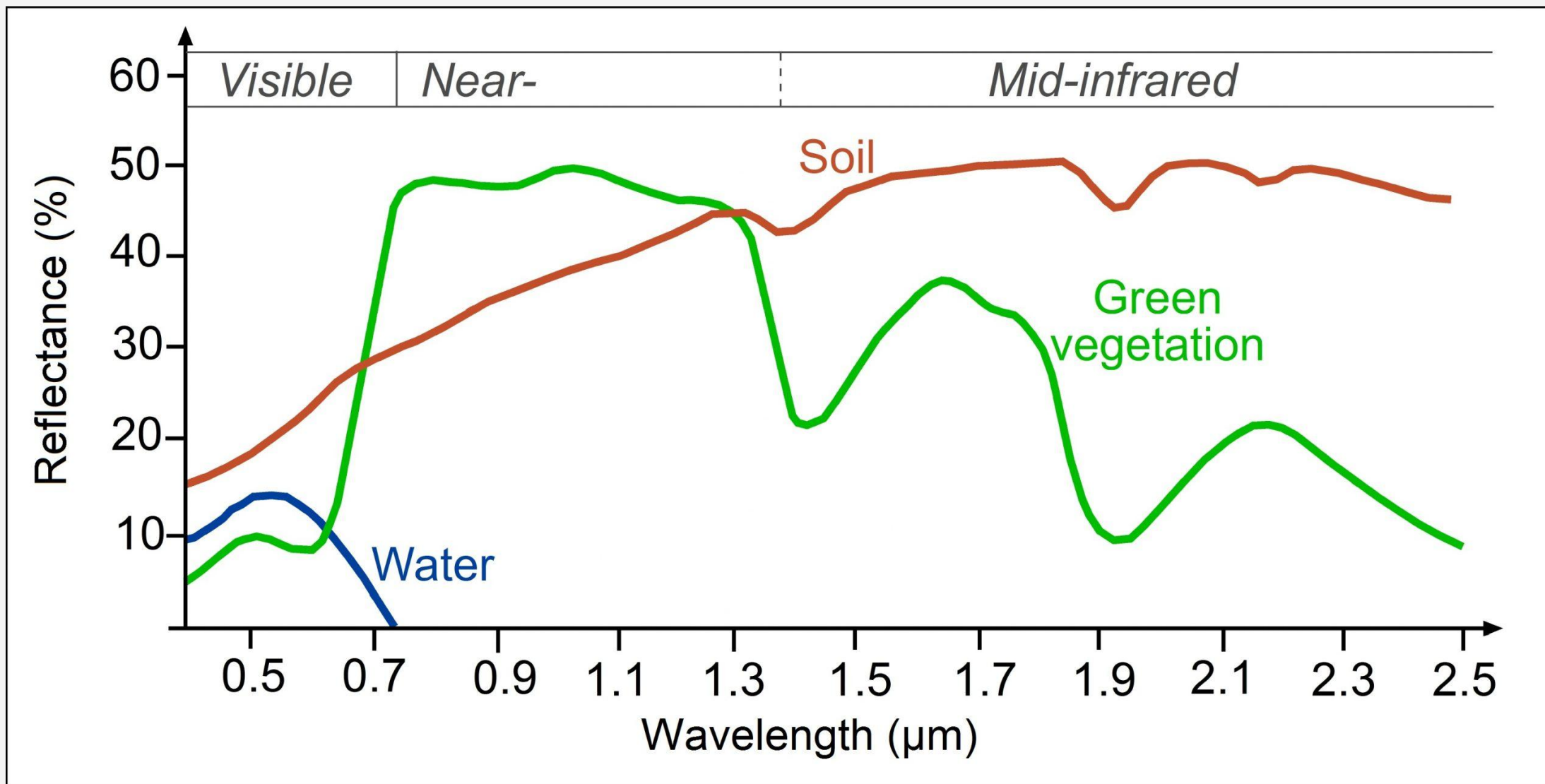


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Deep Learning in the Woods: what can we learn about canopy height from optical remote sensing?

Master Thesis by Emilio Sánchez
18.07.2025 | ILÖK Graduate Conference

Prof. Dr. Hanna Meyer, Dr. Jakub Nowosad





nature ecology & evolution



Article

<https://doi.org/10.1038/s41559-023-02206-6>

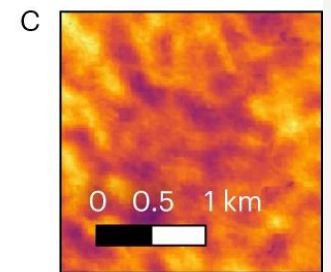
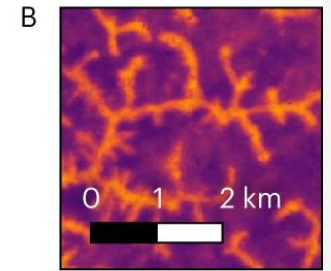
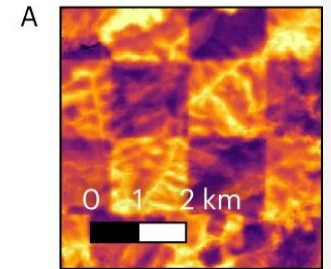
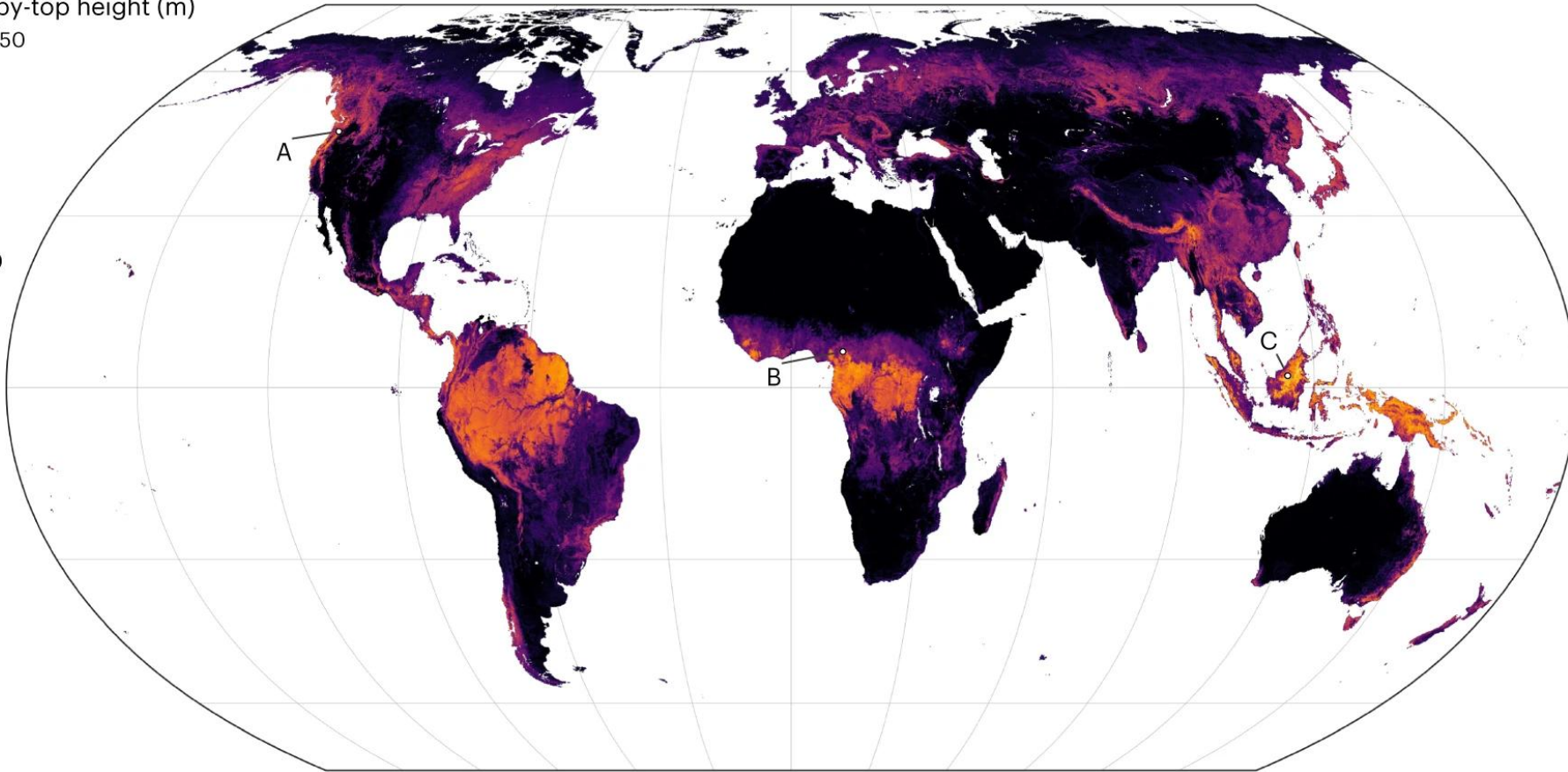
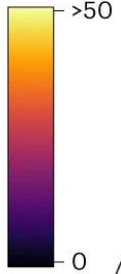
A high-resolution canopy height model of the Earth

Received: 9 June 2023

Nico Lang ^{1,2} , Walter Jetz ³, Konrad Schindler ¹ & Jan Dirk Wegner ^{1,4} 

a

Canopy-top height (m)



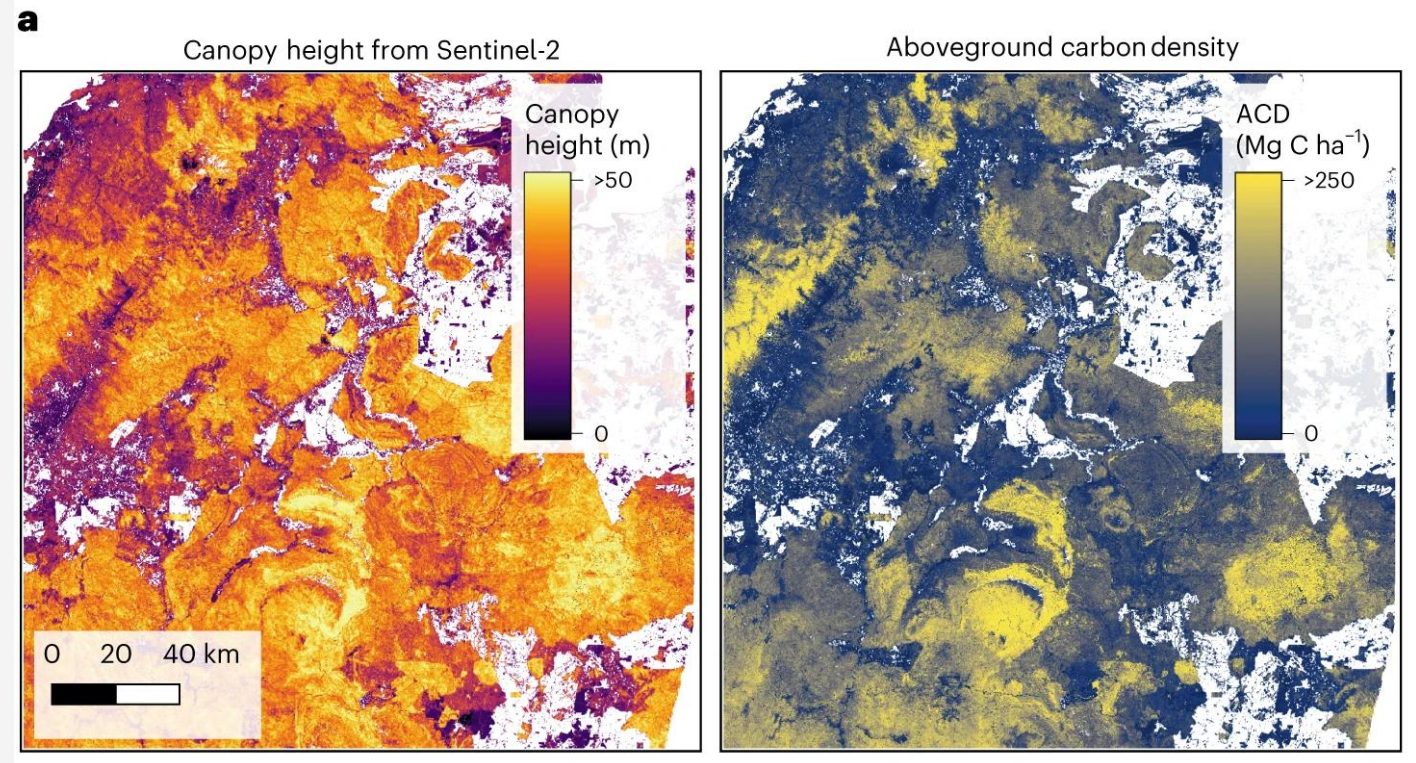
GOALS

- Proof that spectral data has no explanatory value on the canopy height
- Improve future prediction products

WHY IS THIS IMPORTANT?

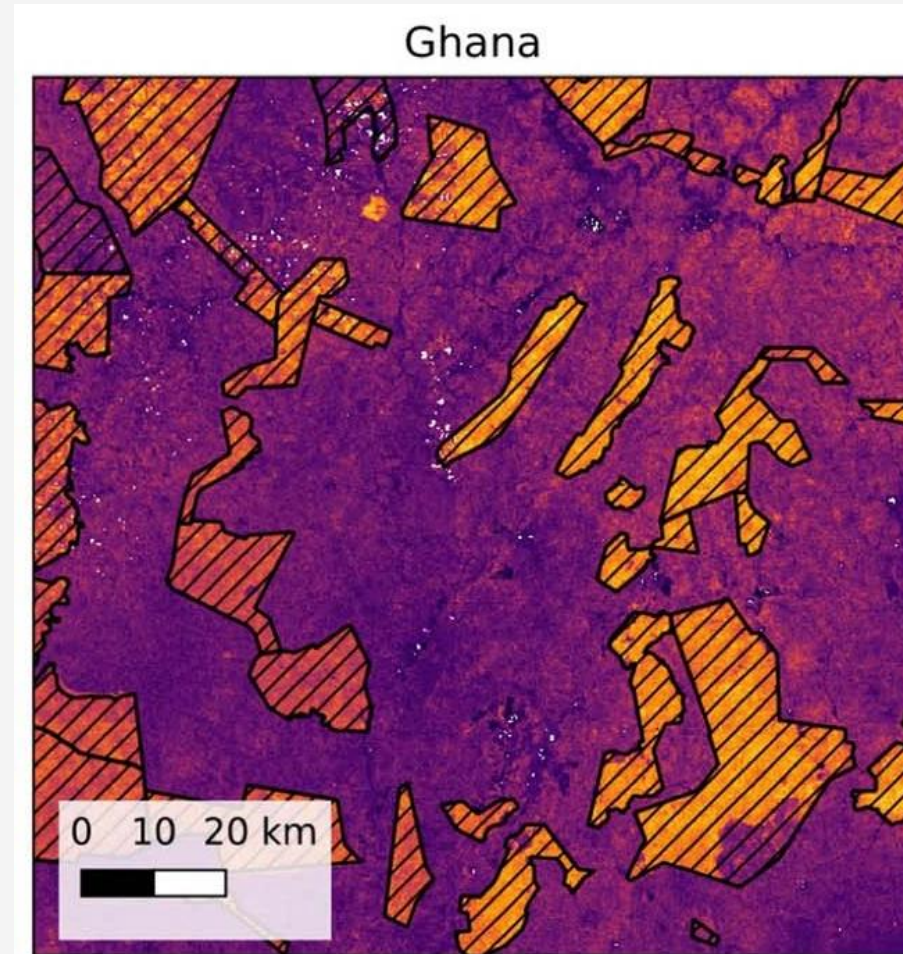
Relevance

- Carbon stock mapping
 - Growth and loss



Relevance

- Carbon stock mapping
 - Growth and loss
- Monitoring
 - Environmental damages
 - Protected area analysis



Relevance

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Relevance

- Carbon stock mapping
 - Growth and loss
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 - Protected area analysis
- Habitat analysis
- Policy making



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Forest canopy height co-determines taxonomic and functional richness, but not functional dispersion of mammals and birds globally

Gang Feng, Jian Zhang , Marco Girardello, Vincent Pellissier, Jens-Christian Svenning

First published: 07 May 2020 | <https://doi.org/10.1111/geb.13110> | Citations: 41

Plant Ecology

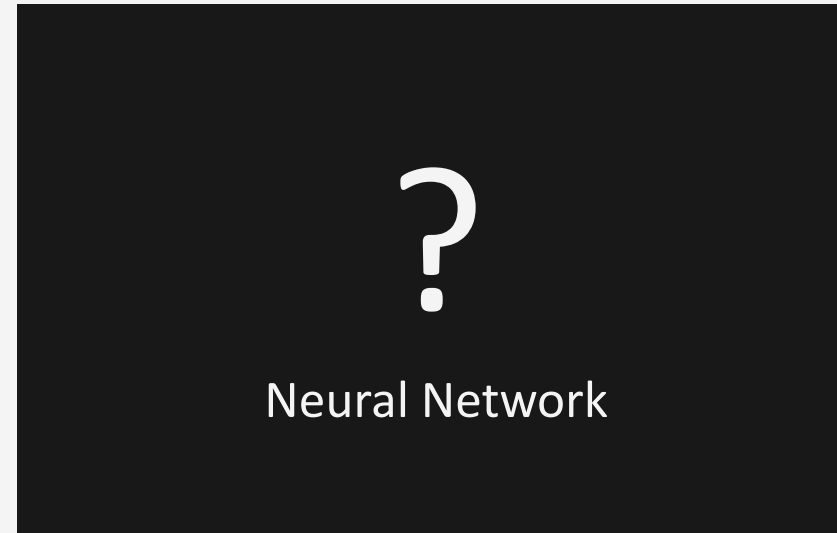
Exploring the relationship between canopy height and terrestrial plant diversity

**Roberto Cazzolla Gatti • Arianna Di Paola • Antonio Bombelli •
Sergio Noce • Riccardo Valentini**

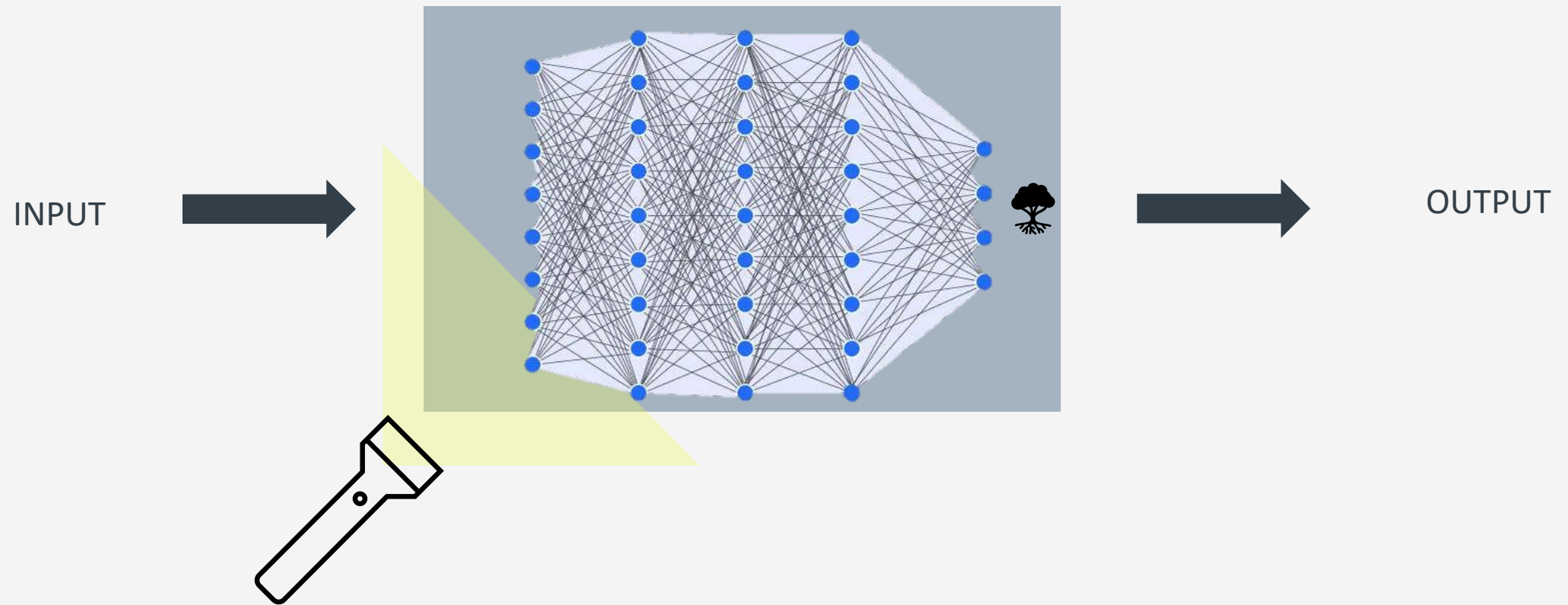
HOW DOES THE MODEL WORK?

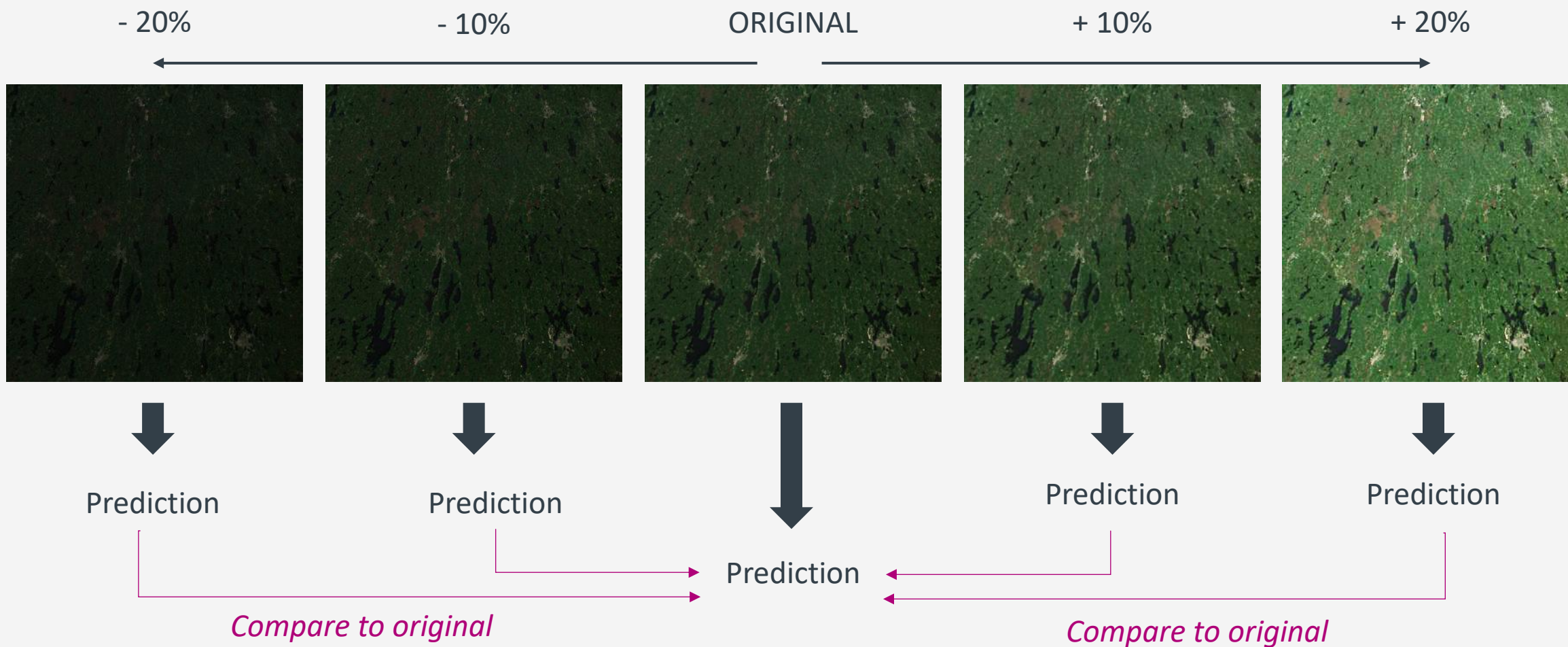
AND HOW I TRIED TO FIND OUT

INPUT

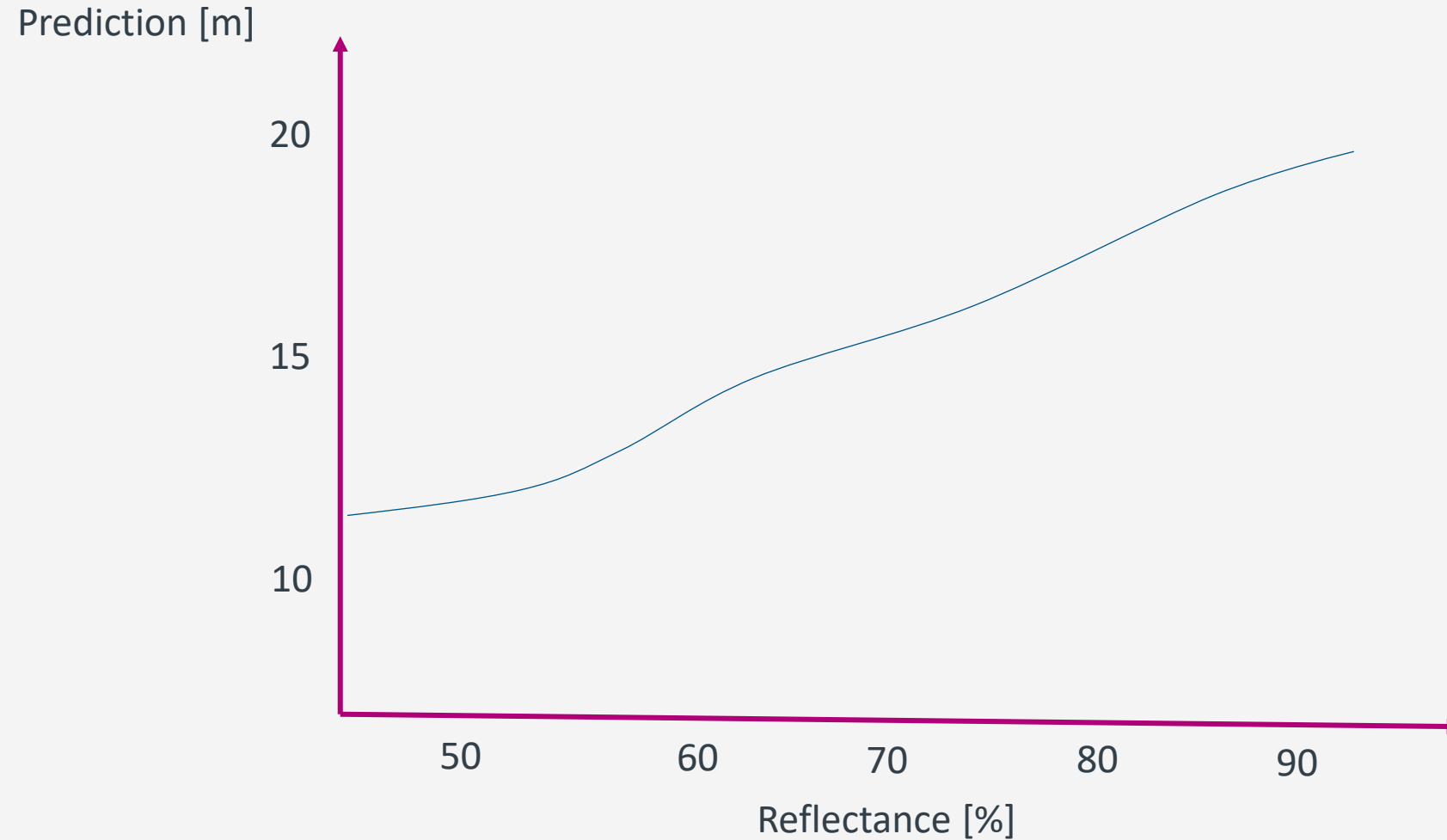


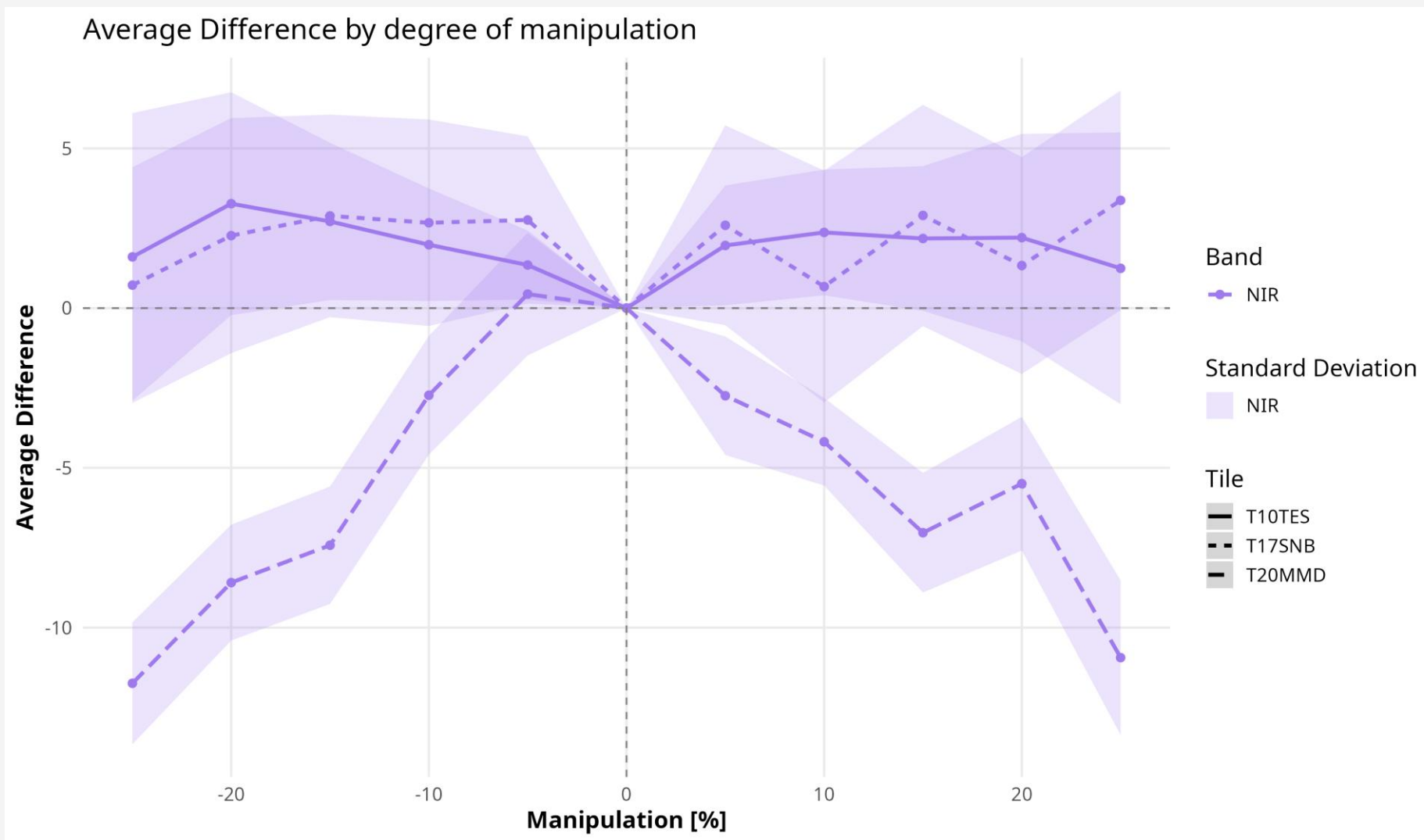
OUTPUT

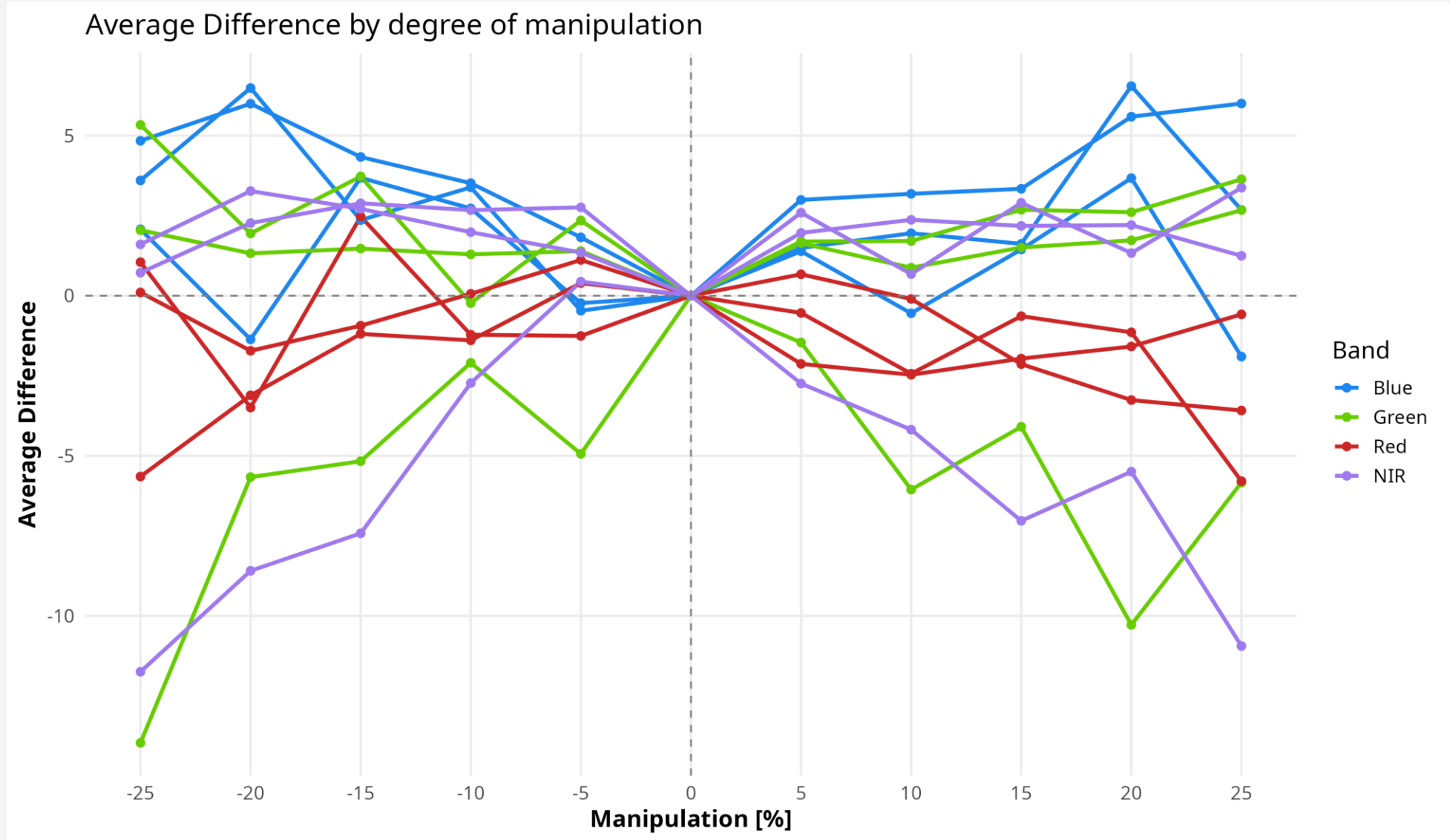




Expectation if model works











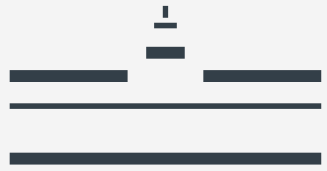
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Location of the data is more important than the values

Beautiful maps are not automatically true!

Key Takeaways

- **Spectral data does not contain information about canopy height**
- **The model primarily learned contextual patterns like location**
- **Critical assessment of AI-based ecological products is crucial**



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Thank you for your interest!

More information, updates on the progress, these slides and all sources are available on my GitHub.

