

Peer Review

Review of: "3D Cloud Reconstruction Through Geospatially-Aware Masked Autoencoders"

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3D Cloud Reconstruction Through Geospatially-Aware Masked Autoencoders

A well-thought-out and executed paper! It aims to tackle a well-known problem in cloud remote sensing by trying to use machine learning to reconstruct cloud features. The detail given to the problem's technical aspects and approach was good.

One area of improvement could be to expand upon the physical understanding that the models have. For instance, a discussion paragraph on the ability of the models to capture the overall physics of clouds stratified by type, microphysics, etc., would go a long way to make the models more credible to many members of the community. Another way would be to do an ablation study on the channels being used in the training – different channel combinations in the VIS-NIR-SWIR are combined for cloud retrievals, so selectively using only that subset of channels would help connect the models to the physics. I would recommend expanding upon Table 4/Figure 8 to achieve this if additional analyses cannot be done.

Similarly, another set of analyses or discussions could be had about the influence of solar and viewing geometries, considering this is using geostationary satellites. Both influence cloud reflectance considerably while also having an impact on the horizontal photon transport in the case of inhomogeneous clouds. If possible, consider commenting on the influence of geometry on the model.

Some insight into the explainability of the vision transformers would be valuable. I would recommend adding a paragraph or two about how one could go about using such models to reconstruct cloud features while ensuring sanity checks (statistically or physically).

And finally, please consider doing another round of grammar check, as there are a few instances of grammatical errors.

Declarations

Potential competing interests: No potential competing interests to declare.