

## Research Project

# Albedo modification impact on global temperate dryland ecosystem water balance

### Third-party funded project

**Project title** Albedo modification impact on global temperate dryland ecosystem water balance

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**Organisation / Research unit**

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**Status** Completed

Recently, substantial societal and scientific attention has highlighted important knowledge gaps about albedo modification, a potential strategy to counterbalance global warming caused by greenhouse gas emissions. Albedo modification, often implemented by augmenting stratospheric SO<sub>2</sub>, increases the amount of reflected solar radiation thereby having the potential to cool Earth within a few years. Despite huge potential and low cost, very little research has been done that explores how albedo modification will influence atmospheric processes and impact ecosystems. The few existing case studies suggest that albedo modification could lower temperatures, but also may decrease precipitation, with potentially large and unintended consequences for ecosystems, particularly in drylands, where water is often the most limiting resource. Our objective for this proposal is to investigate the ecohydrological consequences of changes in temperature and precipitation regimes caused by global albedo modification on global temperate drylands. We will simulate how changes in precipitation and temperature after global albedo modification will influence soil moisture, soil droughts, and ecosystem water balance using a daily time step, multiple soil layer simulation model of ecosystem water balance. We will obtain model output from the Geoengineering Model Intercomparison Project (GeoMIP), which explored four albedo modification scenarios for climate modeling purposes. Precipitation and temperature data for two of the GeoMIP scenarios will serve as inputs to the simulation model, along with site-specific vegetation and soil properties parameters. This work is novel for several reasons. First, very little research has examined the impacts of albedo modification on terrestrial ecosystems: we know of only two other studies, both of which were conducted in agricultural settings. As such, this work has the potential to make a very large contribution to our understanding of how albedo modification may influence ecosystems processes. Second, this work will help to characterize the potential for unintended consequences from albedo management in drylands, which will inform whether albedo modification should be considered as a viable strategy for counterbalancing global warming.

**Keywords** albedo modification, solar radiation management, geoengineering, climate change, drylands, water balance, computer experiment

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**Add publication**

**Add documents**

**Specify cooperation partners**