Forest restoration to maintain rainfall under climate change

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Project description

Across the globe, rainfall has partly evaporated from the ocean and partly from the land. The contribution of the land source depends on evapotranspiration at those source locations, and evapotranspiration depends on land cover. Therefore, land cover affects rainfall patterns, an effect that occurs at scales in the order of 100s-1000s km. Specifically, different vegetation types affect evapotranspiration, where especially forests tend to release relatively much moisture even during period of low rainfall, due to their capacity to access deeper water (Staal et al. 2018). Forest restoration could therefore help to provide rainfall at distant places where it is most needed (Staal et al. 2024), for example to combat droughts or to restore terrestrial carbon sinks (Staal et al. 2023). A state-of-the-art atmospheric moisture tracking model called UTrack (Tuinenburg & Staal, 2020) uses atmospheric data to determine how land cover change affects rainfall patterns. Now, a (yet unpublished) model version to track moisture flows for climate change scenarios has been developed by the supervisor and collaborators.

In this Bright Minds Assistantship, you will help with cutting-edge research that is part of the NWO-VENI project “Recovering tropical forest resilience in the Anthropocene”. You can study the effects of forest restoration on rainfall patterns in the tropics (or elsewhere) for different climate change scenarios, with wide applications. Details of the project can be discussed with the supervisor, but the work will involve data analysis and possibly atmospheric simulation modelling. The work can be done from home. Regular meetings are preferably in person, but can be done via Teams if needed.

Job requirements

No prior knowledge is necessary, but an affinity for (and experience with) programming (for instance Python or MATLAB) would be highly appreciated.

References

Staal, A., Koren, G., Tejada, G. & Gatti, L.V. (2023). Moisture origins of the Amazon carbon source region. *Environmental Research Letters* 18, 044027.

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Staal, A., Tuinenburg, O.A., Bosmans, J.H.C., Holmgren, M., van Nes, E.H., Scheffer, M., Zemp, D.C. & Dekker, S.C. (2018). Forest-rainfall cascades buffer against drought across the Amazon. *Nature Climate Change* 8, 539-543.

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