Mineral reactivity: what have we learned in the past 10 years

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The past 10 years have seen unprecedented expansion of our capability to understand analytically and computationally mineral reactivity and potentially use it to solve many fundamental societal issues from global sustainability to climate geoengineering. In 2008 in the issue of Elements entitled “Phosphates and Global Sustainability” Eric Oelkers and myself idenitied the problem of dwindling phosphate (amongst other) natural resources and considered how science can contribute to a more sustainable use of such resources. We identified phosphate reactivity as a key piece in the pazzle of sustainability. Since then work at increasingly higher resolution and smaller scale is beginning to bring into focus a picture of exceptional complexity for mineral surface reactivity. This work now helps us understand what makes surfaces, particulary those of nanomaterials, toxic to life forms and how we can design such materials more sustainably and safely.