

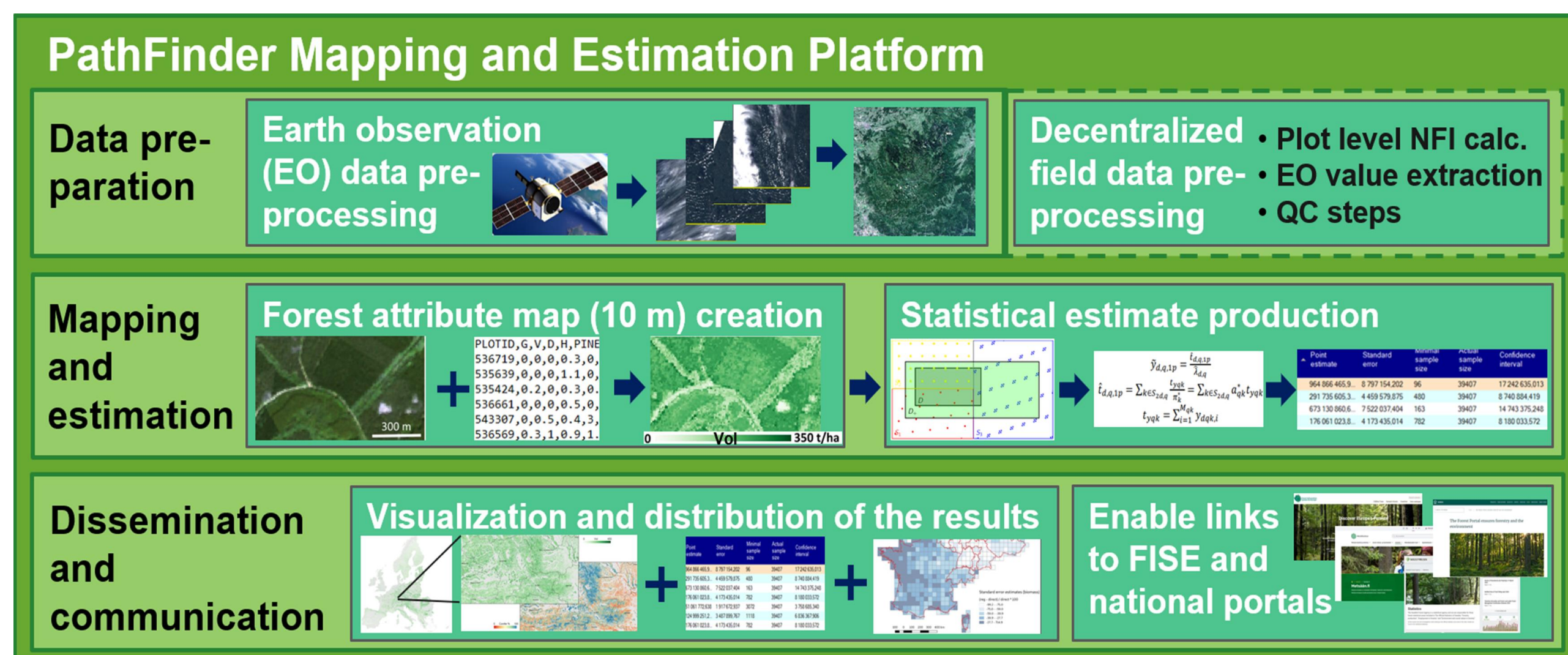
European-wide forest structure maps and estimates integrating Sentinel-2 and National Forest Inventory data

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Introduction

- PathFinder project develops an integrated forest monitoring and pathway assessment system.
- A major component of the system is the PathFinder platform for creation of harmonized forest estimates and maps across Europe.



Design of the platform is fully described in D2.1 at: <https://pathfinder-heu.eu/resources>

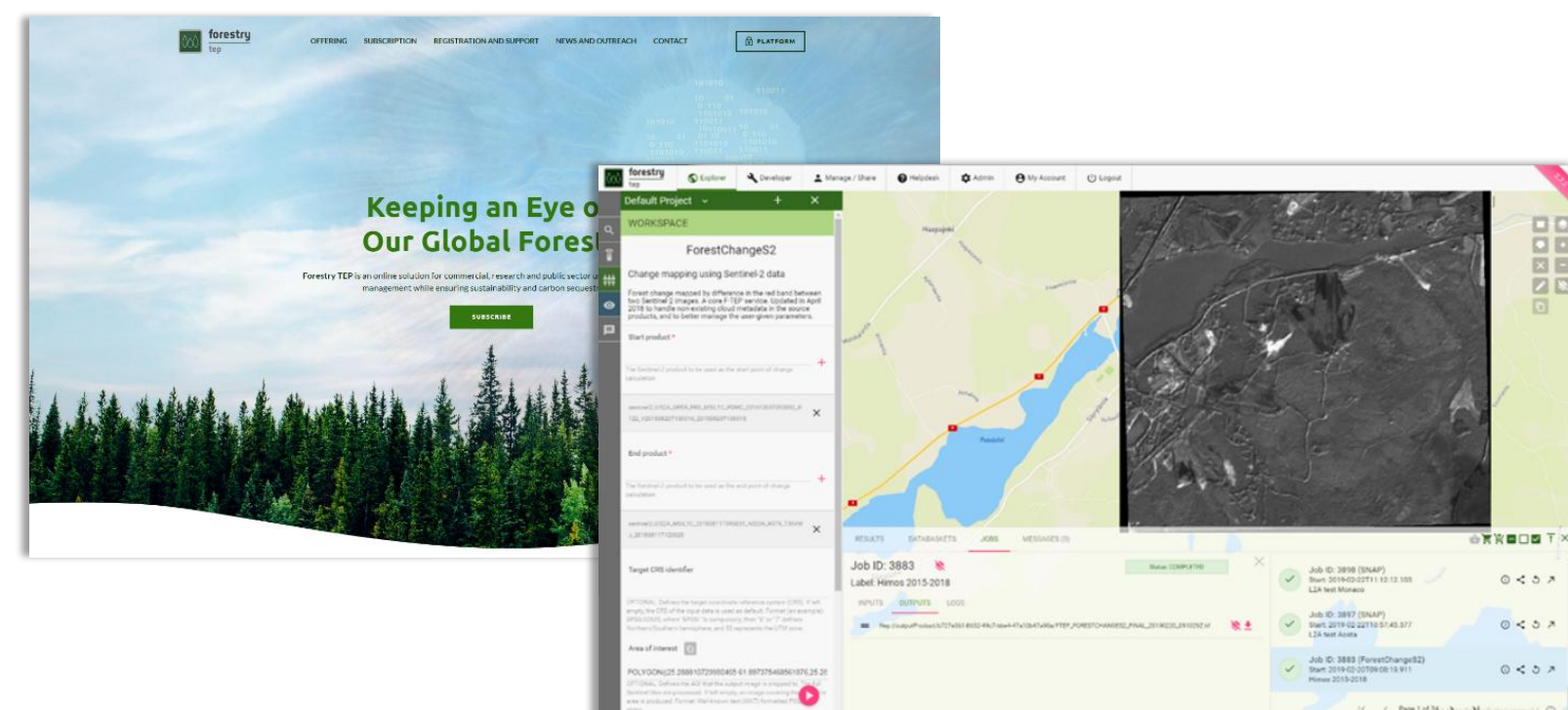
Key characteristics of the platform

- Maximize synergy between field and EO data
- Protect NFI field plot location privacy
- Enable provision of harmonized timely forest information across Europe

Applications used in platform demonstration

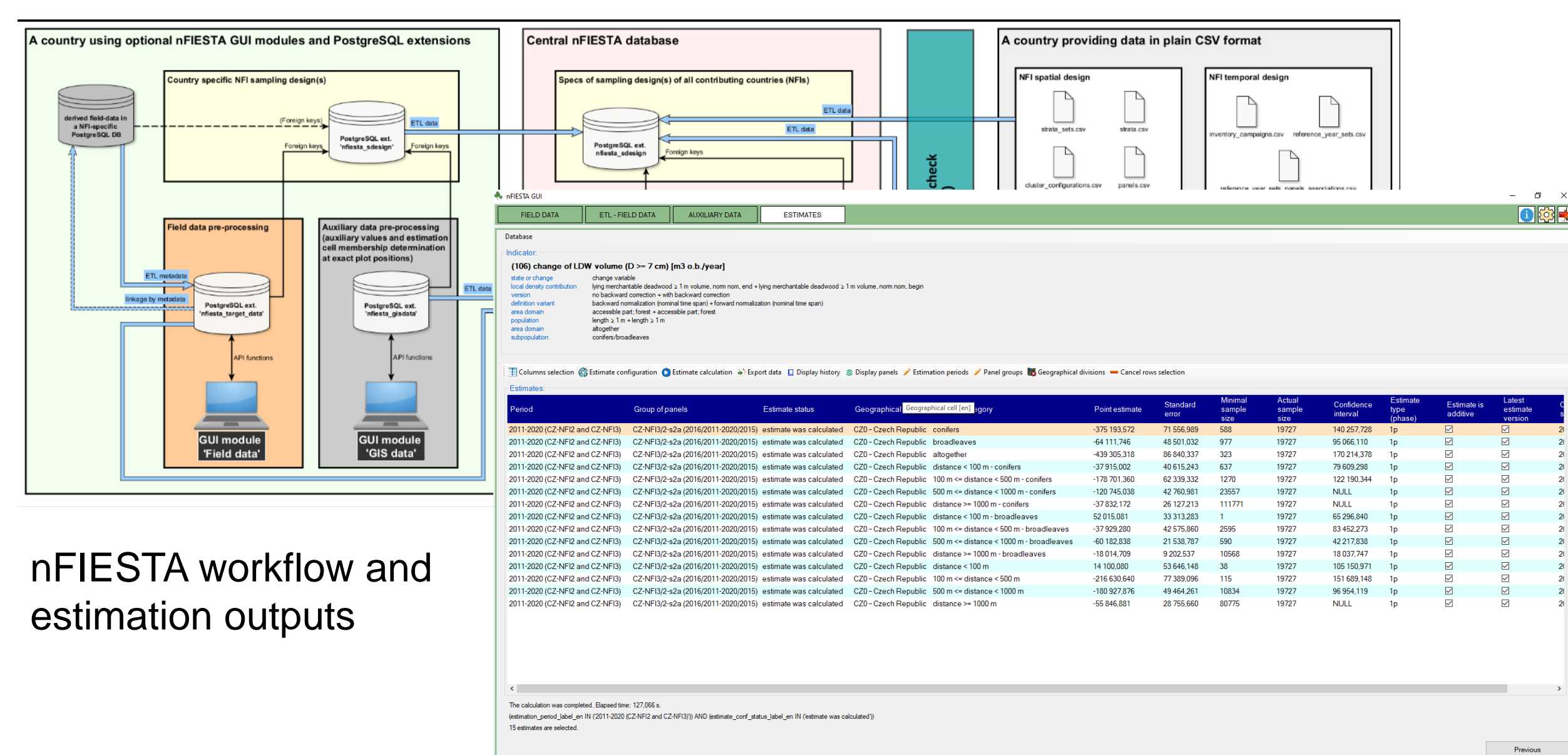
- **Forestry TEP** (<https://f-tep.com/>) for EO data and map production.

- EO imagery preparation
- Map production with EO data and NFI plots



- **nFIESTA** (<https://gitlab.com/nfiesta>), methodological framework and software for estimation

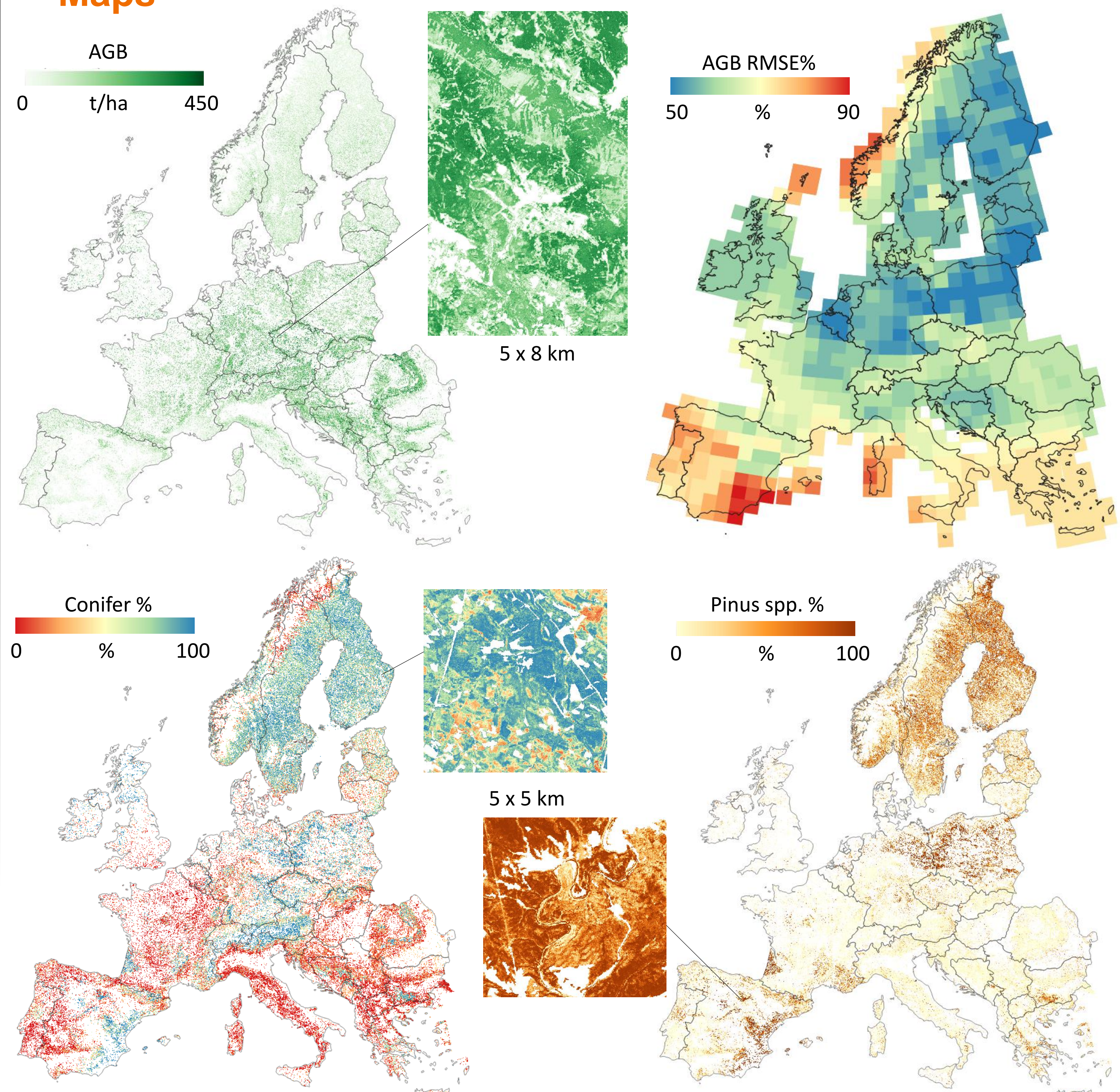
- Integration of NFI data of different countries
- Combination of field data and EO products for improved accuracy of estimates
- Quality control relying on additivity of estimates
- GUI with several modules
- Free and Open Source (EUPL license)



Demonstration

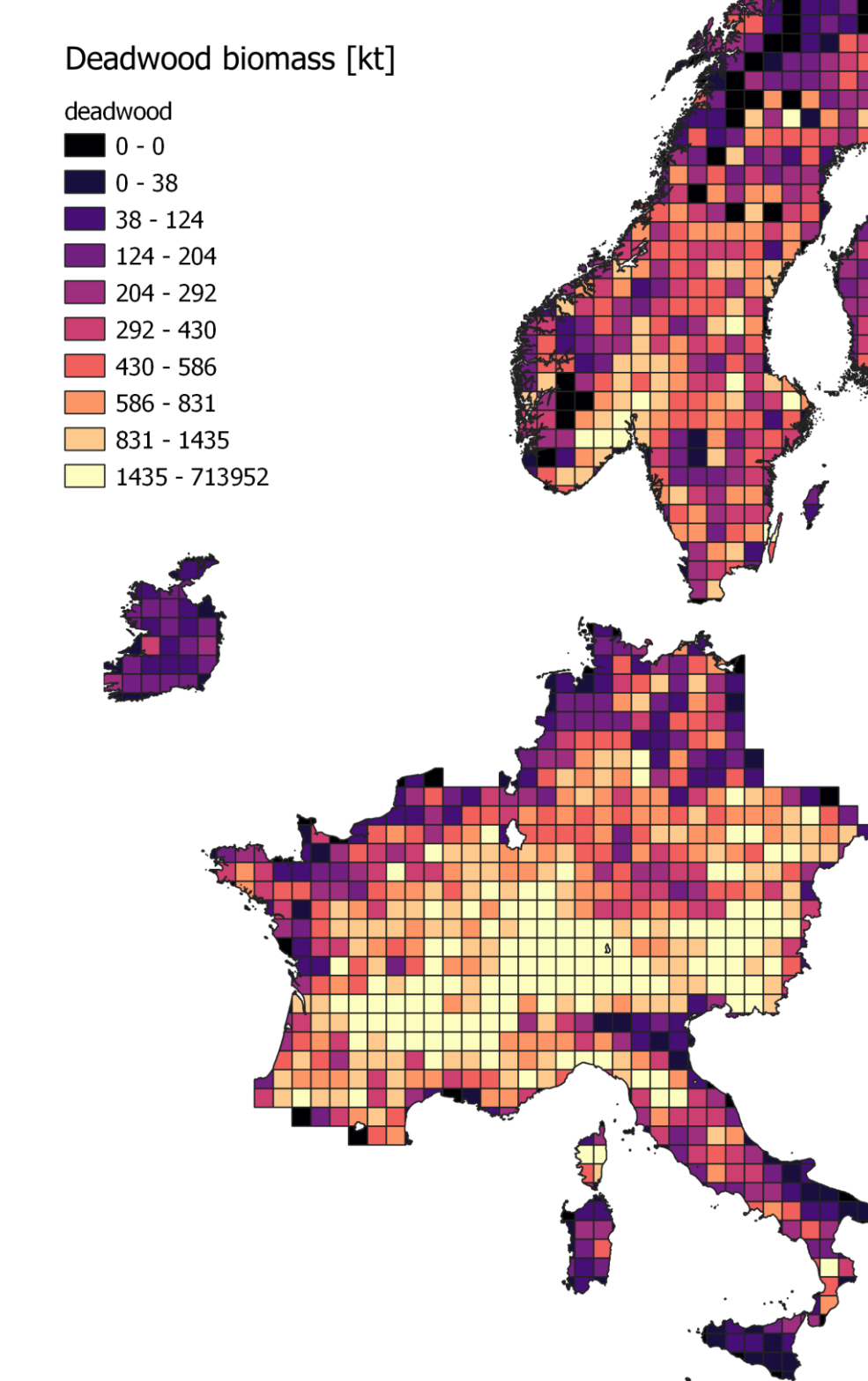
- Sentinel-2 imagery 2020 and 2024 + NFI field data from 14 countries
- 18 maps in 10 m resolution (Vol, AGB, DBH, BA, H, GAI, NAI, Conifer % and Species proportions for 10 species groups)
- Estimates for INSPIRE grid cells and arbitrary areas from nFIESTA

Maps



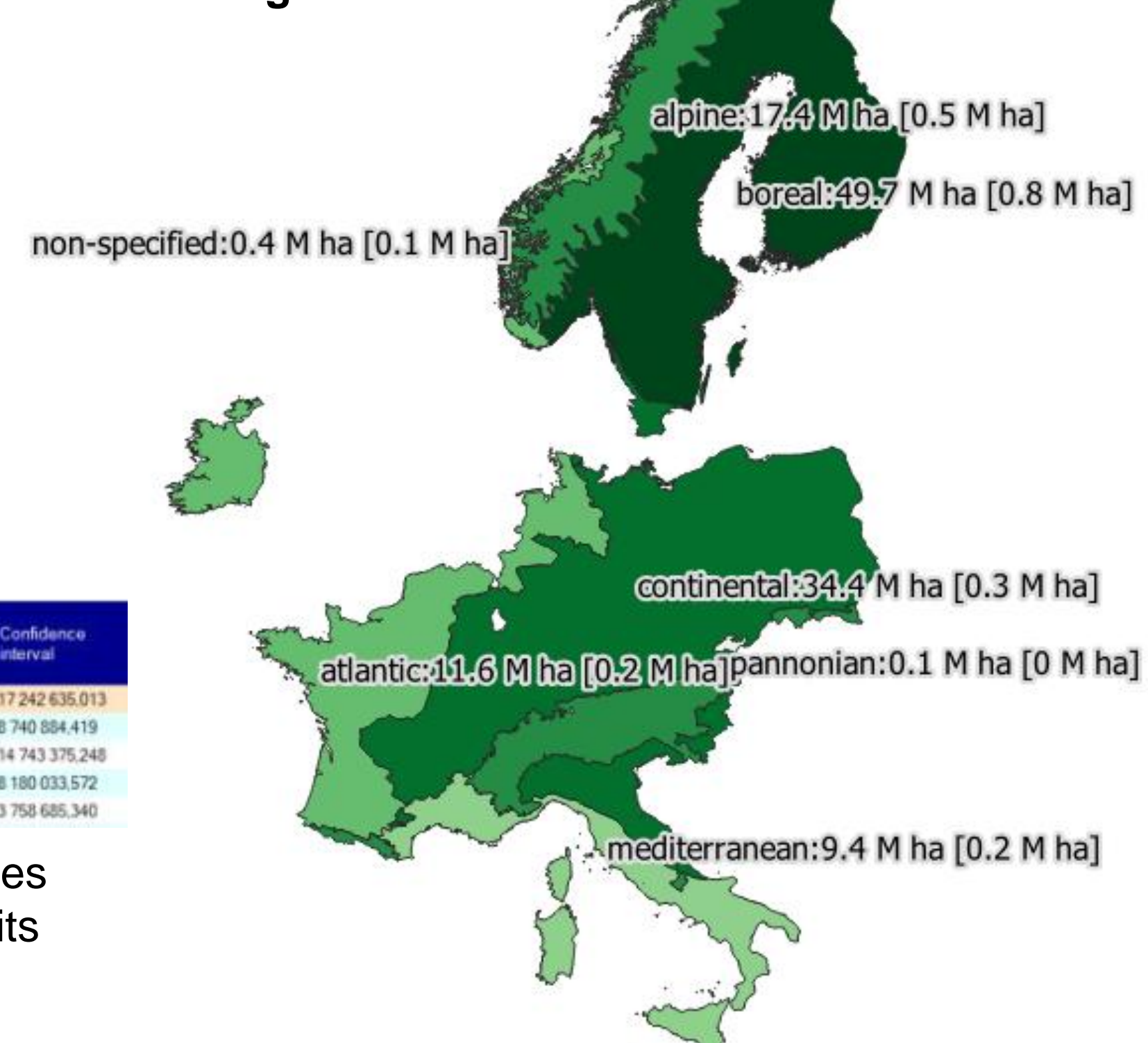
Estimates

Deadwood in 50 km INSPIRE cells



- Harmonized estimates across Europe for:
 - Admin areas
 - INSPIRE cells
 - Biogeographical regions etc.

Forest area for biogeographical regions



Point estimate	Standard error	Minimal sample size	Actual sample size	Confidence interval
964 000 405.3	8 797 154.202	39407	17 242 626.013	
293 725 625.3	4 458 578.875	482	39407	8 740 084.419
673 130 980.6	7 522 037.054	163	39407	14 743 375.248
178 061 023.6	4 173 435.014	782	39407	8 180 033.572
51 061 772.630	1 917 672.937	3072	39407	3 758 685.340

Total volume estimates for administrative units