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Linking albedo dynamics and forest disturbances in the Middle East

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Albedo is an essential climate variable that has a critical role in energy balance systems and climate models. A better understanding of the impact of land use changes on the surface albedo is urgently required for climate modeling. This study explores how disturbances, such as severe droughts and fire can influence albedo trends and climate in the largest remaining forest area of the Middle East, the Zagros Mountains. Our large-scale analysis (covering an area of 384 000 km2) revealed that albedo depends on leaf area index. Using smaller study sites located in different parts of the Zagros region, we also showed that drought could lead a slight increase in albedo, whereas fire results in a decrease in albedo. These changes in albedo were not strongly linked with disturbances occurring in the tree layer. This is because the understory (forest floor) layer dominates the albedo signal in sparse forests. Our results can help improve climate change projections and understand how sparse forest ecosystems respond to ecological catastrophes, such as severe droughts, fires, or insect attacks.

Keywords: albedo, drought, MODIS, climate change, Zagros forest