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# Spatially-Explicit Land Representation in the Austrian GHG Inventory

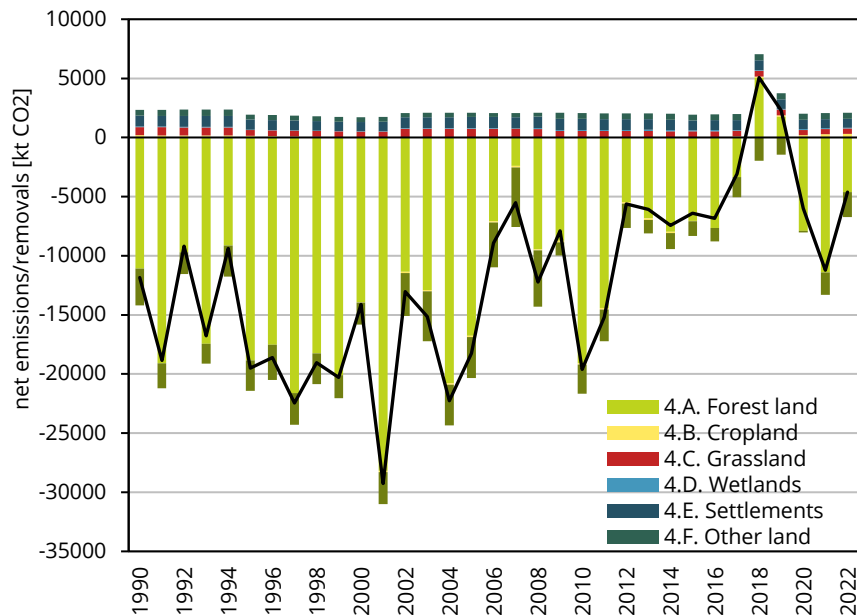
Bradley Matthews, Gebhard Banko, Sebastian Böck, Merlin Meyer, Erwin Moldaschl, Martin Neuwirth, Carmen Schmid, Michael Weiss and Peter Weiss

EO for Monitoring, Reporting, and Verification of Carbon Removals

Copenhagen 8-11 October 2024

# Austrian LULUCF GHG Emissions/Removals 1990-2022

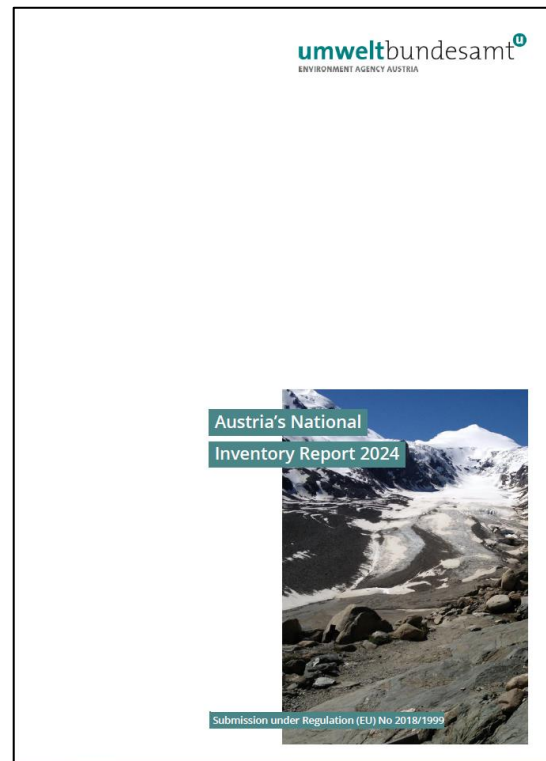
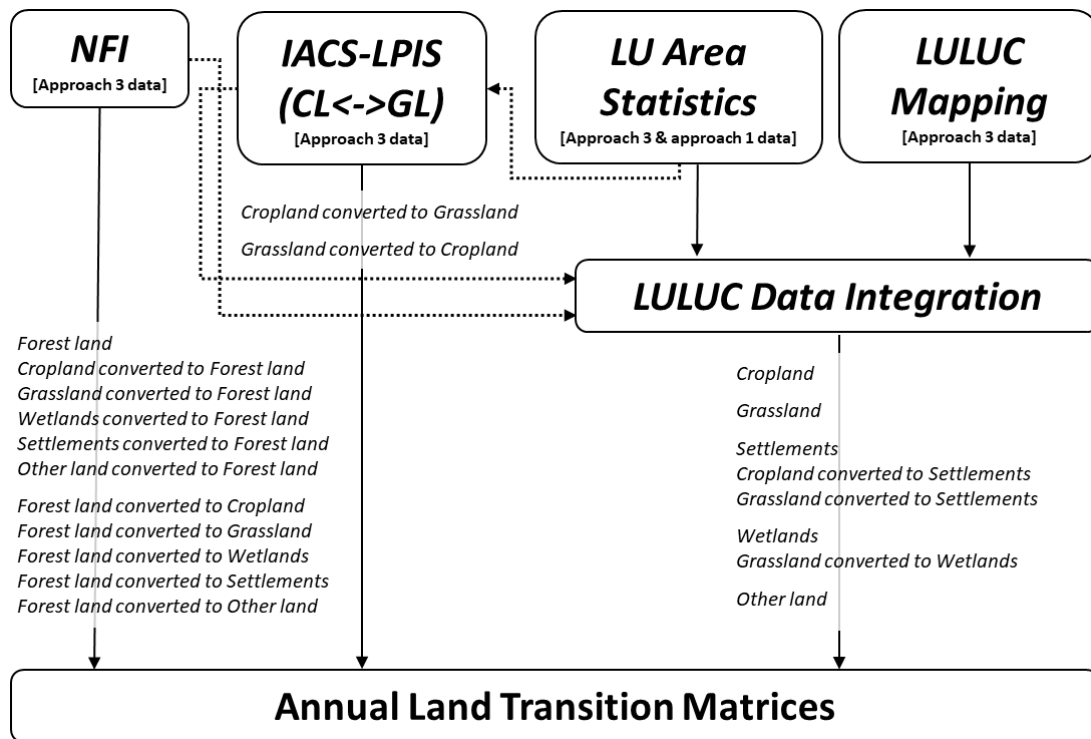
LULUCF: NIR 2024



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- LULUCF significant contributor to the GHG balance of Austria
  - 1990: Net uptake of 11.7 Mt CO<sub>2</sub>eq (15% of the national total emissions without LULUCF)
  - 2018/2019: **Net source** of 5 Mt and 2.3 Mt CO<sub>2</sub> eq (additional 3-6% of the national total emissions without LULUCF)
  - 2022: Net uptake of 4.5 Mt CO<sub>2</sub>eq (6% of the national total emissions without LULUCF)
- Forest land dominant driver of sector level and trend
- Large interannual variations, declining sink strength over last two decades

# Austrian System for Land Representation




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# LULUC Mapping Element

- Integration of national, spatially-resolved datasets on land use and land cover for the years 2016, 2020 and 2022
  - Mainly based on national in situ land surveying e.g. IACS-LPIS and cadastral maps
  - Some datasets based on remote sensing:
  - Orthophoto-derived data for mapping extent of Forest land (*BFW Waldkarte*)
  - EO-derived data (CLC+ BB) used to map residual agricultural areas outside of IACS LPIS (*Landwirtschaftsflächen außerhalb INVEKOS*)
- Datasets synthesised according to a common land-use crosswalk and a hierarchical treatment of the data where data overlap

→ Production of national 5 x 5 m land-use maps for estimating 2016-2022 LUC and 2022 LU Status

Hierarchie	Datenquellen	2016	2020	2022	2022 Status
	Stehende Gewässer				DLM 2022
	Straßen, Schienen, Fließgewässer	DKM 2016 + Forststraßen 2022	DKM 2020 + Forststraßen 2022	DKM 2022	DKM 2022
	Vegetationsarme Flächen auf Almen (INVEKOS Almen + Hutweiden, DKM-Alpen)	LISA 2022	LISA 2022	LISA 2022	LISA 2022
	Wald auf Almen (innerhalb Almen + Hutweiden, DKM-Alpen)	BFW 2020	BFW 2020	BFW 2020	BFW 2020
	Landschaftselemente INVEKOS	INVEKOS 2016	INVEKOS 2020	INVEKOS 2022	INVEKOS 2022
	Landwirtschaftsflächen INVEKOS	INVEKOS 2016	INVEKOS 2020	INVEKOS 2022	INVEKOS 2022
	BFW Waldkarte	BFW 2020	BFW 2020	BFW 2020	BFW 2020
	Moore				Moore 2022
	Landwirtschaftsflächen außerhalb INVEKOS	Maske 2022	Maske 2022	Maske 2022	Maske 2022
	Unterste Ebene	Digitale Katastralmappe	DKM 2016	DKM 2020	DKM 2022

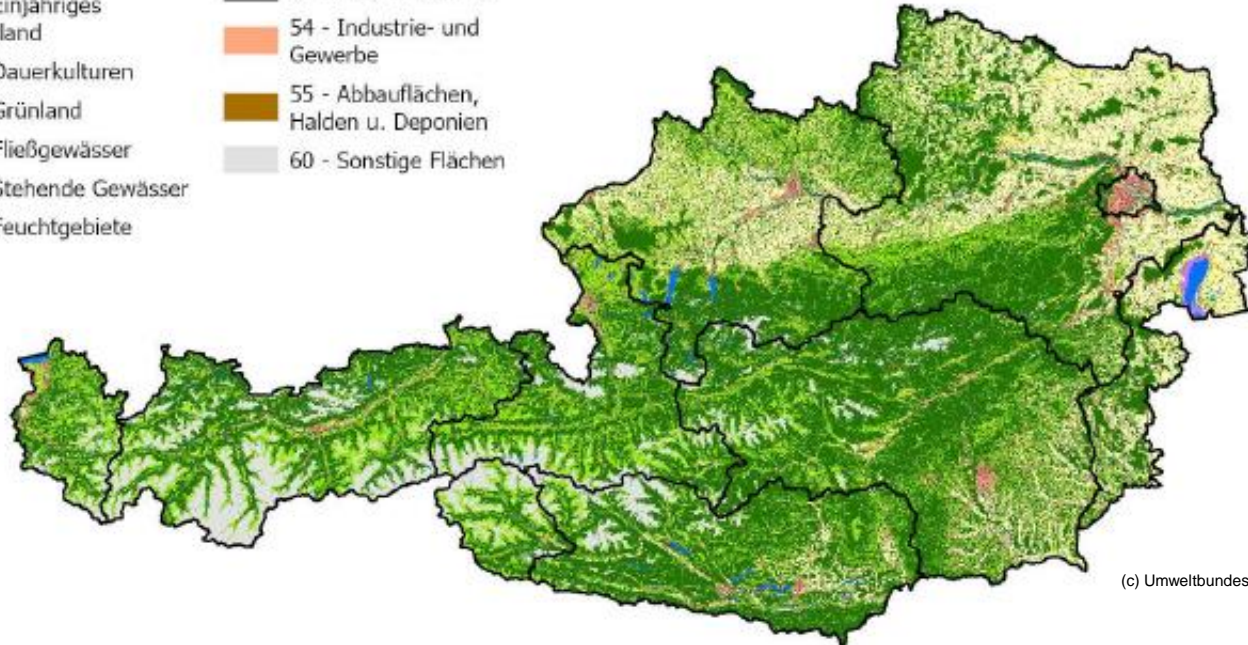
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# LULUC Mapping Element

## Status-Layer 2022

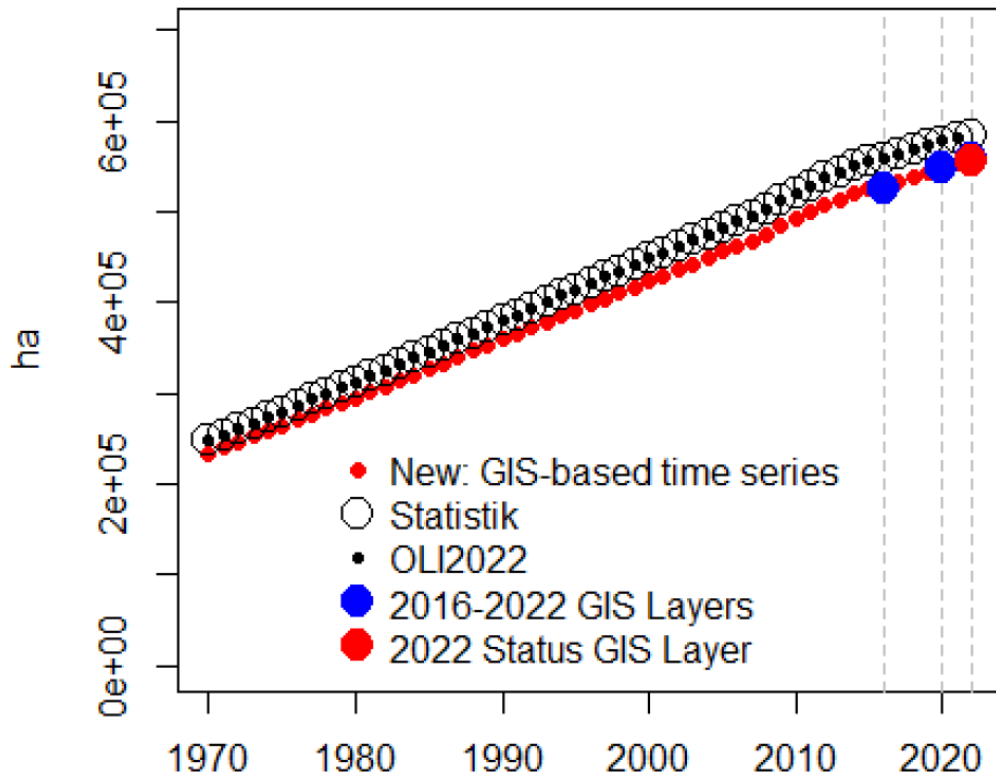
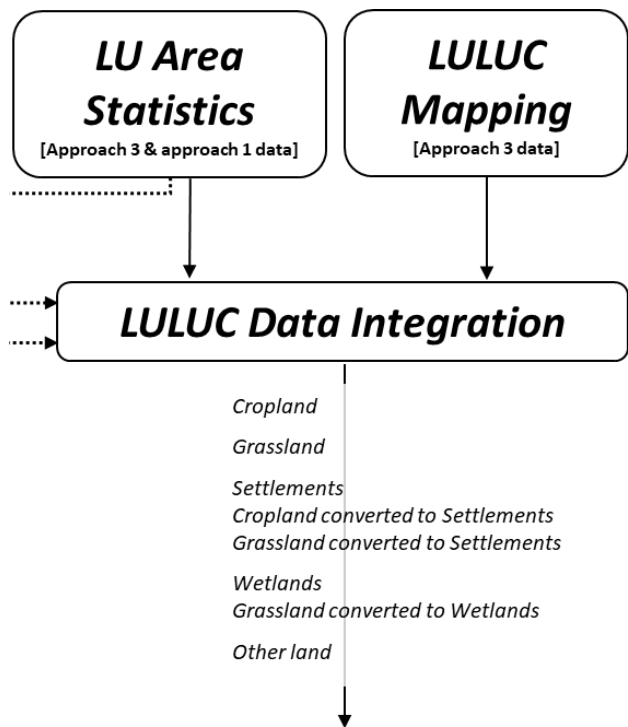
### Statuslayer 2022

	10 - Waldflächen		51 - Wohngebiete
	21 - Einjähriges Ackerland		52 - Gärten und Parks
	22 - Dauerkulturen		53 - Verkehrsflächen
	30 - Grünland		54 - Industrie- und Gewerbe
	40 - Fließgewässer		55 - Abbauf Flächen, Halden u. Deponien
	41 - Stehende Gewässer		60 - Sonstige Flächen
	42 - Feuchtgebiete		



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# Example: Settlements



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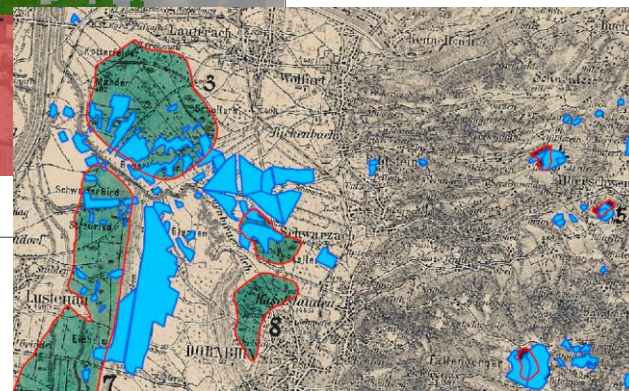
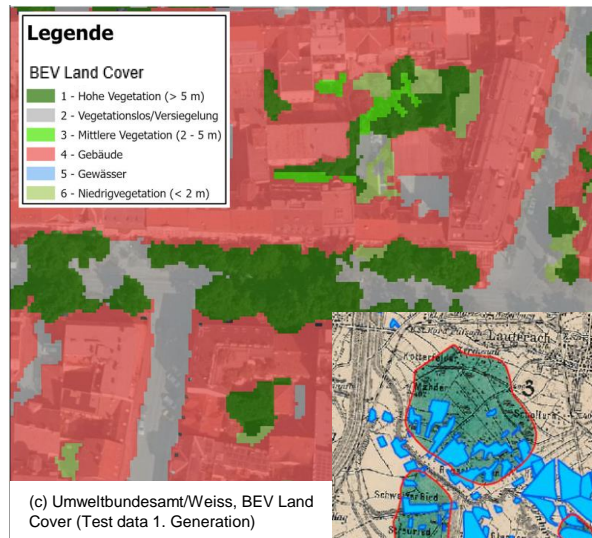
# Other Spatially-Explicit Datasets used for LULUCF

- *BEV Land Cover Austria:*

- Maps of land cover classification produced by the Federal Office of Metrology and Surveying based on orthophoto and ALS analysis
- Used (together with other datasets) for mapping and quantifying tree and low-vegetation cover in Settlements, as well as soil sealing
- First incorporated in the NIR 2024

- Historical peatland cadastre

- Analogue peatland maps published in 1911 were scanned, georeferenced and digitised
- Used (together with other datasets e.g. financial soil valuation, agricultural soil mapping, drainage cadaster) for mapping and quantifying the extent of organic soils and historical drainage of wetlands
- To be incorporated in the NIR 2025



# Investigating Potential Further Applications of EO for LULUCF e.g. GHG-KIT Project

- Austrian consortium of 3 research institutions and 4 industry partners (+4 advisory board members)
  - Umweltbundesamt involved in the R&D call and active in the project as the main stakeholder and potential user providing iterative input on the design and function of the prototypes
- Aim: Development of a blueprint support system for integrated GHG monitoring based on satellite information products together with the development and demonstration of two prototypes:
  - Inverse modelling system for verification of the currently reported emissions (top-down approach)
  - System for deriving LULUCF activity data time series for Austria from EO data (Sentinel 2 and Landsat)
- Funded by the Austrian Research Promotion Agency (FFG) under the Austrian Space Applications Programme (ASAP)



# Summary & Perspectives

- Austrian system for land representation is largely based on spatially-explicit data on land use
- Mainly based on national *in situ* land surveying e.g. NFI, IACS-LPIS and cadastral maps
- Remote sensing data also utilised for land cover and land use e.g.:
  - Orthophoto-derived data on for mapping extent of Forest land as well as tree cover and soil sealing in Settlements
  - EO-derived data (CLC+ BB) used to map residual agricultural areas outside of IACS LPIS
- System for land representation subject to continuous improvement
- We are continuously and actively investigating potential further applications of EO for LULUCF purposes

# Thank you for your attention!

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