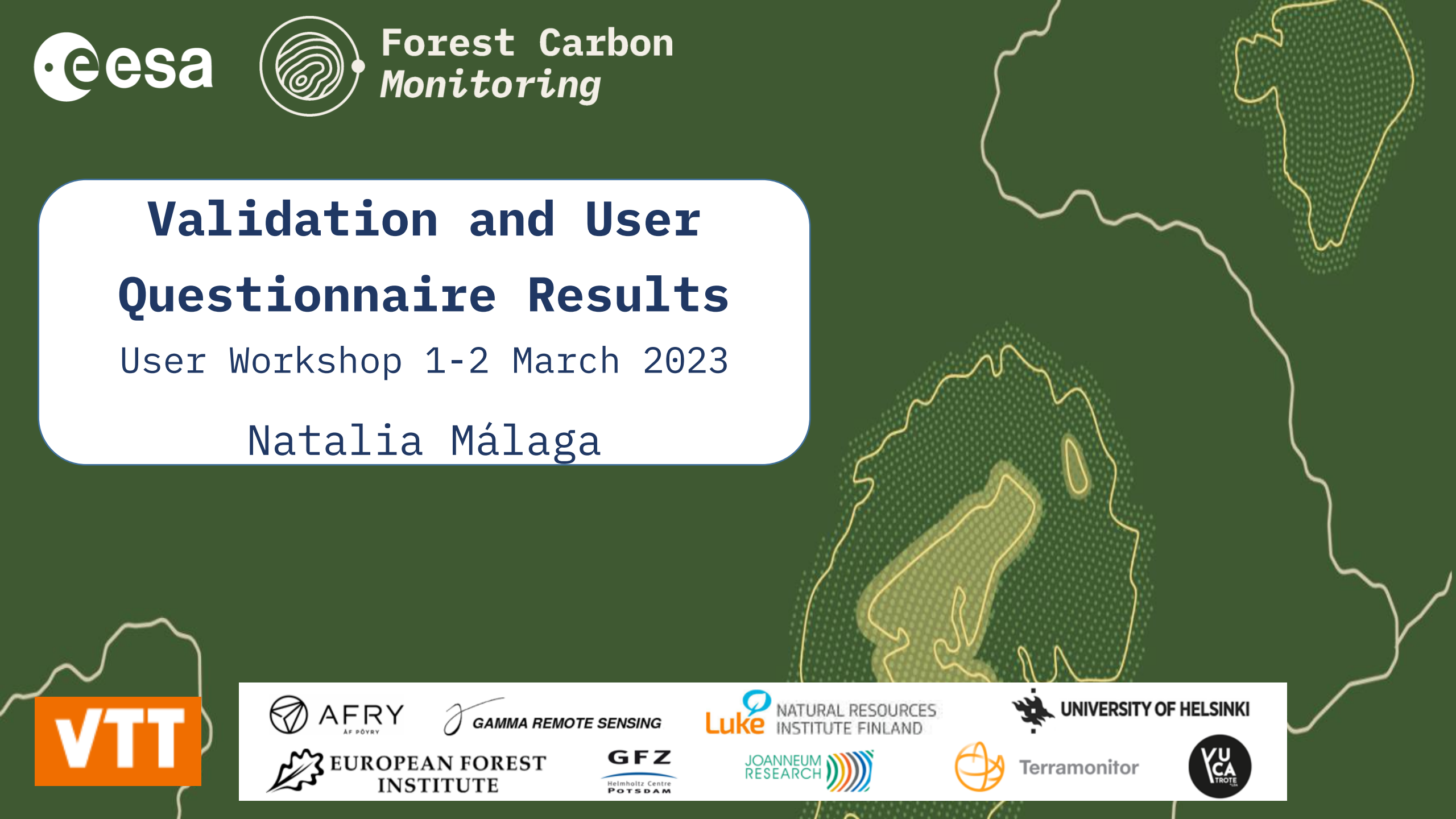
Forest Carbon Monitoring

Validation and User Questionnaire Results

User Workshop 1-2 March 2023

Natalia Málaga



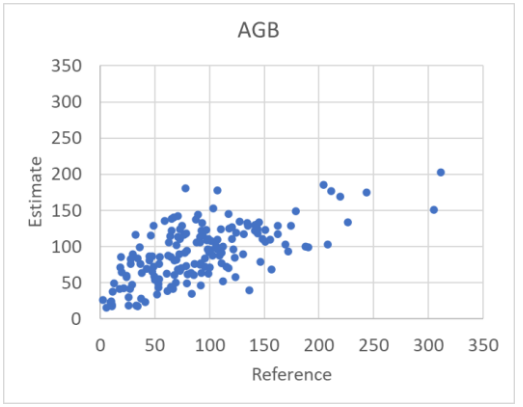
Uncertainty assessment: local-national demos

- Product uncertainty metrics and scatter plots with field reference data
- Yearly consistency with year-to-year scatter plots

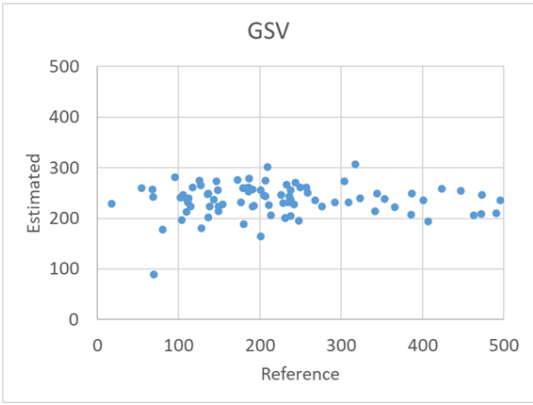
Demonstration uncertainty based on sample plots

		Diameter	Height	Basal area	Volume	Above ground biomass
Catalonia[1]	RMSE%	32.9	39.5	40.2	51.1	46.8
	Bias%	-1.4	4.3	-1.3	-0.6	0.2
Extremadura	RMSE%	80.6	70.4	68.1	61.2	
	Bias%	15.6	10.7	4.8	0.6	
Galicia	RMSE%	17.9	23.8	38.5	50.9	
	Bias%	-0.9	-10.6	17.2	3.8	
Peru	RMSE%	16.6	13.8	46.2	58.1	63.2
	Bias%	0.4	3.3	-3.2	1.2	8.3
Romania[2]	RMSE%	30.7	22.2	33.6	43.9	62.7
	Bias%	-3.2	-0.7	-3.2	-1.6	-19.4
Finland[3]	RMSE%					60.0
	Bias%					-0.5

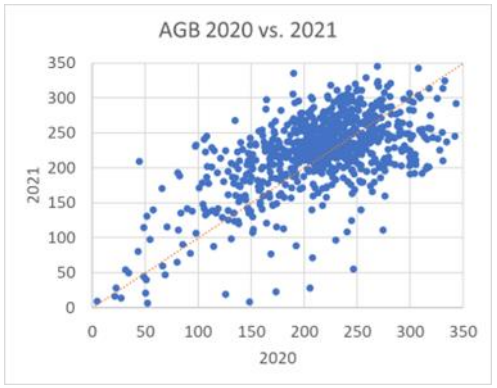
[1] With 2016 plots
[2] For 2021, some irregularities with the AGB reference data
[3] Preliminary, average for 2017 and 2019, total Finland



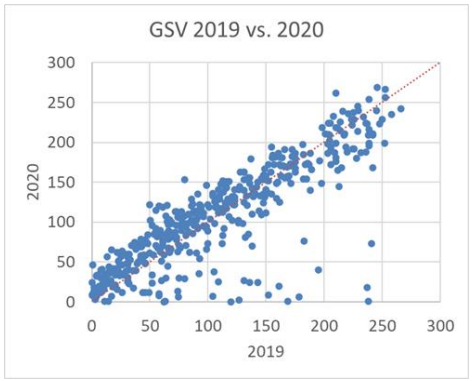
Catalonia uncertainty scatter (AGB)



Peru uncertainty scatter (GSV)



Romania year-to-year consistency (AGB)



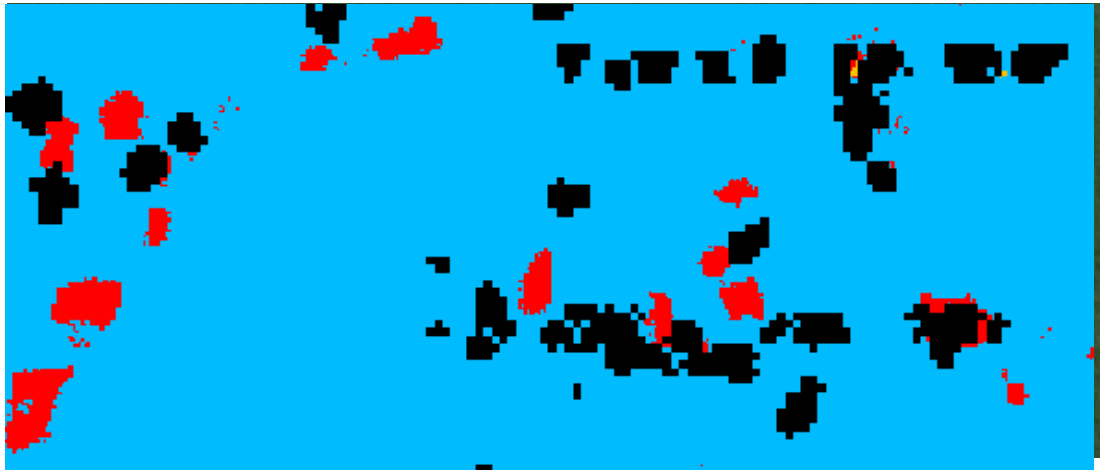
Galicia year-to-year consistency (GSV)

Catalonia yearly averages over all uncertainty assessment plots

	D (cm)	G (m^2/ha)	H (dm)	GSV (m^3/ha)	BLP (%)	CP (%)	ABM (t/ha)
2020	18,5	18,5	86	92,7	61	38	82,2
2021	18,7	18,4	87	92,9	58	41	80,3

Uncertainty assessment: Change products

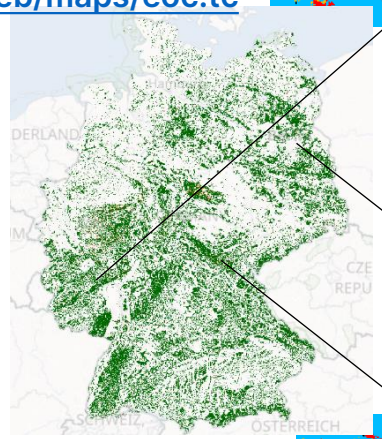
- Mainly visual assessment and comparison to other products
- In Peru Madre de Dios stratified sampling with NICFI Planet data (4 m spatial resolution)



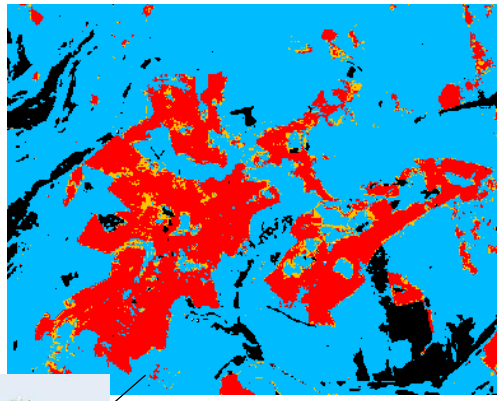
Changes 2020-2021 Madre de Dios

Total clearance:
- User's accuracy: 91%
- Producer's accuracy: 100%

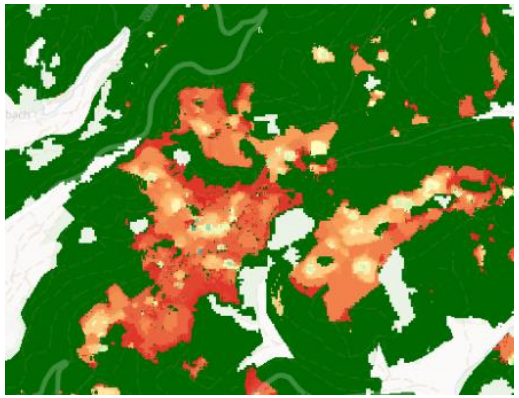
Tree canopy cover loss 2018-2021 Germany (DLR) https://geoservice.dlr.de/web/maps/eoc:tcclde

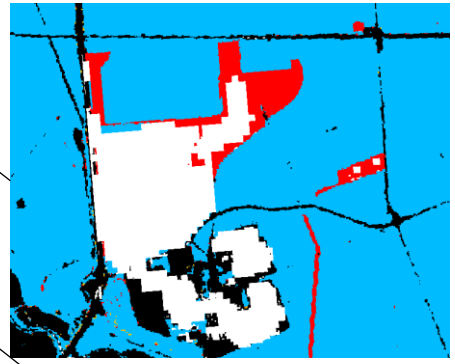


FCM

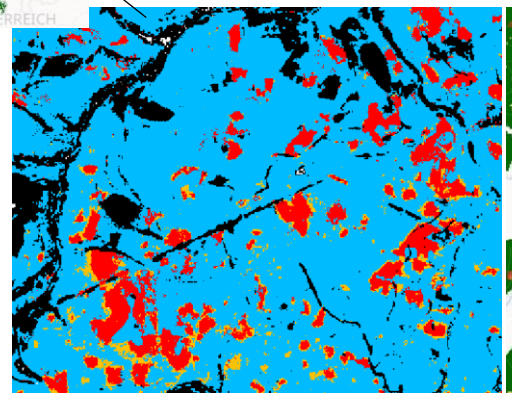


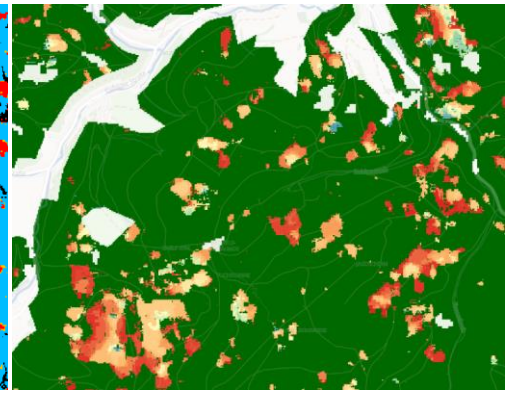
DLR





Not a temporal match! DLR product 2018 - Mar 2021. FCM product 2020-2021 (composites). Darkest red areas are the latest in DLR. Compare total change (red) in FCM with the reddest areas in the DLR product.

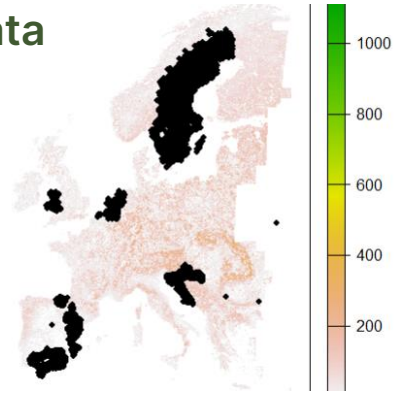




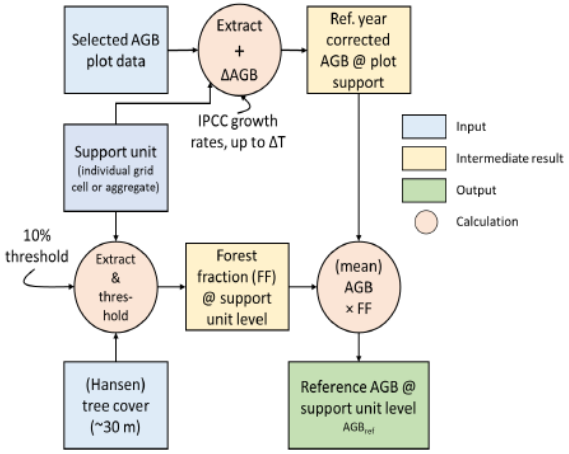
Uncertainty assessment: European wide biomass mapping

Methodological approach

Distribution of reference data

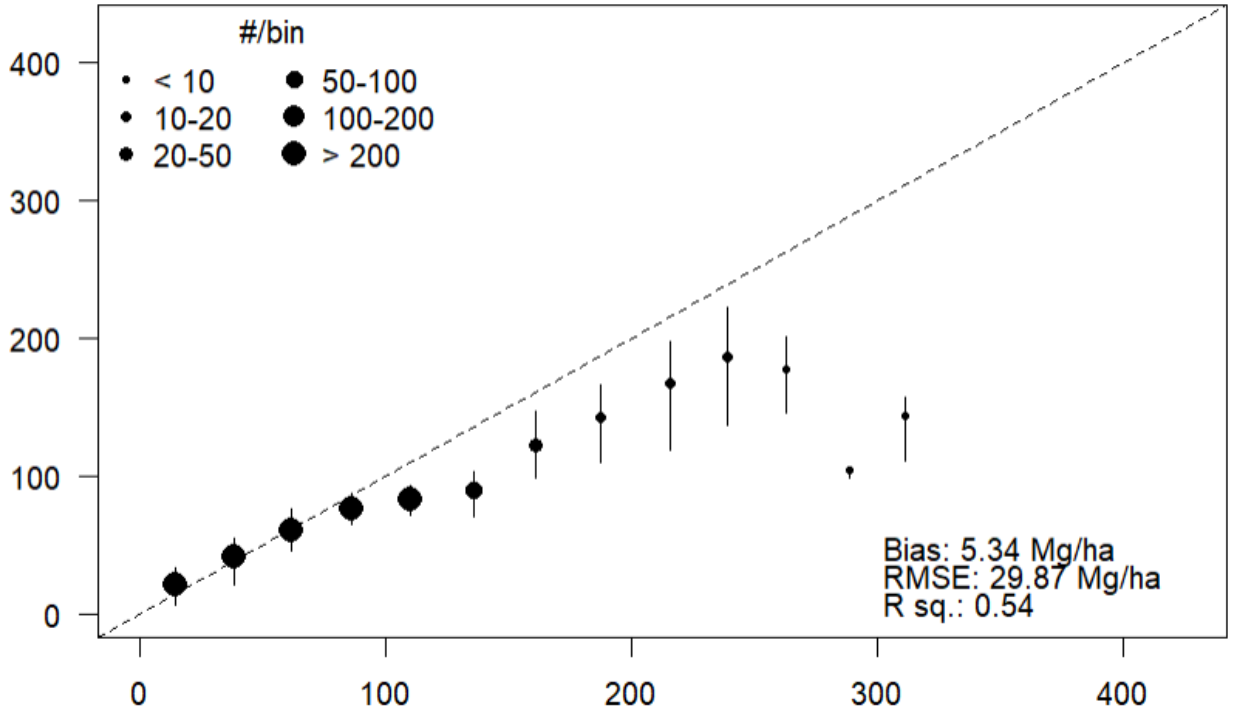


Accuracy assessment framework using plot2map tool: Araza et al., 2022, RSE



Preliminary results

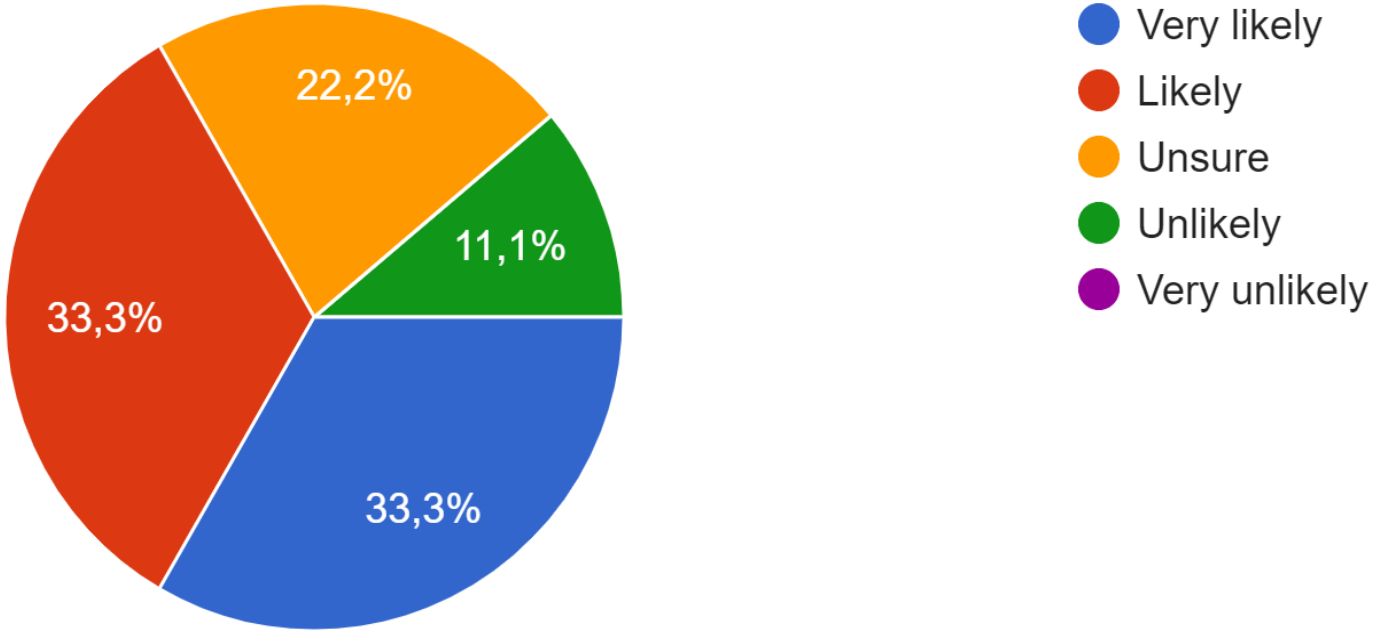
- 20 m European wide biomass map tend to underestimate >100 Mg/ha and to slightly overestimate at lower AGB (<100 Mg/ha), compared to LiDAR maps in particular



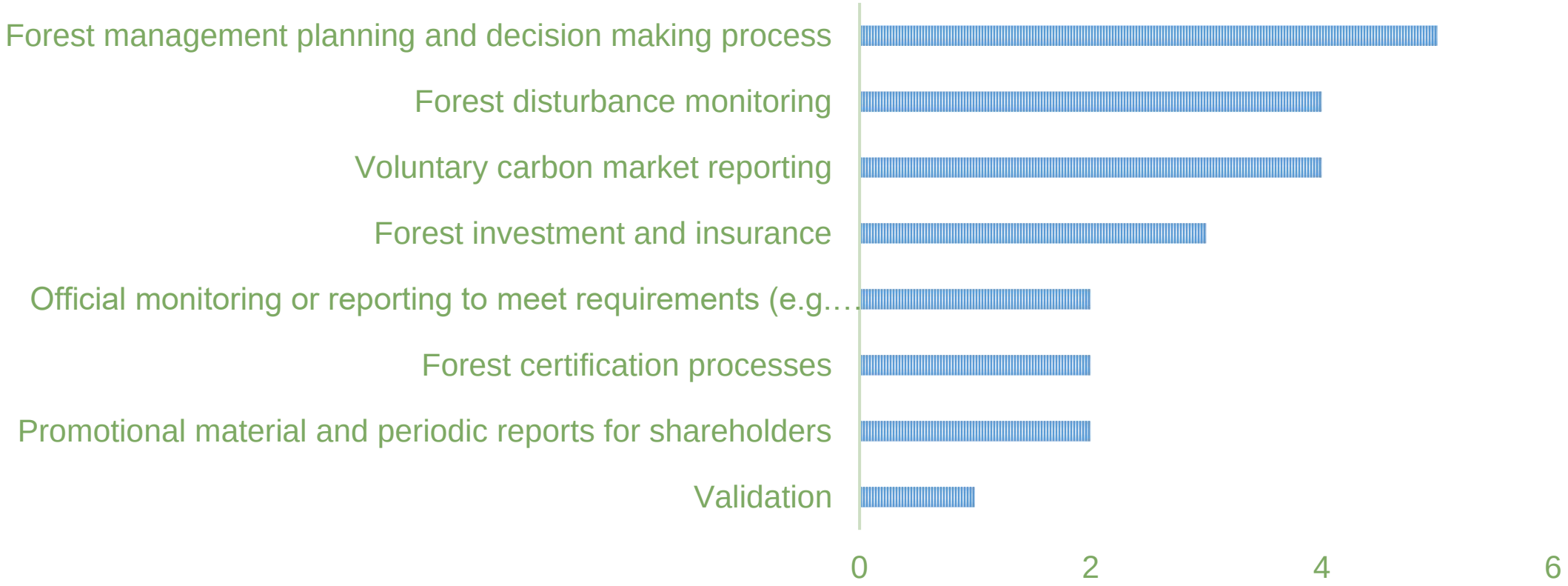
Product assessment - user survey

- Objective:
  - **Assess** the value of the delivered products (i.e. estimates/maps on forest variables, AGB and AGB change detection) and the overall utility to the project users.
- Seven organizations responded
- Overall Results:
  - General satisfaction with the demonstrations, most recommendations go on the line of enhancing the spatial resolution and the accuracy of the results

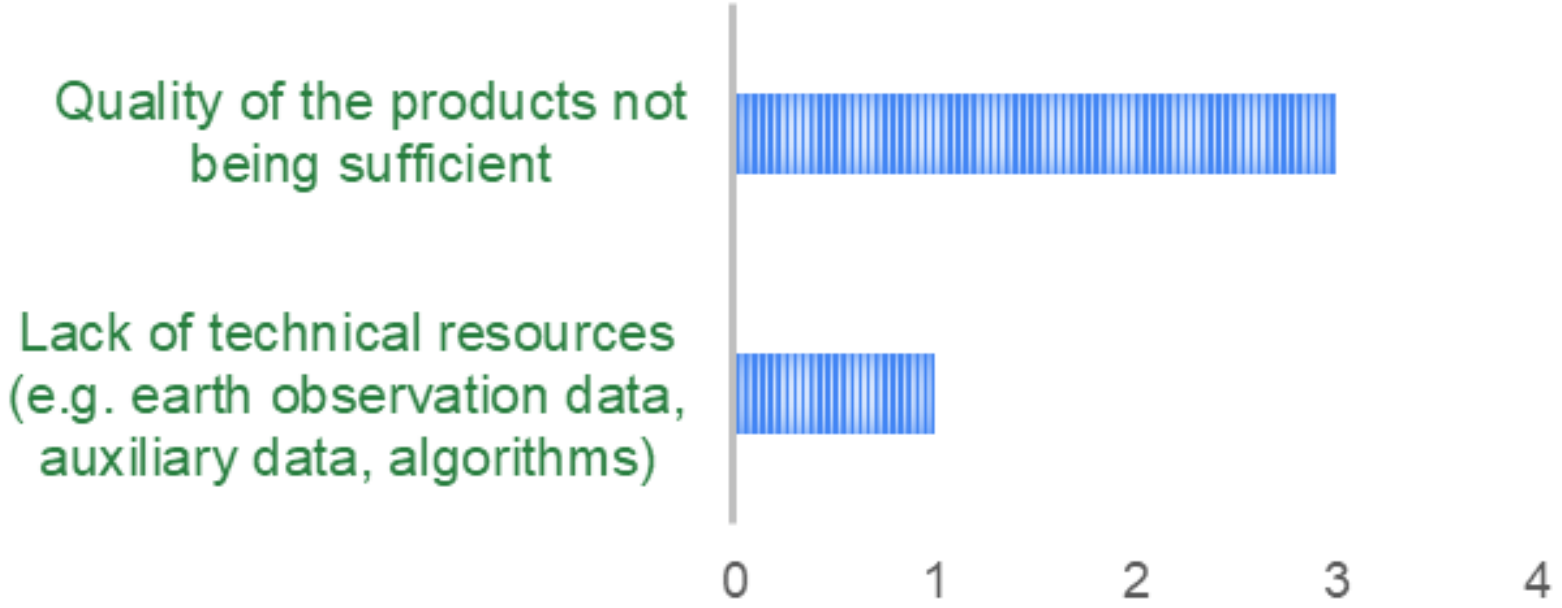
What is the potential for the provided products to be used in the core work and/or decision making cycles of your organization?



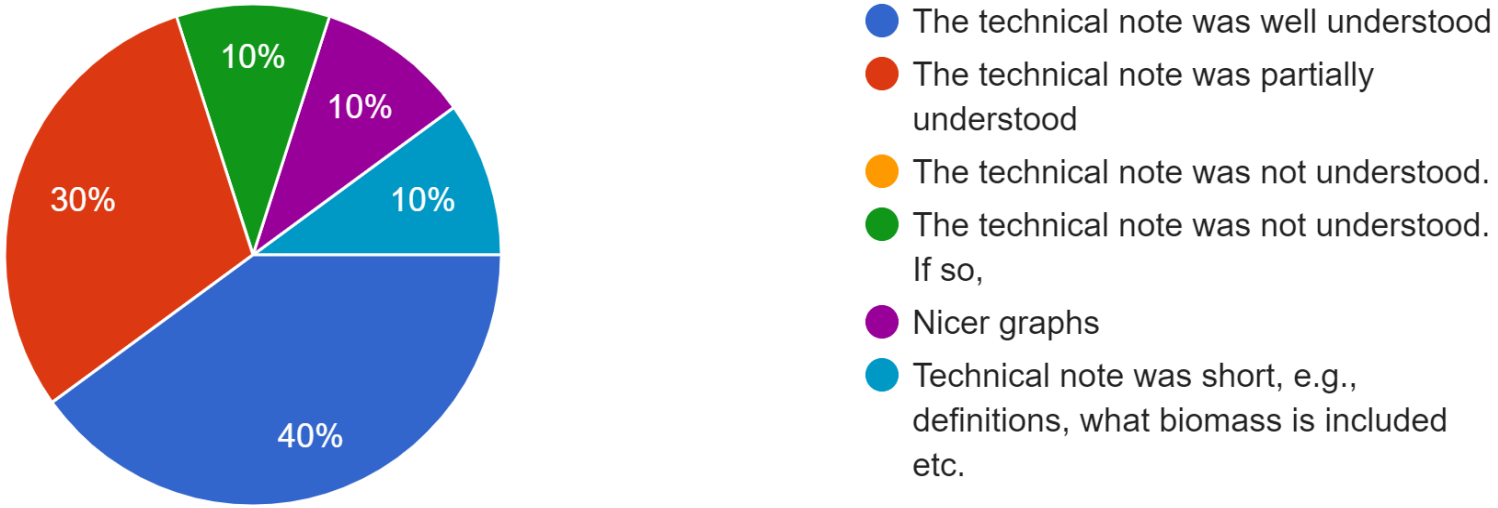
Where do you see the potential use of the products in your organization?



If any, what are the barriers of the organization to uptake the products provided



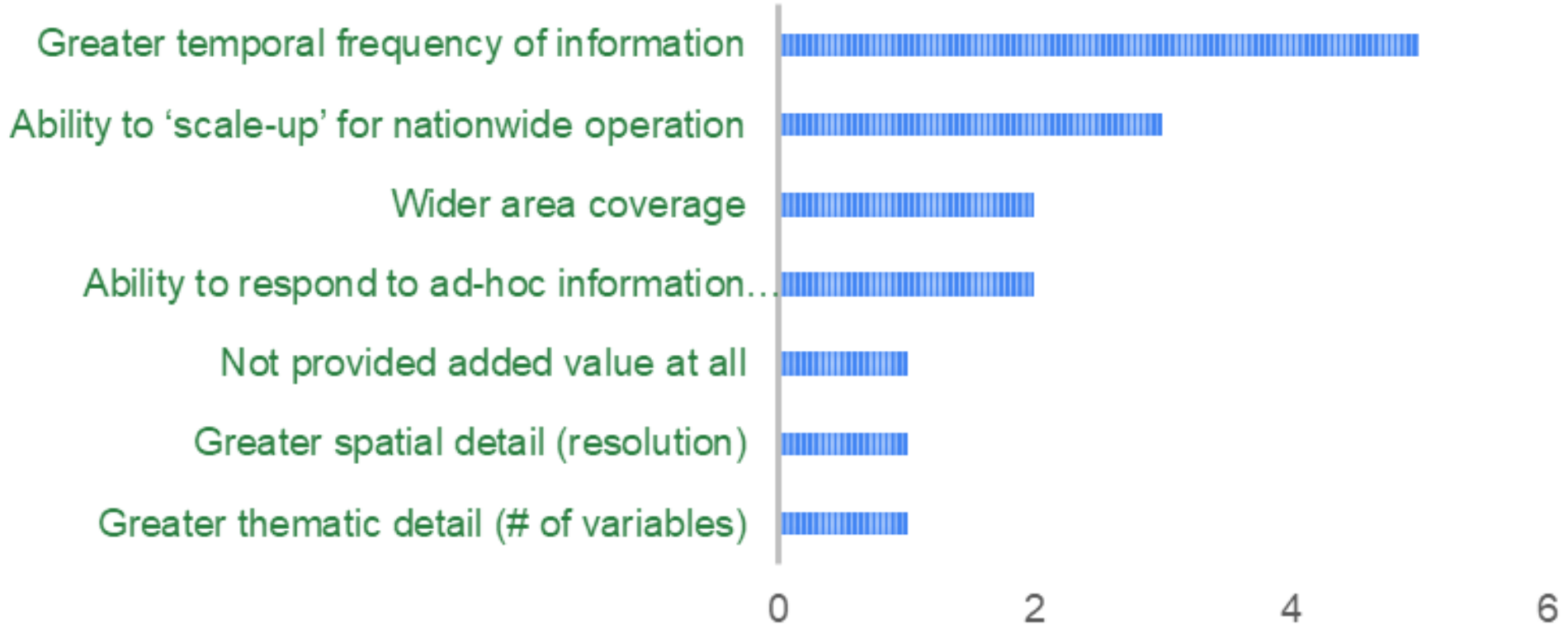
Was the information about production processes and results well described in the Delivery Note provided?



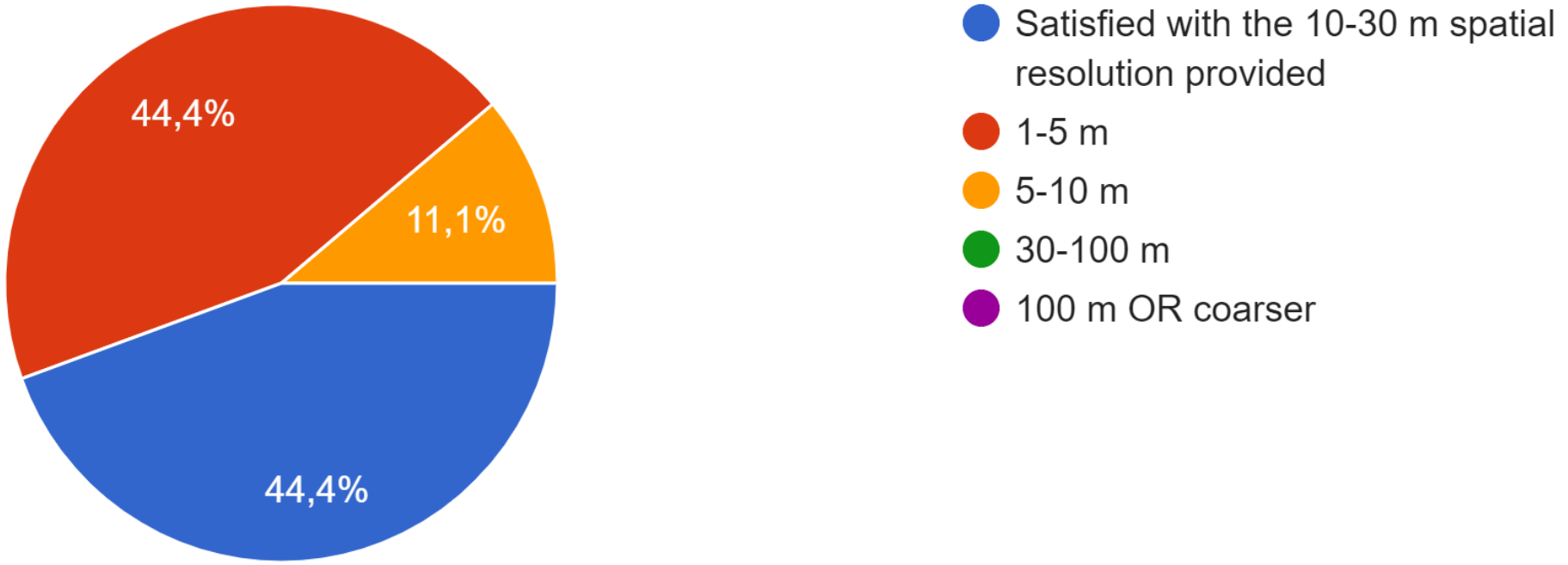
Overall recommendations to the Delivery Note:

- Format: more schematic, less complex language
- Content: Further information on the temporal extent, biomass model description, forest definition, C pools, justify the reason of using only a selection of the plots measured on the field, etc.
- Meetings that support the explanation of the products

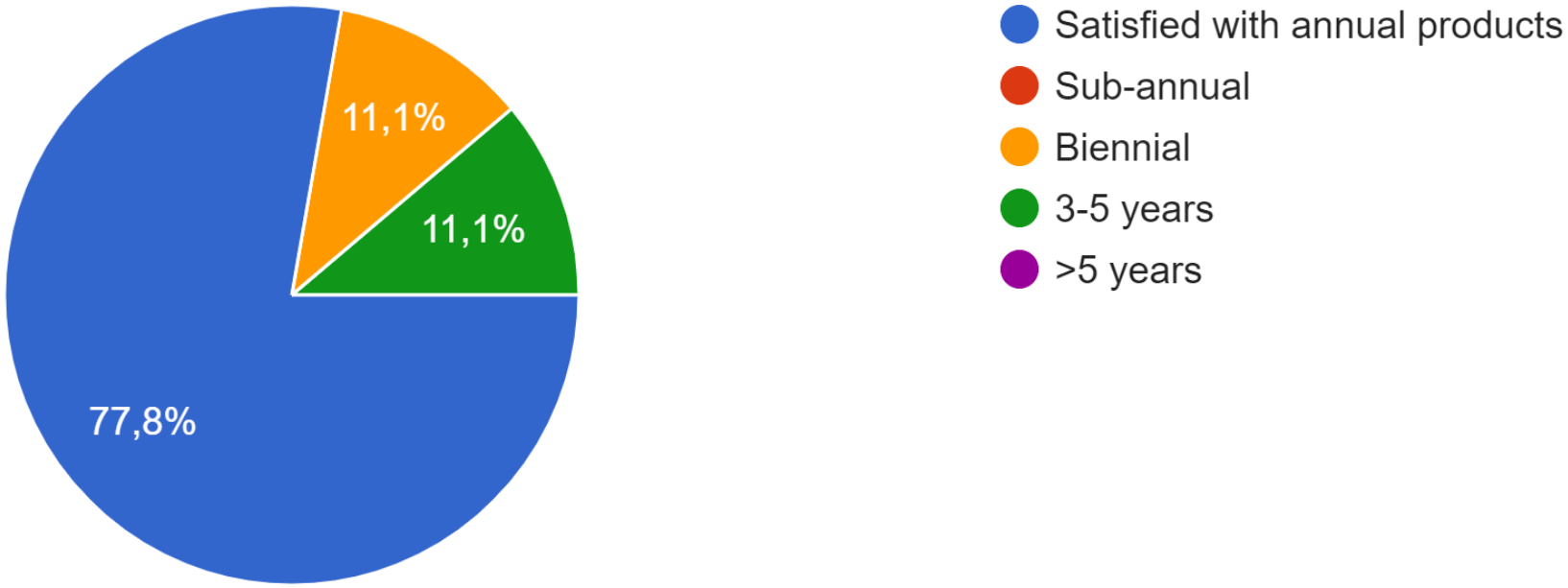
In comparison to existing and historical information your organization regularly uses, where has the products provided added value?



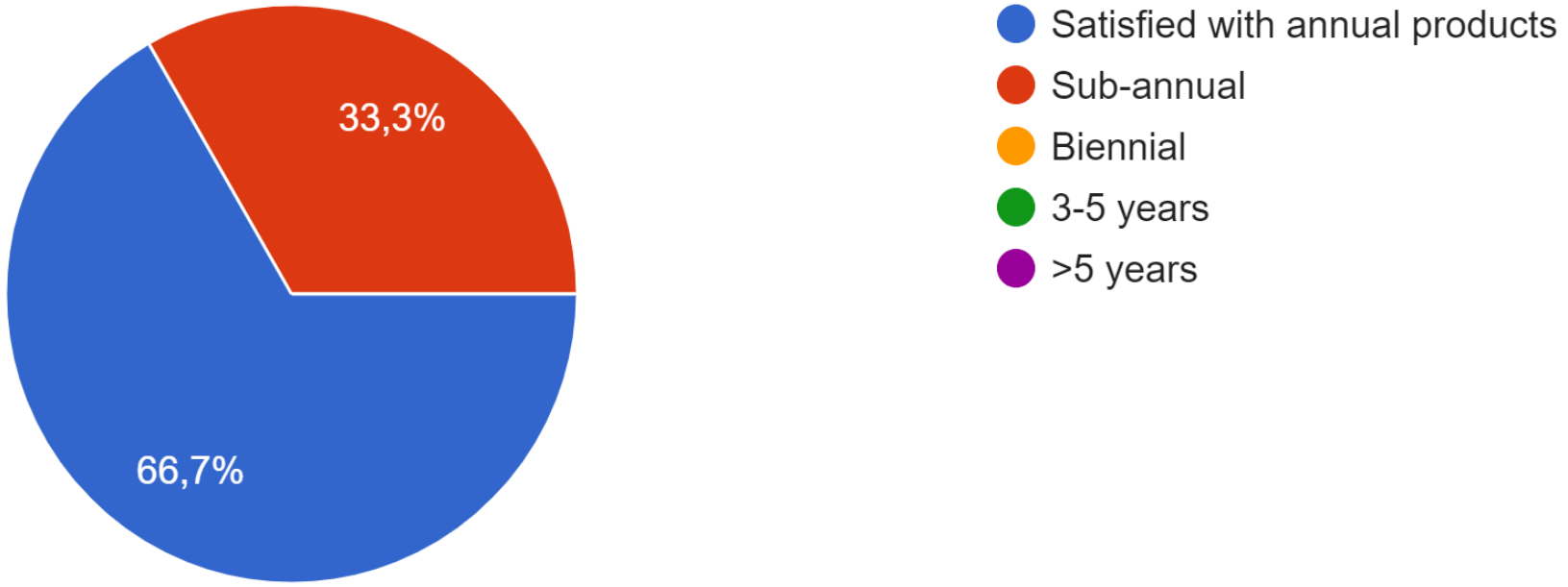
Spatial resolution: are you satisfied or would you have preferred other spatial resolutions (minimum mapping unit)



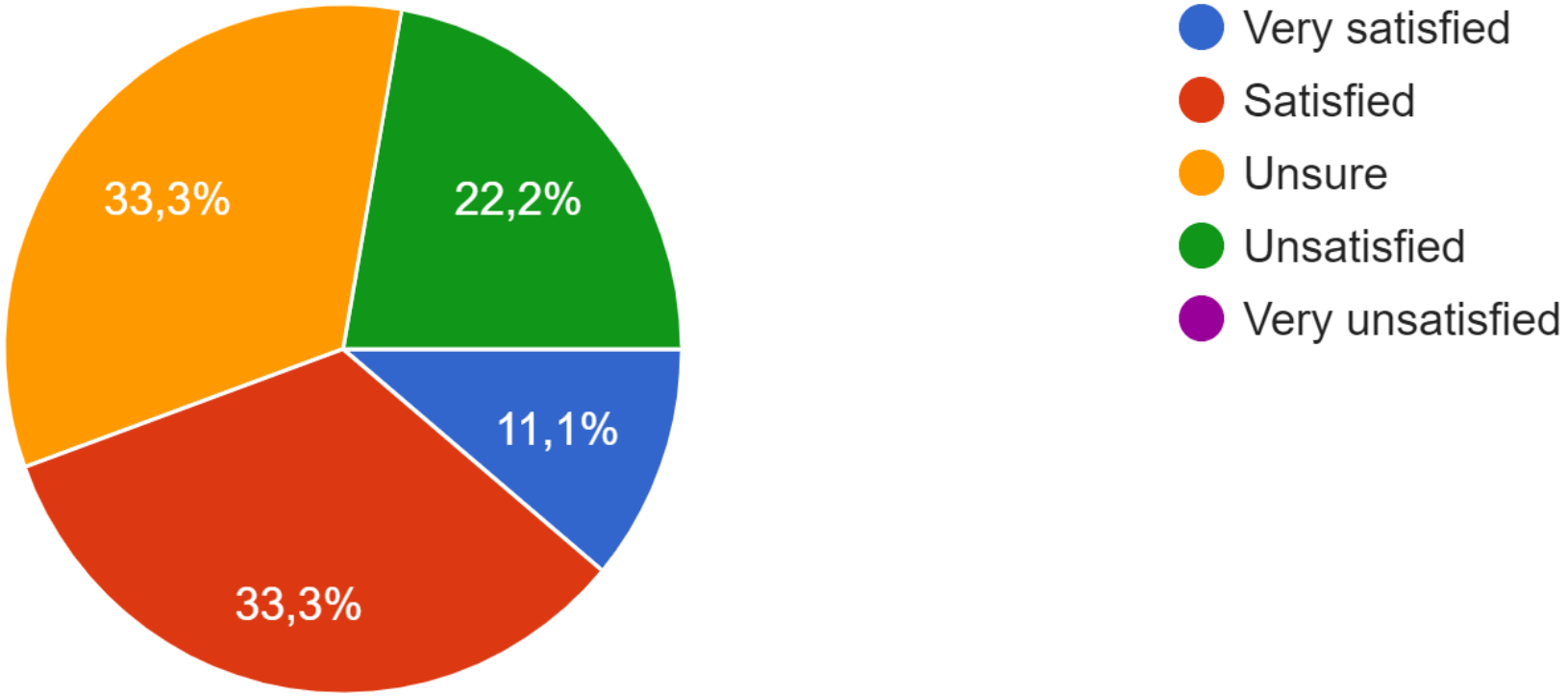
Temporal resolution of the forest structure and biomass products: are you satisfied or would you have preferred other temporal frequency?



Temporal resolution of the change products: are you satisfied or would you have preferred a different resolution?



Regarding the accuracy of the products, how satisfied are you overall?



Do you have recommendations on how to improve the products or what kind of products should be provided to make them usable for your organization

- Higher spatial resolution to obtain results for individual stands.
- For forest management, better accuracy is needed together with a better spatial resolution.
- Uncertainty map that go together with the mapped variables.
- Besides the accuracy of the results, the usefulness of the platform will highly depend on how interactive and user-friendly it is.
- Further information on future productions plans, methodological details, tree species information for etc.
- Less overlap required.
- Use more imagery data sources (even not free) and more ground data.

esa

Forest Carbon Monitoring

Thank you!

More information at:
https://www.forestcarbonplatform.org

VTT

AFRY ÅF PÖYRY

GAMMA REMOTE SENSING

Luke NATURAL RESOURCES INSTITUTE FINLAND

UNIVERSITY OF HELSINKI

EUROPEAN FOREST INSTITUTE

GFZ Helmholtz Centre Potsdam

JOANNEUM RESEARCH

Terramonitor

YUCATROTE