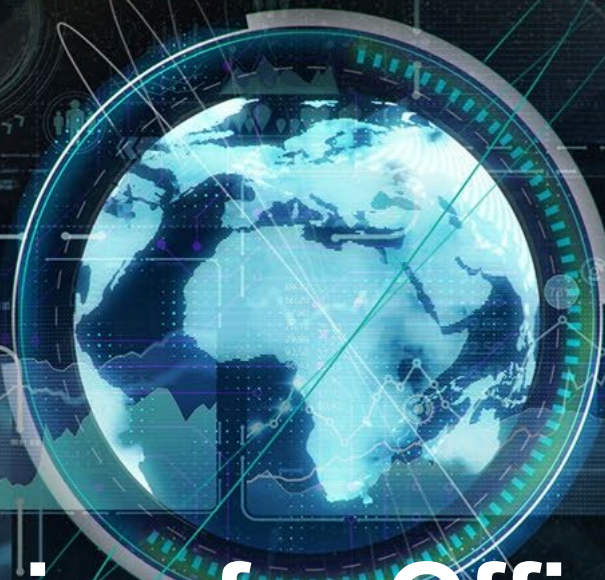


StatEO

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Grassland Monitoring for Official Statistics Using Satellite Data



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1. Official statistics underestimate grassland extent

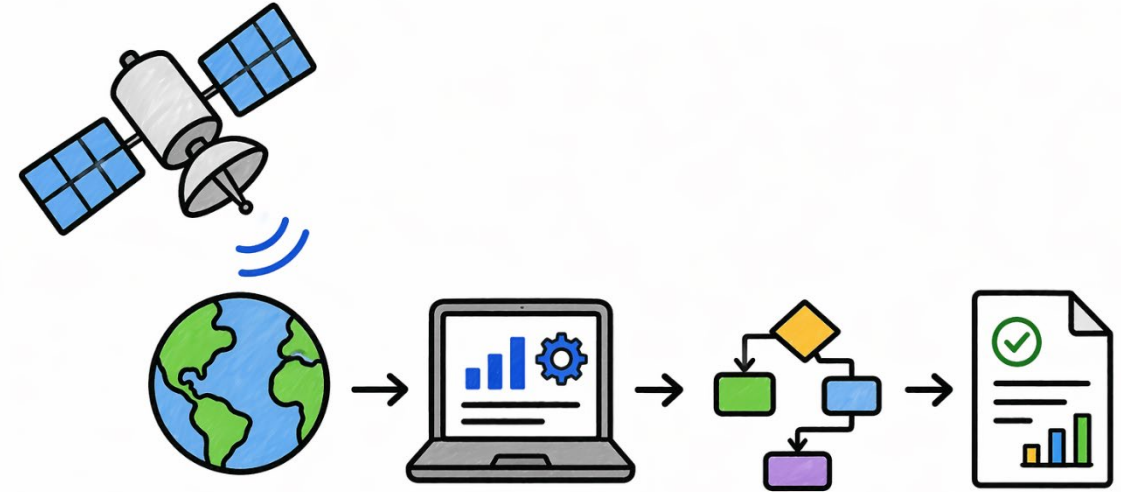
- Grasslands are declining → biodiversity loss
- EU subsidies depend on accurate monitoring
- Administrative data includes only declared fields
- Missing: non-registered & semi-natural grasslands

- Need for:
 - reliable and comparable monitoring data
 - wall-to-wall territorial coverage



2. Objective: detect all grasslands in Latvia

- Develop a satellite-based workflow to:
 - detect and map grasslands across Latvia
 - go beyond administrative records
- **Full national coverage, consistent over time**



3. Data Sources and Partners

- Data Sources:
 - Sentinel-1 (radar - VV, VH)
 - Sentinel-2 (optical - B02, B03, B04, B08)
 - Reference datasets (administrative data – forest inventories, agricultural parcels, biotopes, address points)
- Partners:
 - University of Latvia - algorithm development & processing pipeline
 - Rural Support Service of Latvia - domain expertise & agricultural reference data

4. How we detect grasslands

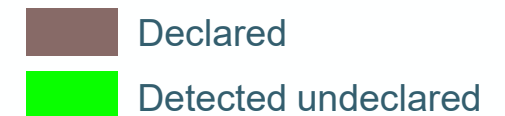
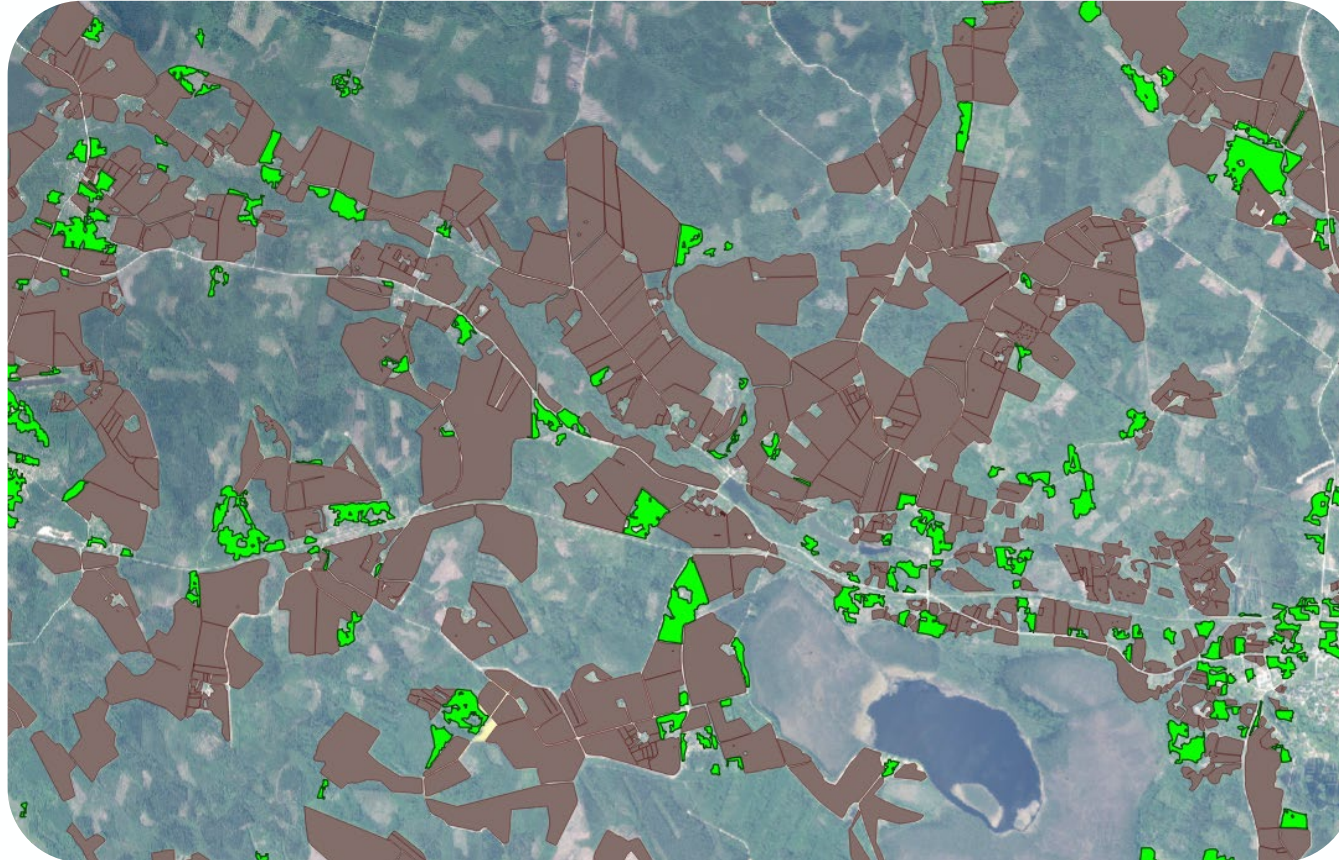
Sample S1/S2 raster values at reference points for ground truth (14,261 points, 8 classes)

Train ML using:
Optical (S2): 4 bands \times 4 quarters = 16 features
Radar (S1): VV + VH \times 6 months = 12 features

Produce land-use map for all Latvia identifying grasslands

5.1. Mapping grasslands across Latvia

- EO reveals grasslands missing from official records



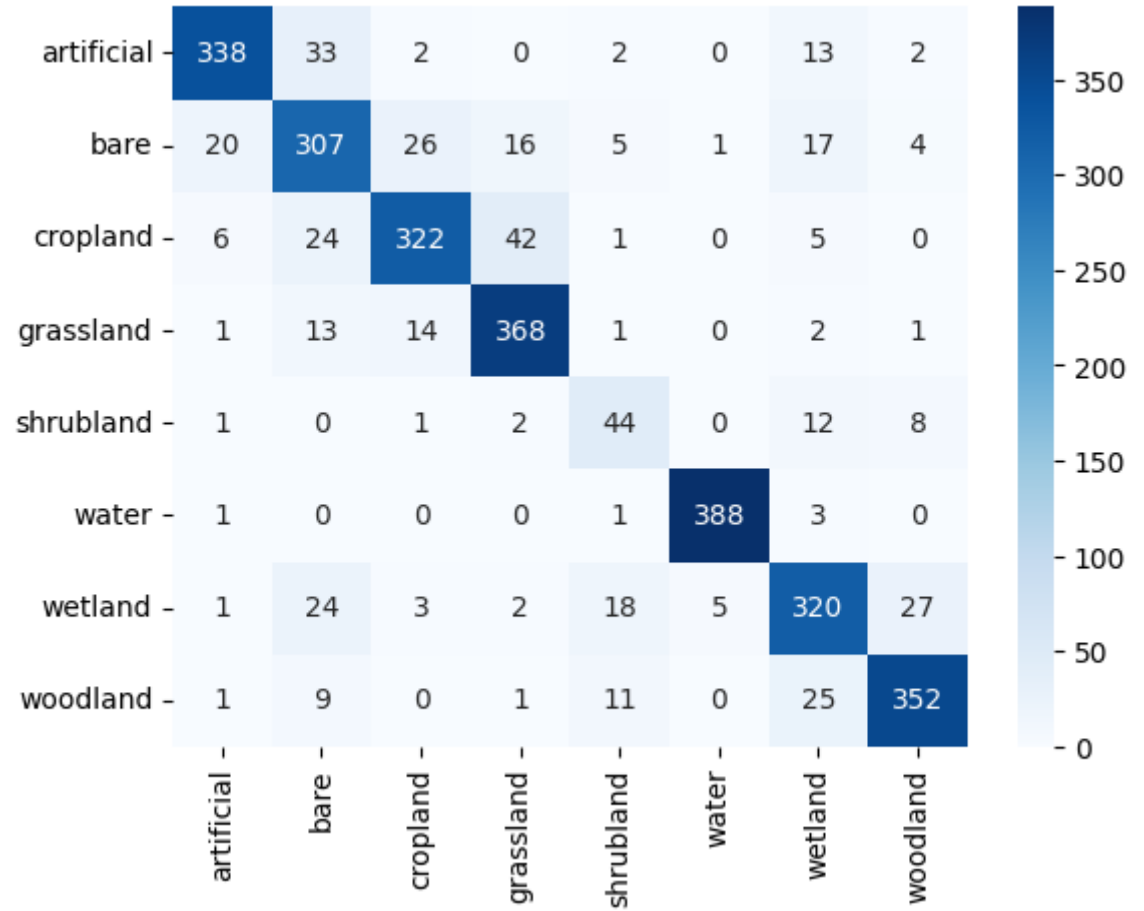
5.2 Grassland age

- Estimates age of grasslands



5.2. Mapping grasslands across Latvia

- ML algorithm: XGBoost
- Split: 80/20 stratified train/test
- Tuning: RandomizedSearchCV 1000 iter. F1-weighted
- Model distinguishes:
 - grasslands vs cropland, forest, others
- Model performance:
 - Overall accuracy: 86%
 - Grassland recall: 92%
 - Grassland precision: 85%



6. Why this matters for official statistics

- Complements administrative data
- Improves completeness of grassland statistics
- Supports:
 - agricultural policy monitoring
 - biodiversity reporting
- Additional capability:
 - Grassland age estimation using time series
 - Detects renewal and vegetation changes

7. Conclusions

- Satellite data enables national-scale grassland detection
- Administrative data alone is incomplete
- EO + administrative data = better statistics

8. Recommendations for R&D and Policy

1. Integrate EO into official statistics

- Combine satellite and administrative data
- Use reproducible workflows

2. Address gaps in administrative data

- Include non-registered grasslands
- Improve completeness of statistics

3. Support long-term monitoring

- Ensure continuous data processing
- Strengthen collaboration (statistics + research + policy)

Thank You!



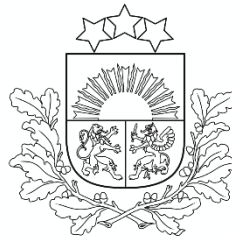
Thank you for your attention!

Code will be published on Central Statistical Bureau of Latvia GitHub
<https://github.com/CSBLatvia> under MIT license

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