

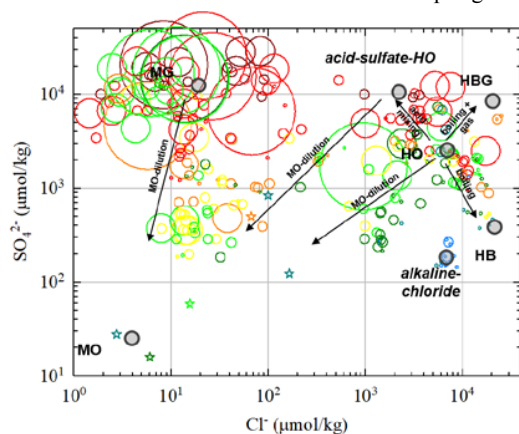
## Fluorescent dissolved organic matter is a tool to assess fluid source and mixing in terrestrial hot springs

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Dissolved organic matter (DOM) in hot spring systems is a complex, dynamic pool of molecules with multiple sources and fates. Recently, we developed a novel PARAFAC model for hot spring DOM that revealed a unique fluorophore in acidic springs (pH < 4; [1]). Here we assess DOC concentration and DOM fluorescence characteristics for ~200 hydrothermal features in Yellowstone National Park that span a range of hot spring types. A plot of [DOC] as a function of sulfate, chloride, and pH (Fig. 1) confirms typical mixing patterns identified using sulfate and chloride alone [2]. However, fluorescent DOM is a sensitive tracer of surface derived organic matter and allows us to distinguish mixing between different source types even when they have similar sulfate-chloride. It also allows us to assess the extent to which mixing has occurred subsurface without terrestrial influence vs. at the surface manifestation of the spring.



**Fig. 1:** Hot spring DOC concentration (open circles, symbol size  $\propto$  concentration; range: 15–3000  $\mu\text{M}$ ) plotted in molal  $[\text{SO}_4^{2-}]$  vs.  $[\text{Cl}]$  space. Color scale is pH (red-orange: pH < 4; yellow-green: 4 < pH < 7; blue: pH > 7). Mixing trends and fluid types from [2] are overlain as arrows and shaded circles.

[1] J Nye, E Shock, H Hartnett (2020 in press) *Org. Geochem.* doi.org/10.1016/j.orggeochem.2019.103964

[2] D Nordstrom, R McCleskey, J Ball (2009) *Appl. Geochem.* **24**(1): 191-207