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Ecosystem impacts of elevated OCS

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Community comment on "An approach to sulfate geoengineering with surface emissions of carbonyl sulfide" by Ilaria Quaglia et al., Atmos. Chem. Phys. Discuss.,
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Dear Dr Quaglia et al.,

I appreciate your interest in carbonyl sulfide (OCS) for geo-engineering. Between major volcanic eruptions, OCS provides sulfur to the stratosphere that is ultimately converted to reflective sulfate particles. It seems only natural that we should investigate its use in altering incoming solar radiation. Perhaps Paul Crutzen was first to mention this in a 2006 opinion piece (DOI:10.1007/s10584-006-9101-y), but he also mentioned the problem of long-term ecological consequences. I urge you to highlight these problems and unknowns in your manuscript.

There are at least two issues that would need investigation before releasing a large amount of OCS at the surface. The first is that high levels of OCS enhance the stomatal conductance (Stimler et al., 2010, <https://doi.org/10.1111/j.1469-8137.2010.03218.x>). We do not have enough information about how wide spread this effect is. If stomatal conductance changes (the stomata become more open) regardless of water status, this would lead to greater mortality and likely other unwanted effects, especially with climate change.

The second is that soils start to interact with OCS differently under high concentrations (Conrad and Meuser 2000, [https://doi.org/10.1016/S1352-2310\(00\)00136-9](https://doi.org/10.1016/S1352-2310(00)00136-9)). A different, not well understood mechanism underlies this separate phenomenon. It could lead to changes in soil pH which would also have cascading, unwanted side effects.

It is important to study geoengineering so that we can make informed choices regarding our Earth system. With the current state of our knowledge, we cannot say that releasing large amounts of OCS at the surface would not lead to ecosystem collapse.

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