Climate-Weathering Feedback: Weak, Strong, or Irrelevant?

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The persistence of life on the planet, despite secular forcing and more abrupt perturbations that could have caused climate catastrophe, argues for strong climate regulation in the Earth system. Thirty years of intense research on the weathering-climate relationship have yielded a much deeper understanding of surface processes and climate feedbacks, but the implications of these studies for the strength of the climate-weathering feedback have been inconsonant. Even when great care has been taken to isolate the effects of temperature on weathering at the watershed to continent scale, the global implications have been unclear. The role of sulfuric acid produced during oxidative weathering of sulfides possibly decouples weathering and climate. Studies of ancient weathering present evidence for both strong and weak climate-weathering feedback. And recently the argument has been made that the submarine environment, where seafloor is altered in its interaction with seawater, is where climate regulation takes place: surficial weathering may be irrelevant as a climate stabilizing mechanism. In this talk I will explore paradoxes arising from existing studies and possible solutions to the paradoxes.