



Assessing old-growthness based on field data: The adjusted old-growth indicator

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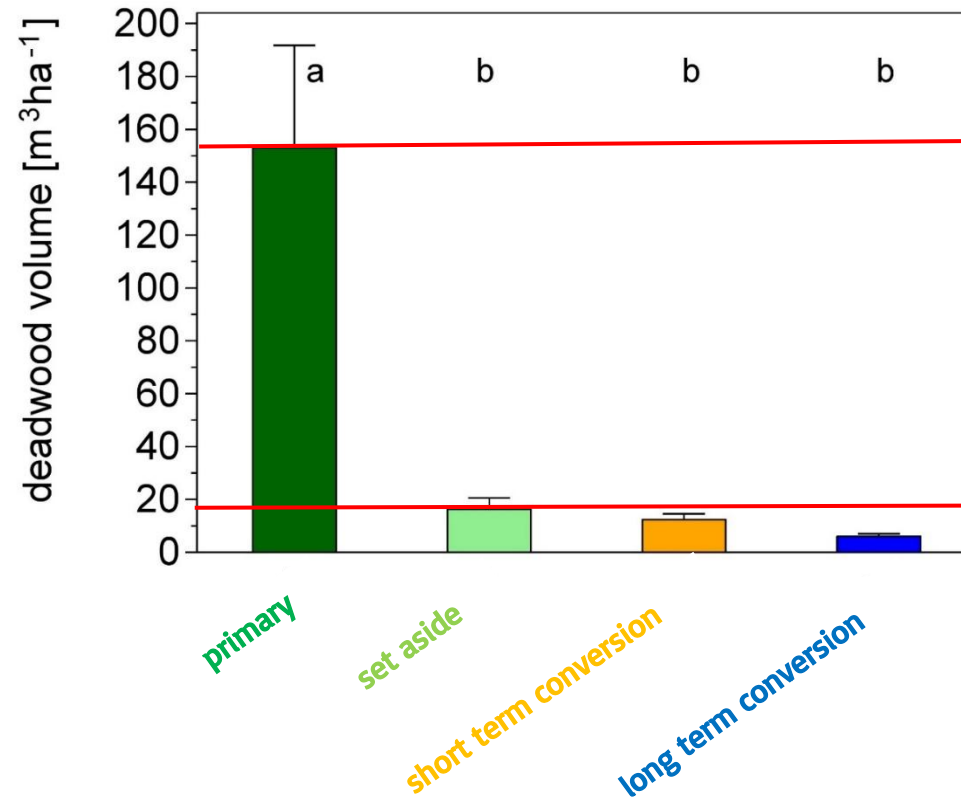


Old-growth characteristics and the shifting baseline syndrome

General characteristic:

- continuous, not categorical
- multivariate
- dynamic (disturbances may change the level of old-growthness)

see: Wirth et al. 2009, Bauhus et al. 2009, Bergeron & Harper 2009, Meyer et al. 2021, Vandekerkhove et al. 2022



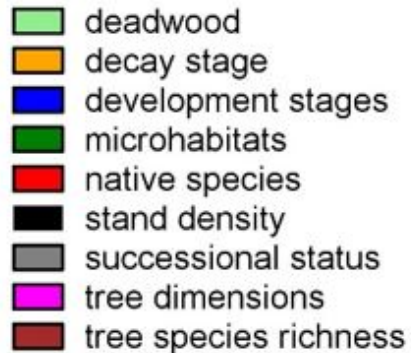
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shifting baseline

adapted from: Schneider et al. (2023), Natur und Landschaft, 98 (2), 49-57, DOI: 10.19217/NuL2023-02-01

The original old-growth indicator (OGI)

- three primary beech forests as reference for maximum old-growthness
- stand related approach: 9 dendrometric sample plots per stand
- 27 variables arranged to 9 criteria
- bootstrapping to derive 90 % range of variation per variable
- single as well as aggregated OGI-values can be calculated: allows for summarized and differentiated interpretation



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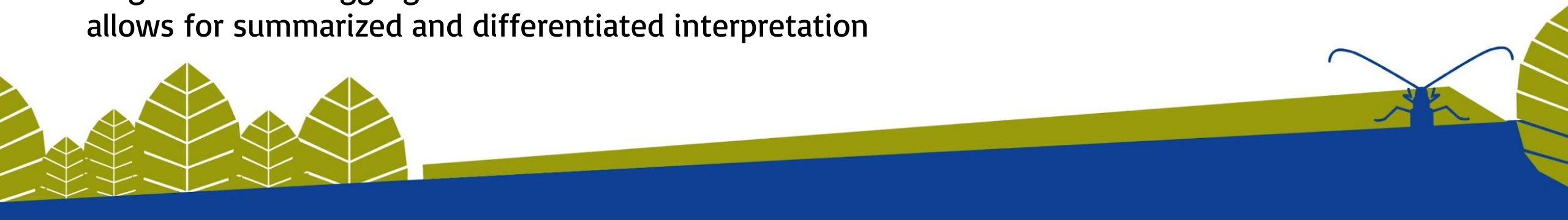
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Quantifying old-growthness of lowland European beech forests by a multivariate indicator for forest structure

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The original old-growth indicator (OGI)



Combining overlap and excess to final OGI

$$OGI = \frac{OGI_{com} + OGI_{exc}}{2}$$

90 % range of comparison stand

overlap | excess

$$OGI_{com} = \frac{overlap}{OG\ range}$$

$$OGI_{exc} = 1 - \frac{excess}{comparison\ range}$$



Applying OGI to the available World Heritage dataset: OGI ad

Great opportunity to extend the reference frame

- besides Havešová, Kyjov and Stužica (Slovakia) also primary forest stands in Abruzzo (Italy), Central Balkan and Stara Planina (Bulgaria), Klenovsky Vapor (Slovakia), Krokár (Slovenia), Sinca (Romania) and Uholka-Schyrokyj Luh (Ukraine) could be integrated
- natural range of variation is much better covered

Challenges arising from the use of already available dendrometric data:

- not all variables could be reproduced (e. g. related to tree regeneration)
- plot number per stand often too low for bootstrapping



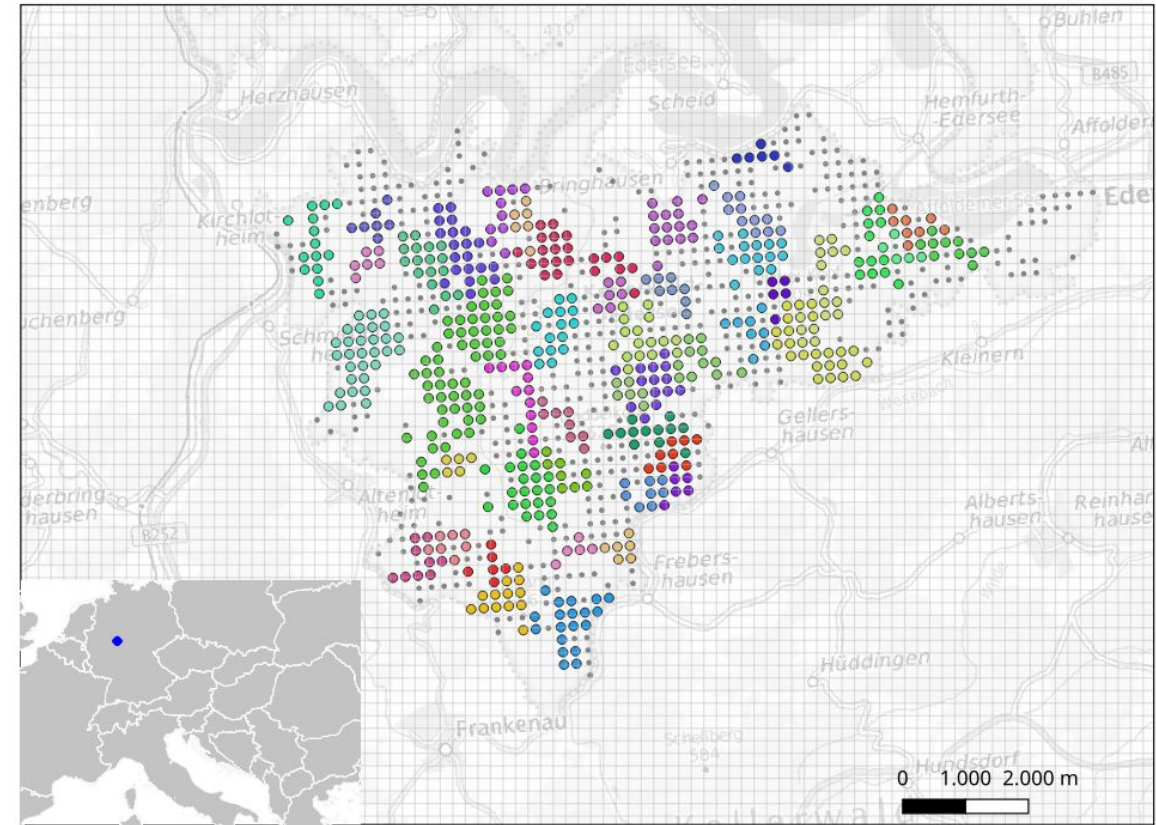
Approach for OGI_{ad}

- reduced set of 12 variables addressing the following criteria: very large trees, deadwood, structural diversity, tree species composition, tree microstructures
- building spatially explicit clusters of plots based on TSA, forest type and age structure as a substitute for classical forest stands

site: ke

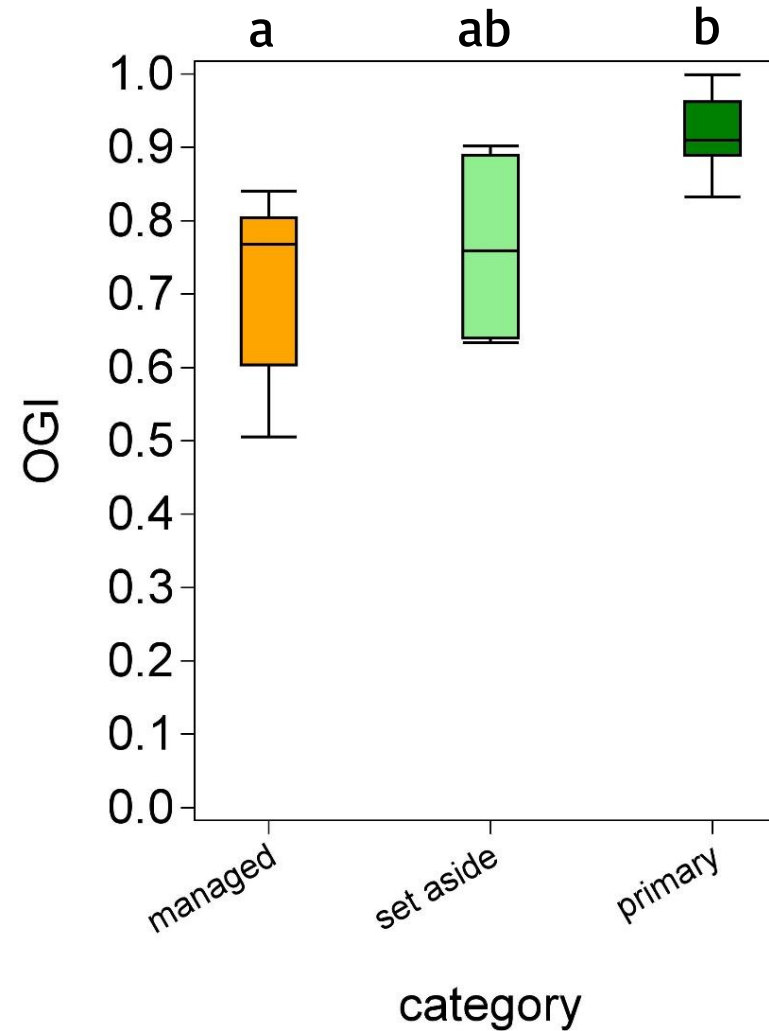
max. distance cluster points: 400m

Grid: 200m



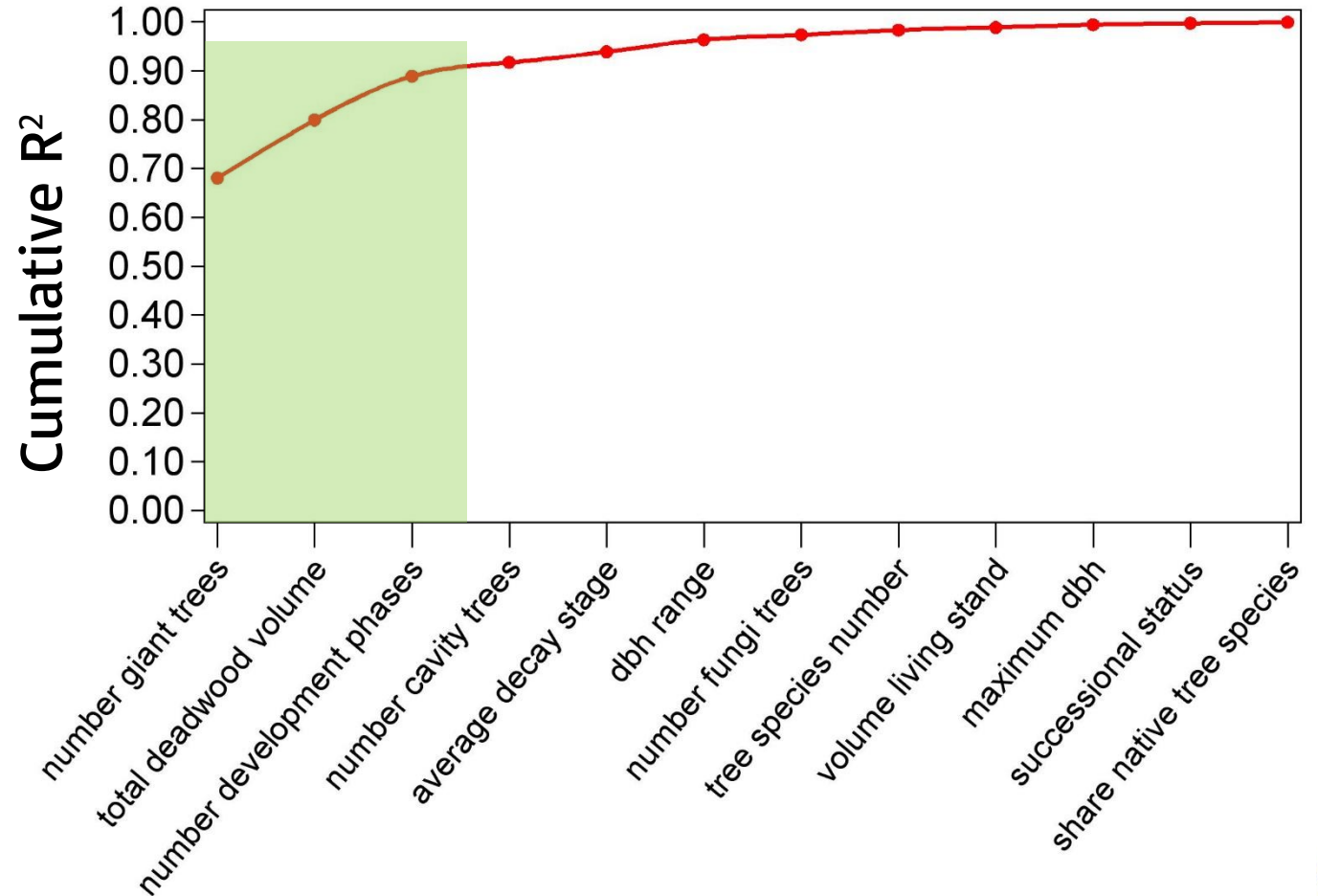
Main results OGI_{ad}

- significant difference between managed and primary forests (multi comparison test)
- intermediate position of set aside stands
- surprisingly low difference can be attributed to high level of naturalness in managed stands
- nevertheless: It's a long way to high level old-growthness (indicated by difference between set aside (6 decades of abandonment on average) and primary)



Conclusions for a rapid field assessment

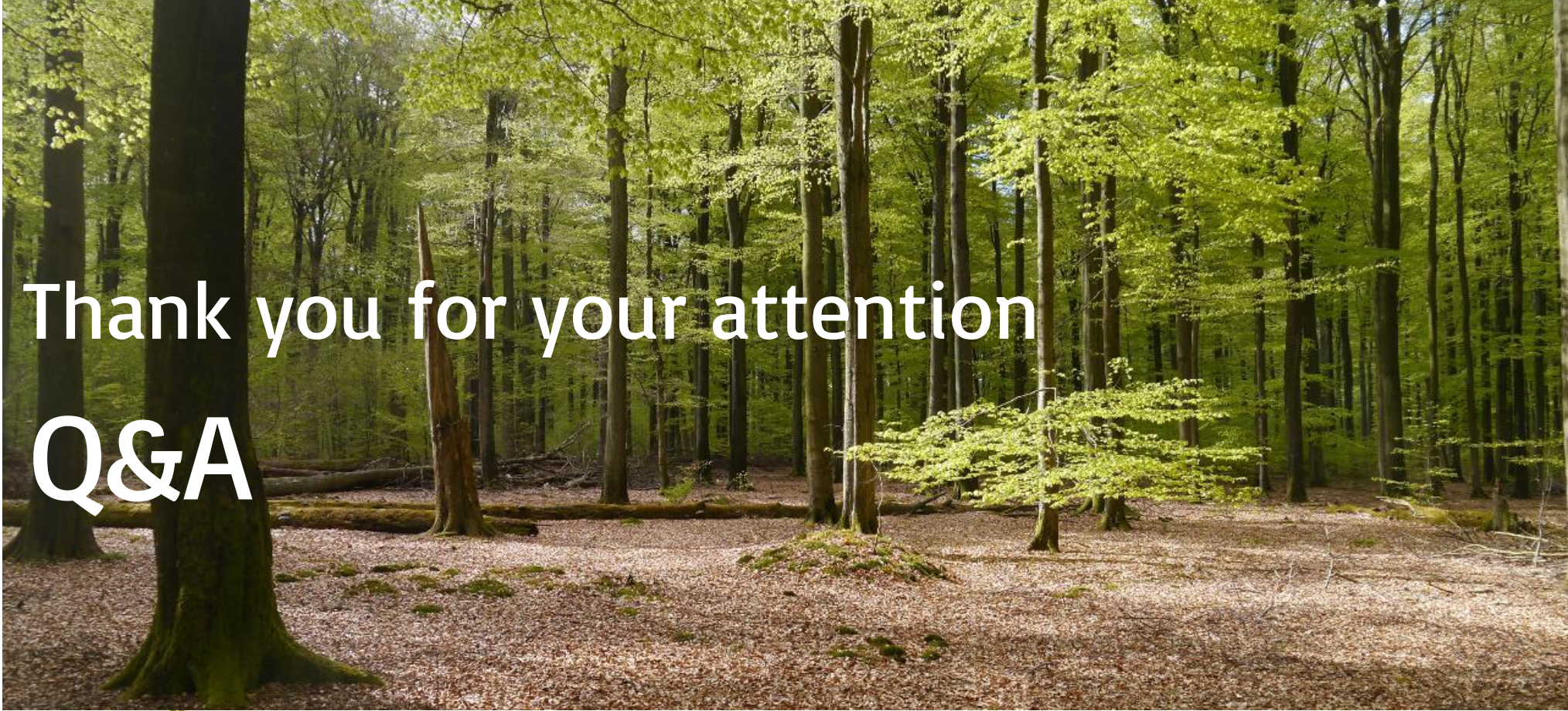
- three variables cover 95 % of OGI_{ad} variation
- transect sampling (line intersect plus distance sampling?) could be suitable to map old-growthness of larger areas of mature forests with native tree species composition



Conclusions

- database of reference stands extended significantly
- available data suitable to calculate OGI_{ad}
- rather high level of old-growthness of managed stands (reason: close to nature tree species composition and management)
- nevertheless: It's a long way to high level old-growthness
- OGI as input to train AI/neural networks working with area-wide remote sensing data (s. talk by Manuela Hirschmugl)
- rapid assessment conceivable (assessing the most important variables with transect sampling)



A photograph of a dense forest of tall, slender beech trees with vibrant green foliage. The forest floor is covered in a thick layer of brown, fallen leaves. The text 'Thank you for your attention' and 'Q&A' is overlaid on the left side of the image in a white, sans-serif font.

Thank you for your attention

Q&A

