometry, heterogeneous equilibrium, reaction paths, and more. Because the WORM Portal is community-driven, its functionality is constantly expanding and improving based on user feedback, with new notebooks and tools being added continuously. For example, we are building introductory geochemistry tutorials and homework assignments for classroom use. We are excited about presenting the current state of the WORM Portal and welcome suggestions to make the platform more accessible to an audience with a range of scientific and technical backgrounds.