Tier-3 GHG emission reporting for 4.A Forest land and KP LULUCF activities aided by CBM-CFS3 – an update from the Czech Republic

Emil Cienciala, Radka Mašková

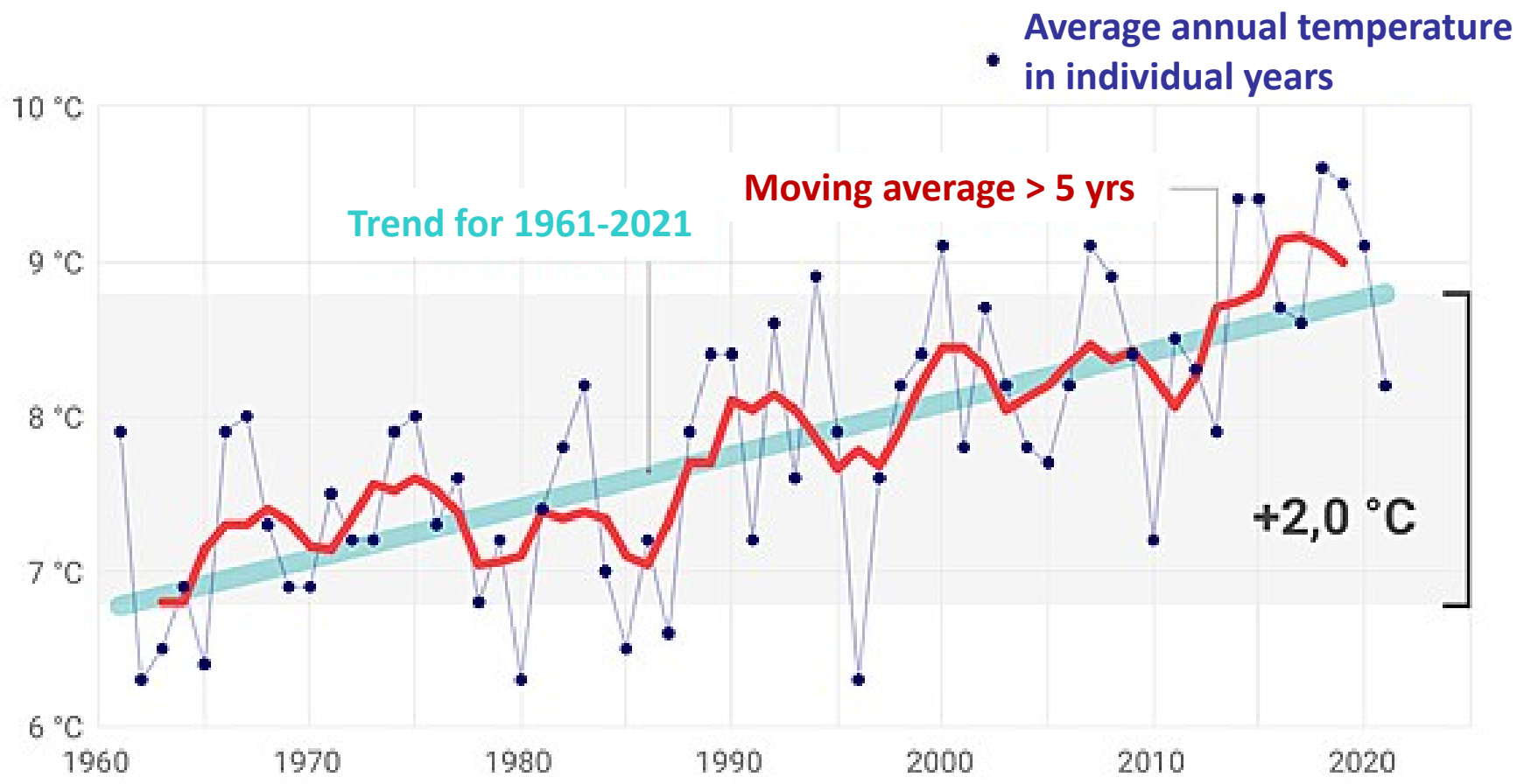
IFER – Institute of Forest Ecosystem Research
Jílové u Prahy, Czech Republic

Agenda

- Currrent situation in Czech Forestry
  and the actual GHG emission estimates
- Situation in the Czech Republic and Central Europe
- Tier-3 estimation aided by
  CBM-CFS3 (Kull et al., 2019; Kurz et al., 2009)
  - Country-specific model callibration
  - Results for 4.A (4A1, 4A2) and KP LULUCF (AR, D, FM)
- The next steps and outlook

Average annual temperature in Czech Republic

Since 1961, temperature increased by 2.0 °C



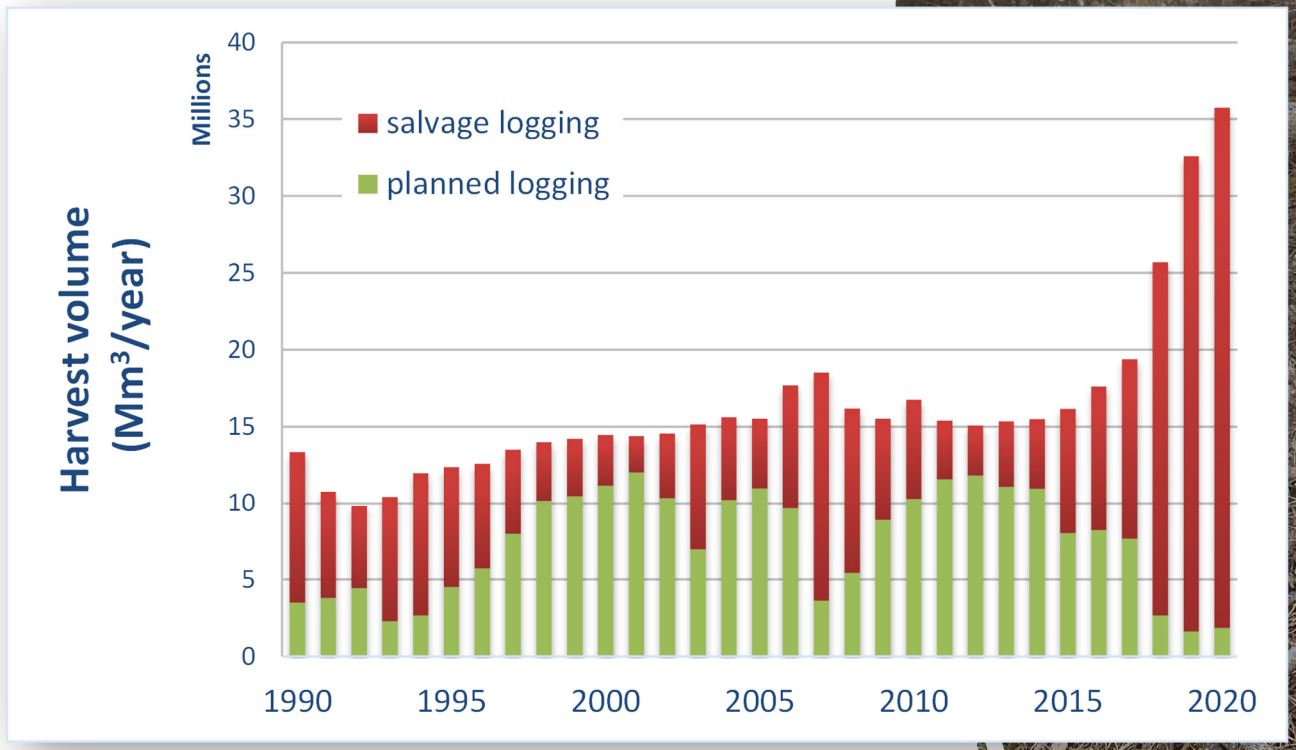
C: faktaoklimatu.cz, CHMI

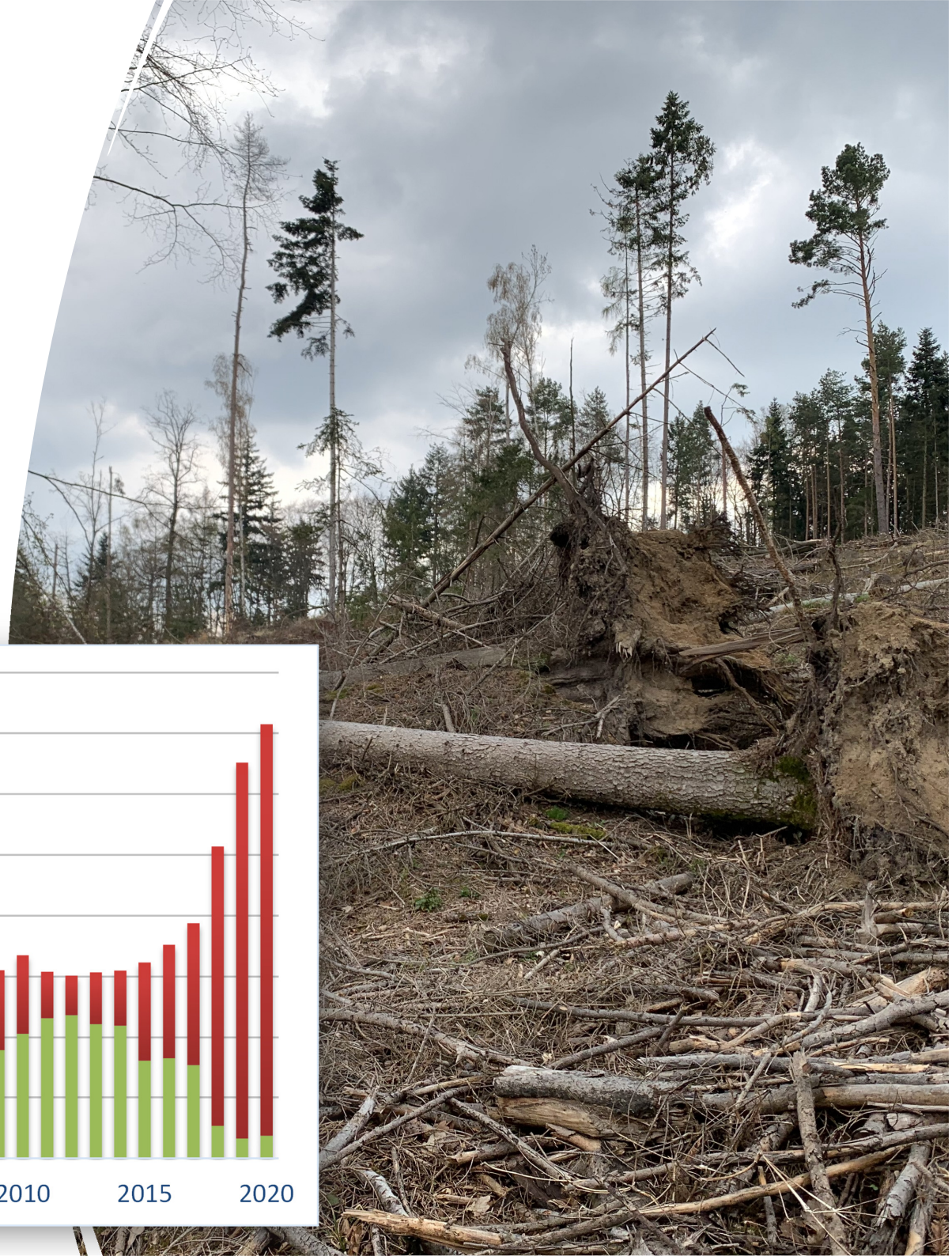
zdroj dat: ČHMÚ

Czech Republic:

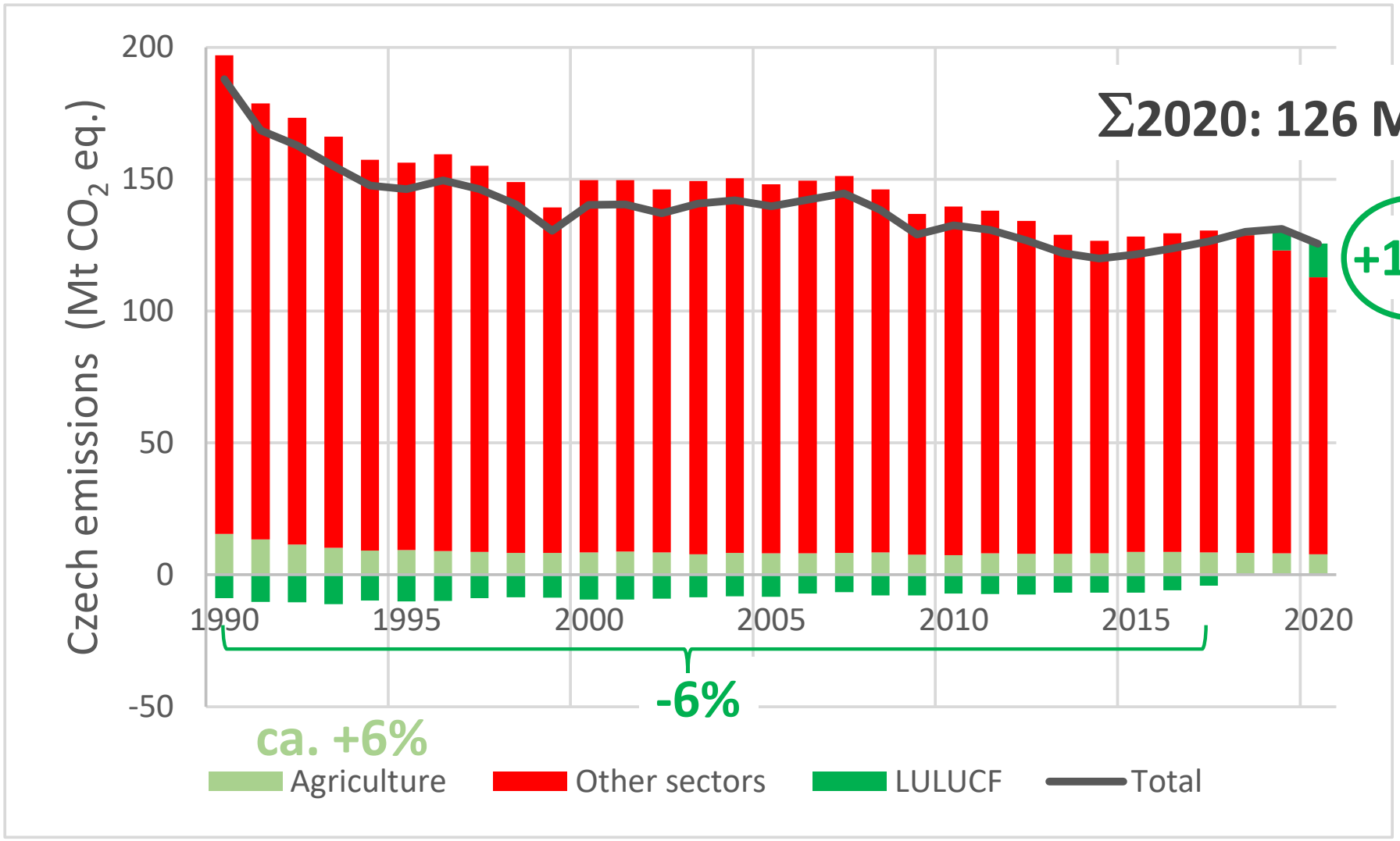
Extreme drought-induced bark beetle calamity…

- Increased sanitary harvest and total wood extraction



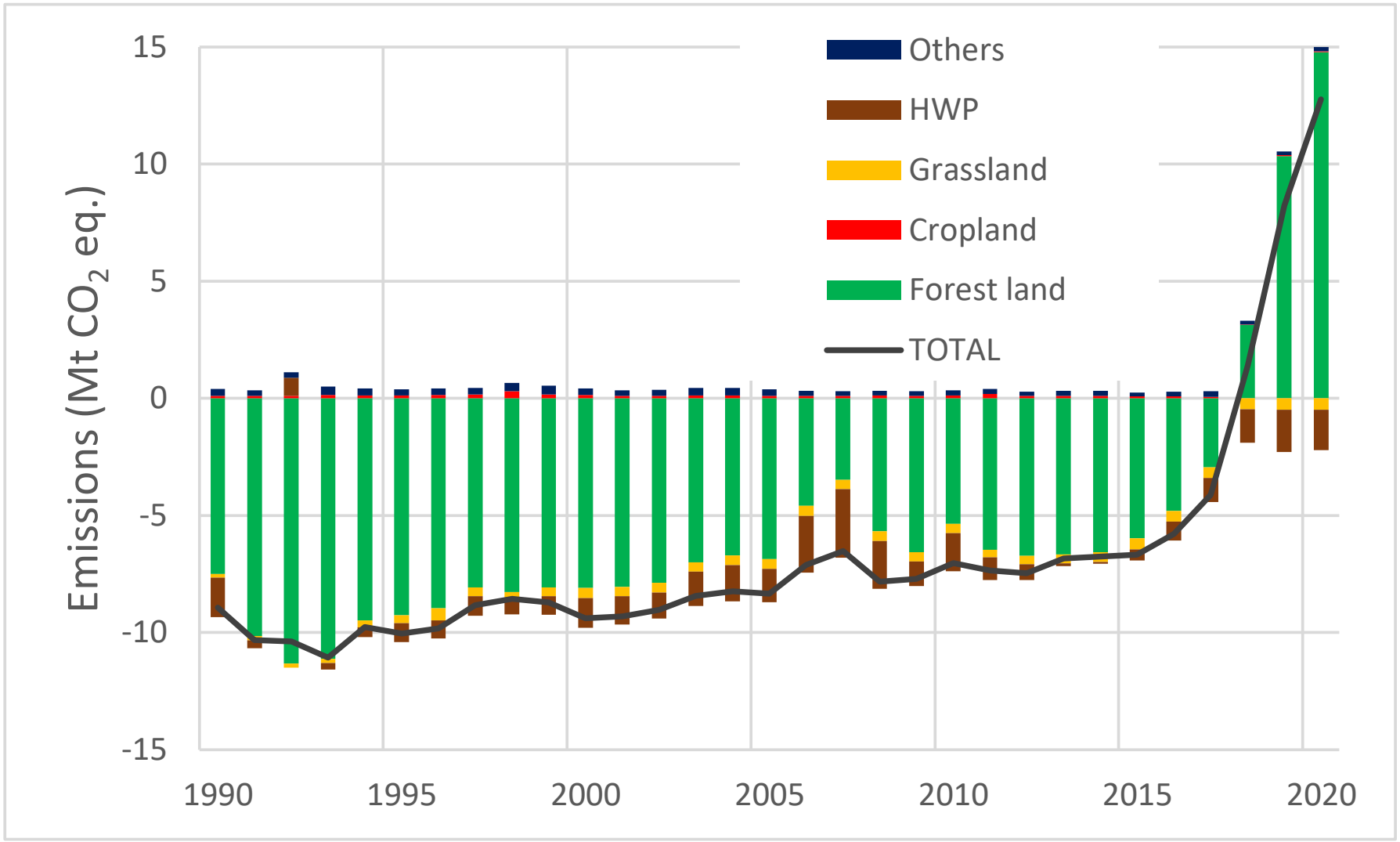


Current Czech GHG data (*NIR 2022*)



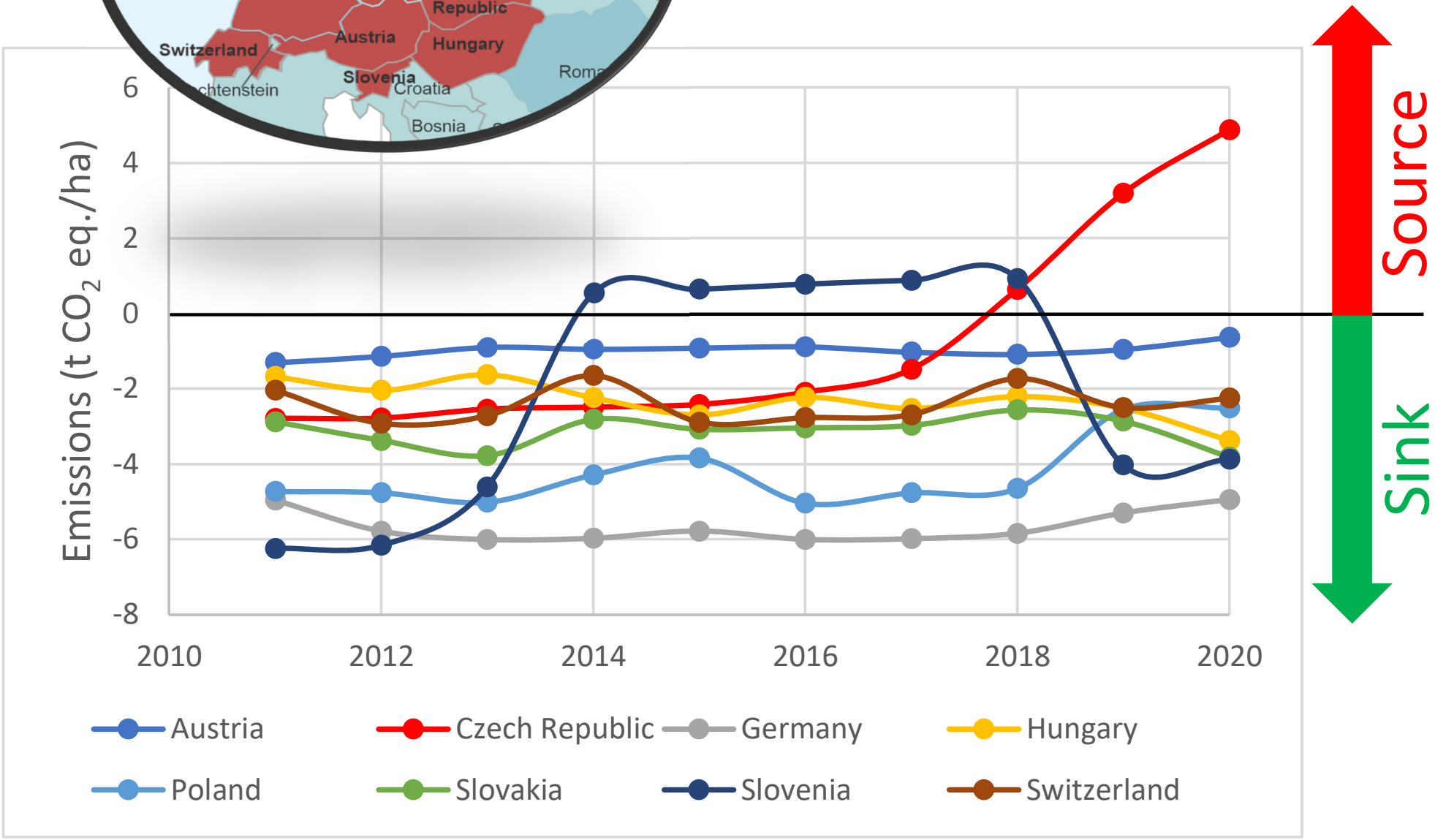
C: IFER and Czech NIR 2022

Current GHG data for the LULUCF sector (*NIR 2022*)



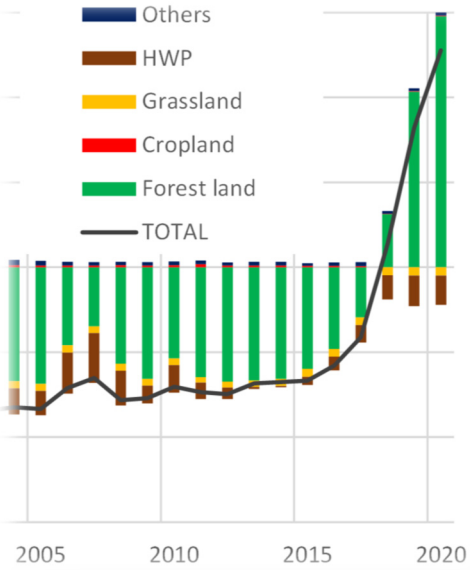
C: IFER and Czech NIR 2022

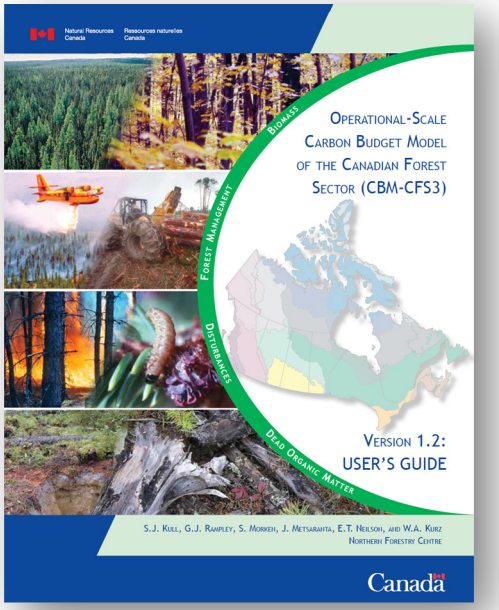
Forestry (incl. HWP) and CO_2 balance



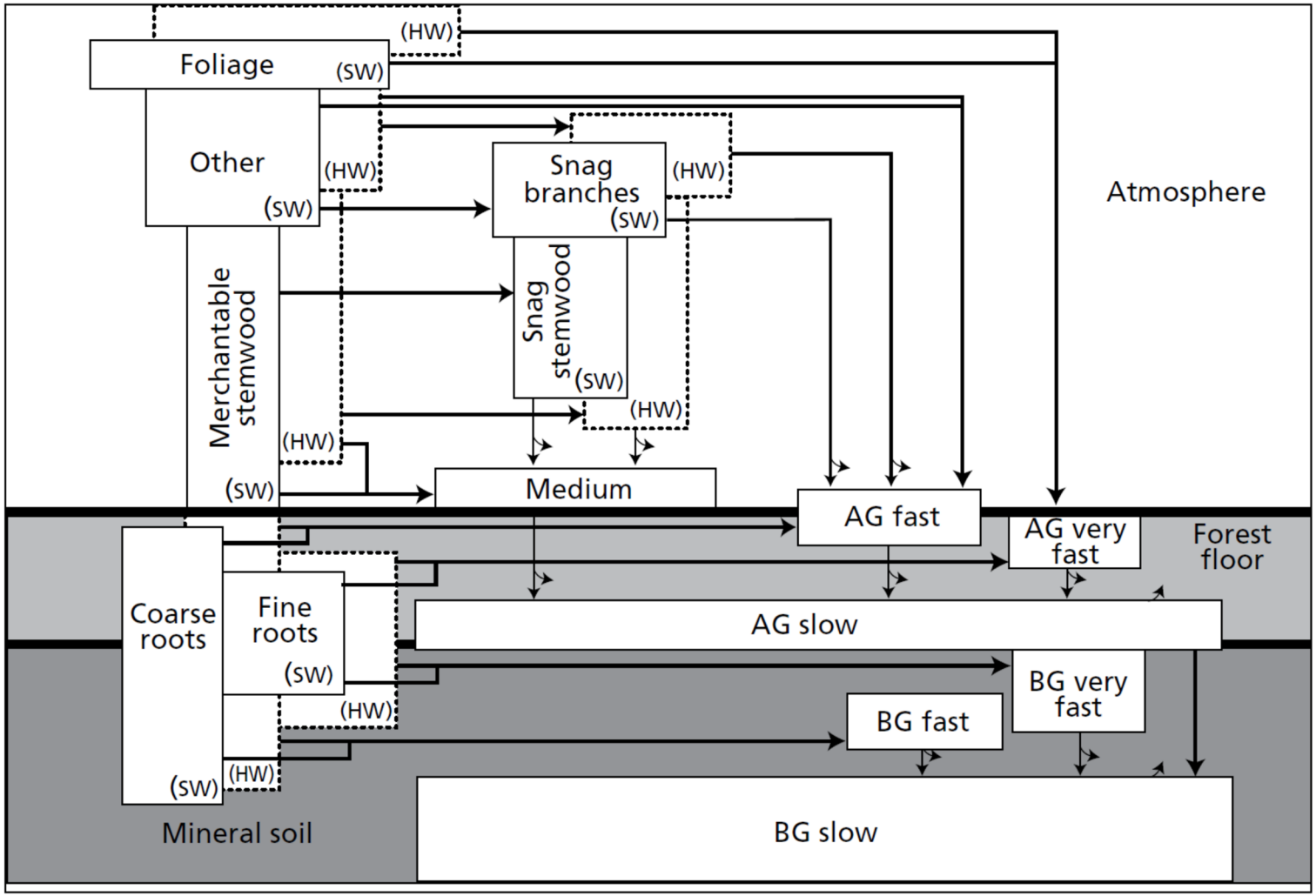
Why Tier-3 and why CBM-CFS3?

- Dynamics of carbon stock change
- All five carbon stock pools
- Annual time step
- Previous CBM-CFS3 experience (model flexibility)
  - Canada (Canadian NIR)
  - EU (Pilli et al. 2017)
  - European studies (Irish NIR, Romania, Slovenia, Italy)
  - FRL settings (CZ, IR, PL)
- Model availability and support (thanks Canada! … and JRC☺)





CBM-CFS3 structure
(21 carbon pools)



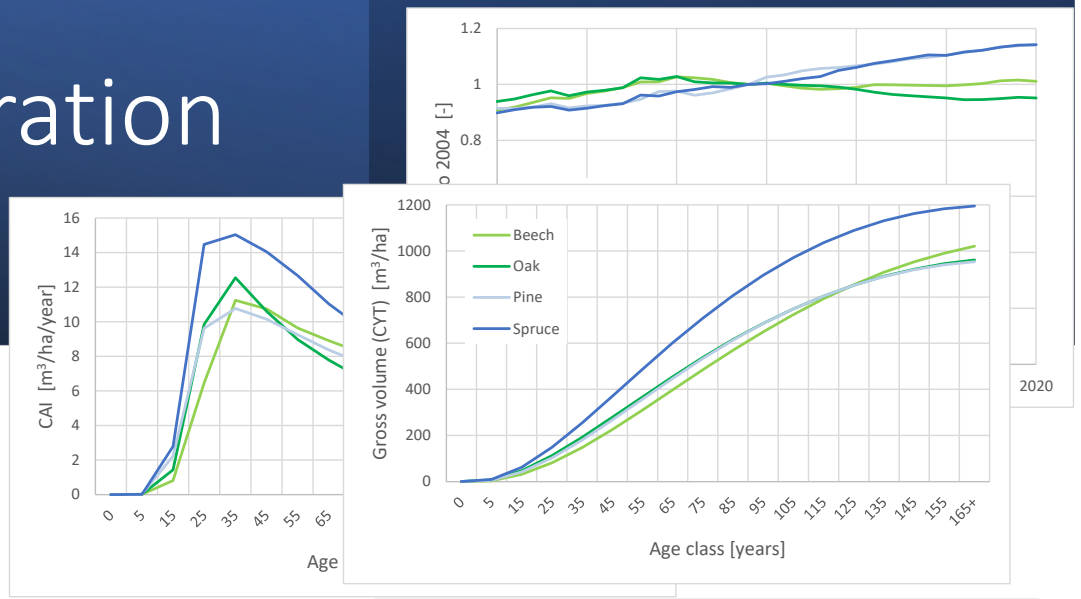
C: Kull et al. 2019, Kurz et al. 2009

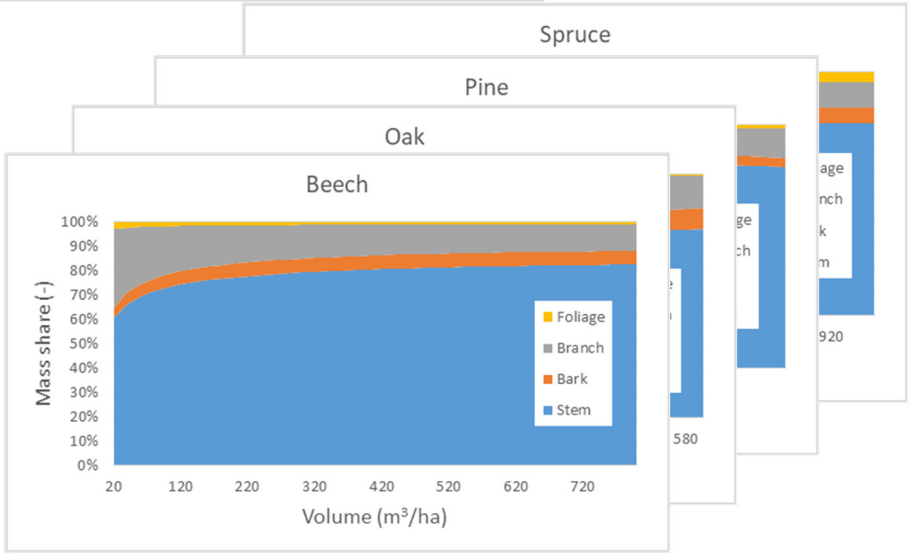
Use of CBM in the NIR 2022

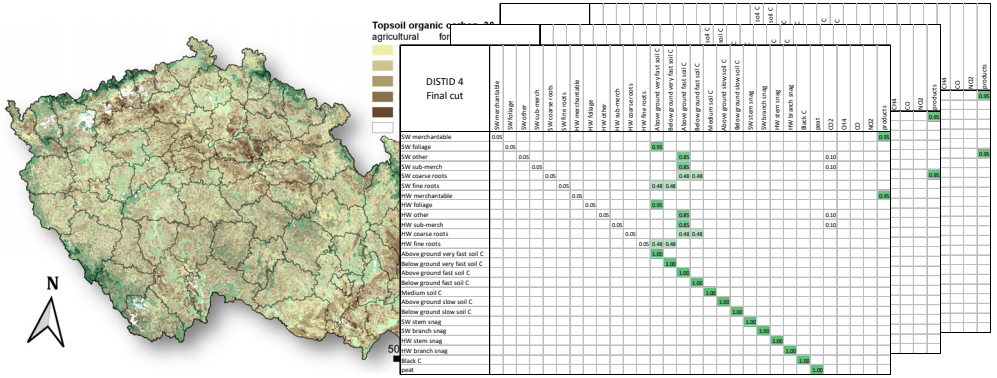
Emission category (UNFCCC) or Activity (KP LULUCF)	Carbon pool UNFCCC	Carbon pool KP LULUCF	Methodological tier and comment
4.A.1 FL remaining FL Forest Management	Living biomass	Aboveground biomass	T3, CBM
		Belowground biomass	T3, CBM
	Dead organic matter (DOM)	Deadwood	T3, CBM
		Litter	T3, CBM
	Soil (Mineral soils)*	Soil (Mineral soils)	T3, CBM
4.A.2 Land converted to FL Afforestation/Reforestation	Living biomass	Aboveground biomass	T3, CBM
		Belowground biomass	T3, CBM
	Dead organic matter (DOM)	Deadwood	T2, T3, CBM
		Litter	T2, T3, CBM
	Soil (Mineral soils)*	Soil (Mineral soils)	T2/T3, Soil carbon maps
4.B.2.1 FL converted to Cropland 4.C.2.1 FL converted to Grassland 4.D.2.1 FL converted to Wetland 4.E.2.1 FL converted to Settlements Deforestation	Living biomass	Aboveground biomass	T2/T3, CBM
		Belowground biomass	T2/T3, CBM
	Dead organic matter (DOM)	Deadwood	T2/T3, CBM
		Litter	T2/T3, CBM
	Soil (Mineral soils)*	Soil (Mineral soils)	T2/T3, Soil carbon maps
Harvested Wood Products	Harvested Wood Products	Harvested Wood Products	T2, Production approach

Country-specific calibration – what is included?

- Land areas by species groups
- Growing stock volume and increment by species groups and age classes
- Biomass equation and component functions
- Turnover and transfer rates of carbon pools
- Land use change – reference soil carbon stock
- Forest management interventions - disturbances



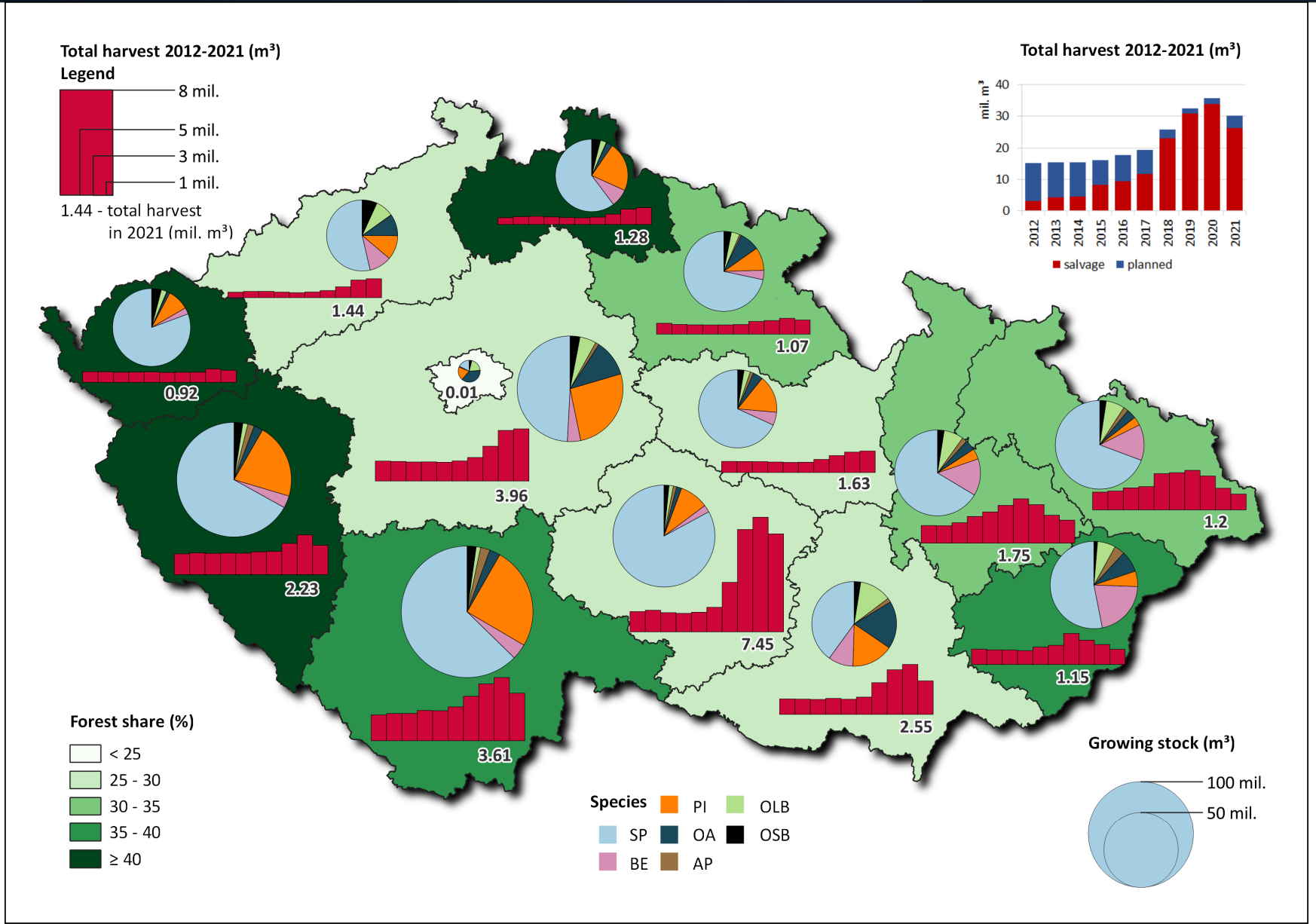




Modelling strategy

- Phase until 2020 (NIR 2022)
  - Resemble reporting strategy as used earlier with T2 methodologies
    - Input data on forest resources (stand-wise inventory)
    - Species classification (4 species groups)
    - Land stratification (one unit)
    - Increment and harvest data
- Phase since 2021 (NIR 2023 and newer)
  - Gradual improvement, increasing detail
    - Implementing sample-based NFI data
    - More detailed species classification (7 species units)
    - Using NUTS3 spatial resolution

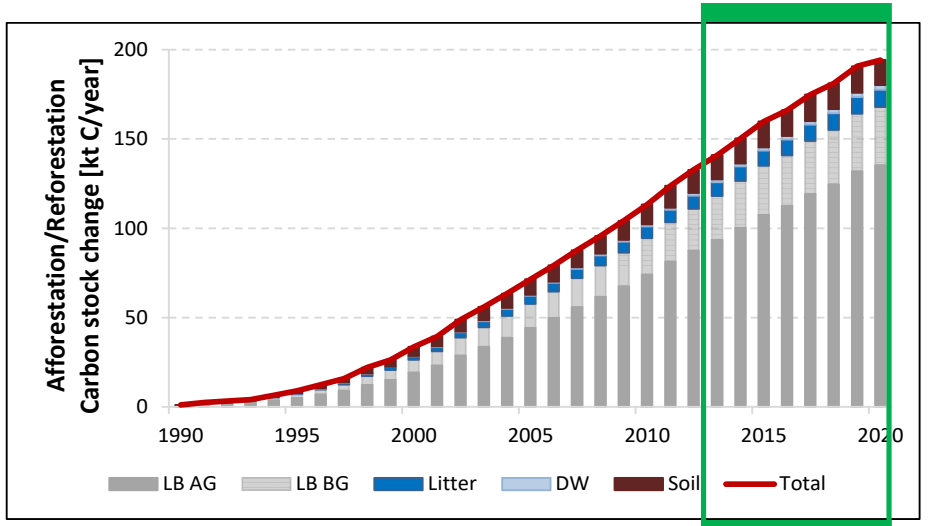
Czech NUTS 3 regions and activity data

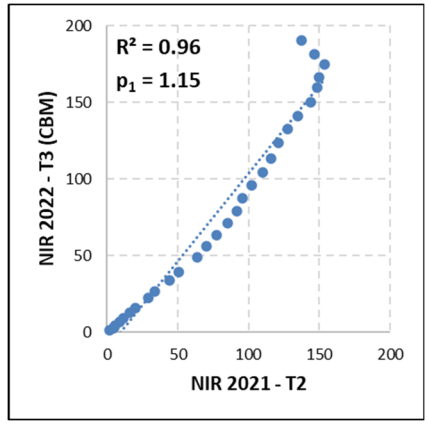


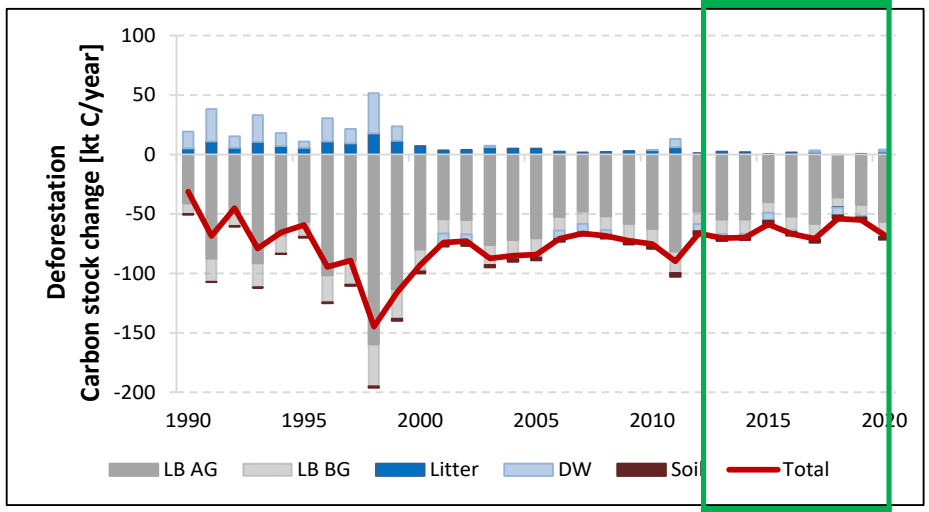
Examples of CBM-CFS3 results

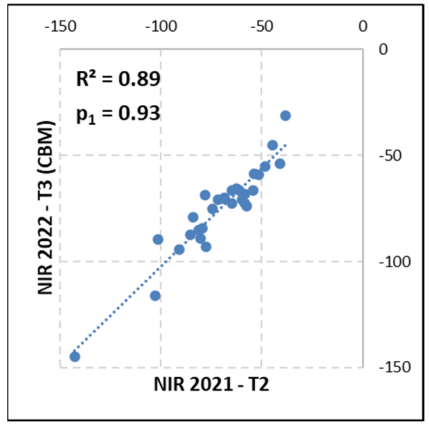
KP LULUCF activities

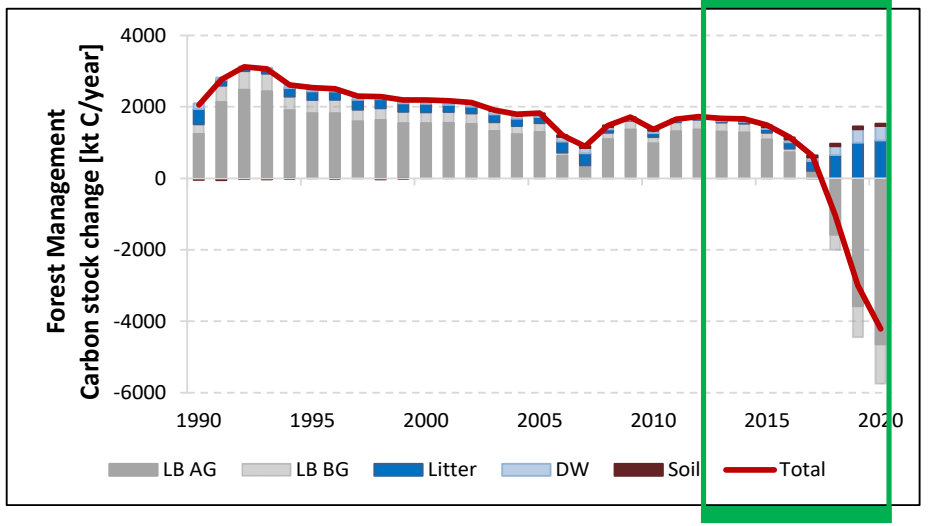
KP II period 2013-2020

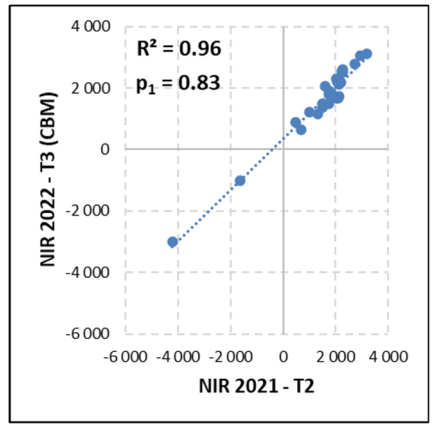






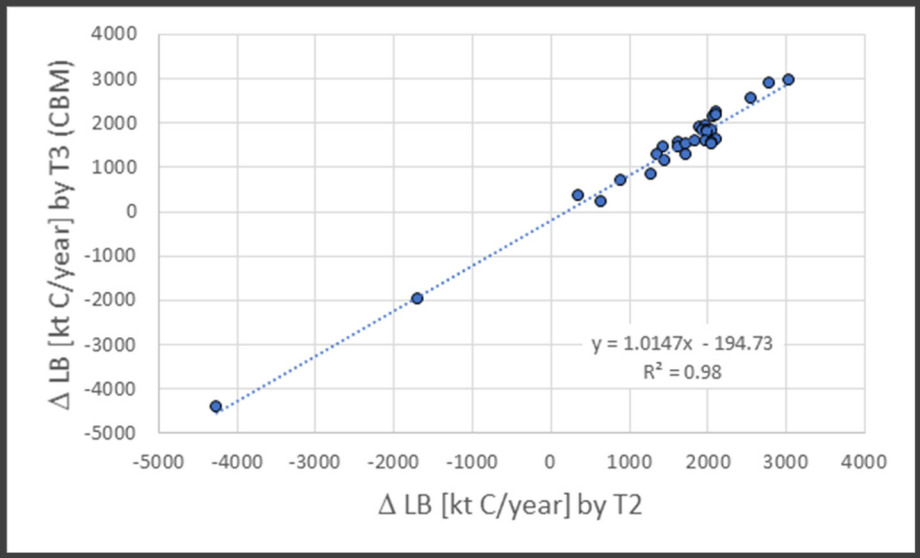




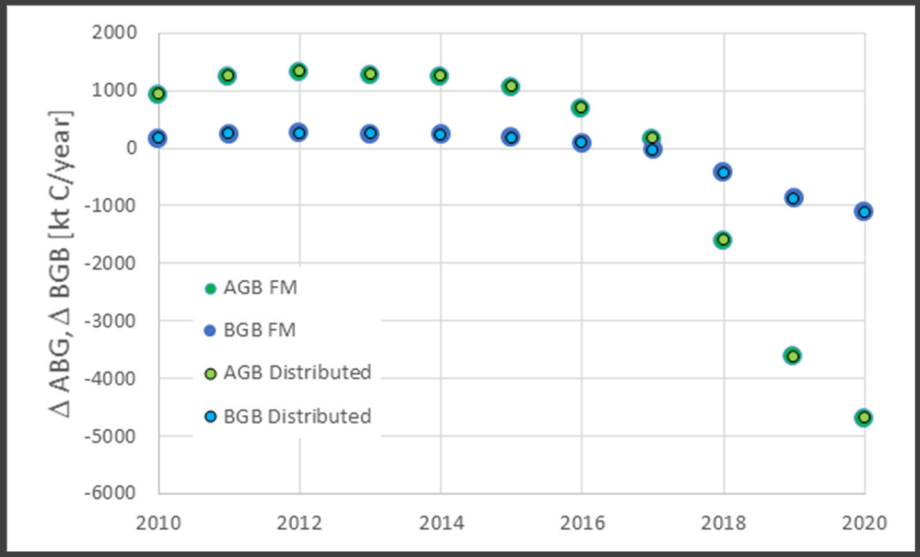


Verification

- Consistency of T2 and T3 estimates (carbon in living biomass)

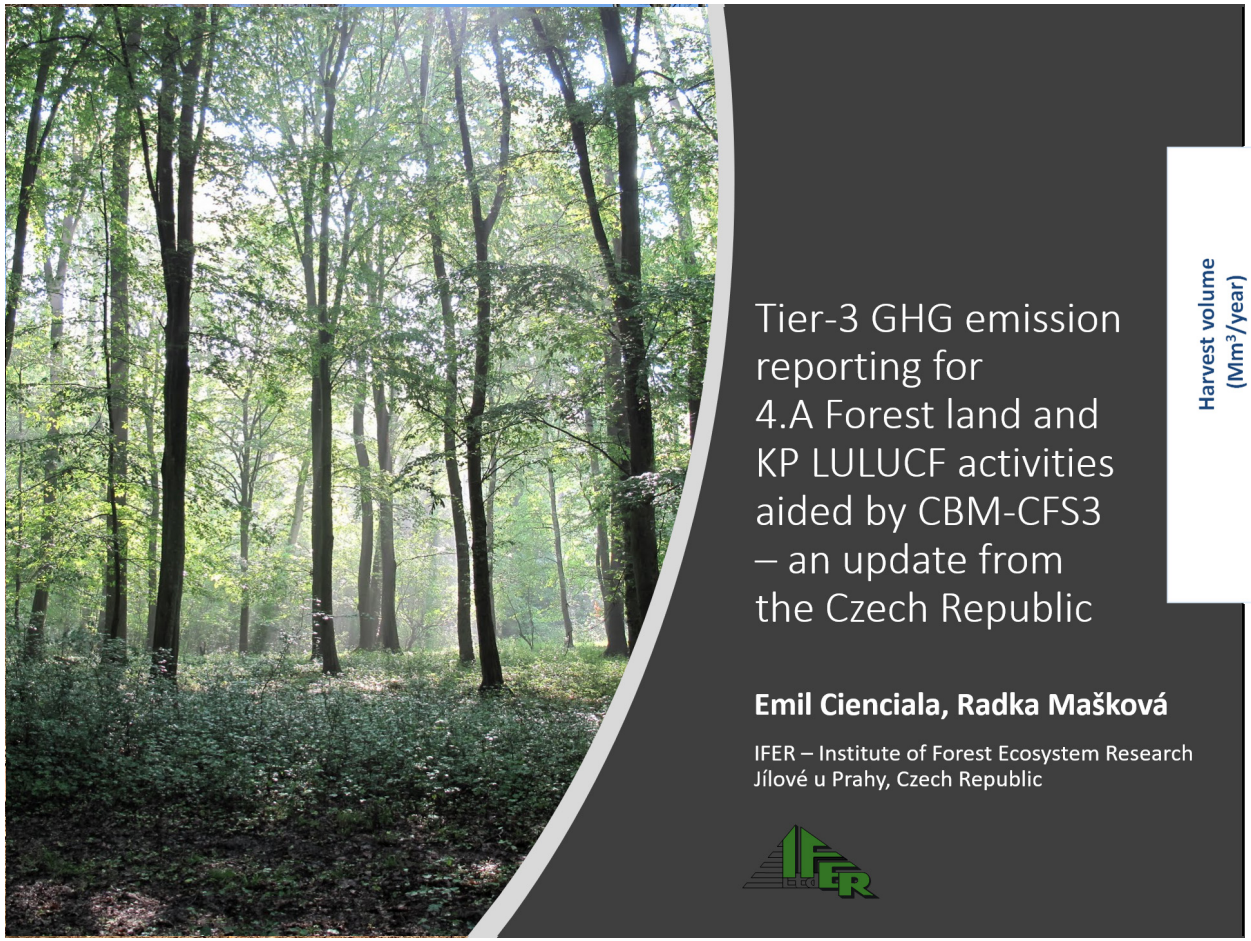


- Consistency with spatially stratified CBM runs („distributed“)
  - 4 vs 7 species groups
  - 1 vs 14 NUTS 3 regions
  - different base year for growth calibration



Next steps with CBM

- Taking into account Regulation (EU) 2018/841
- Adopting NUTS 3 spatial resolution
- Uncertainty estimation
- Seven species groups
- Migrating to sample based NFI data
- Reconciliation of historical time series and projections



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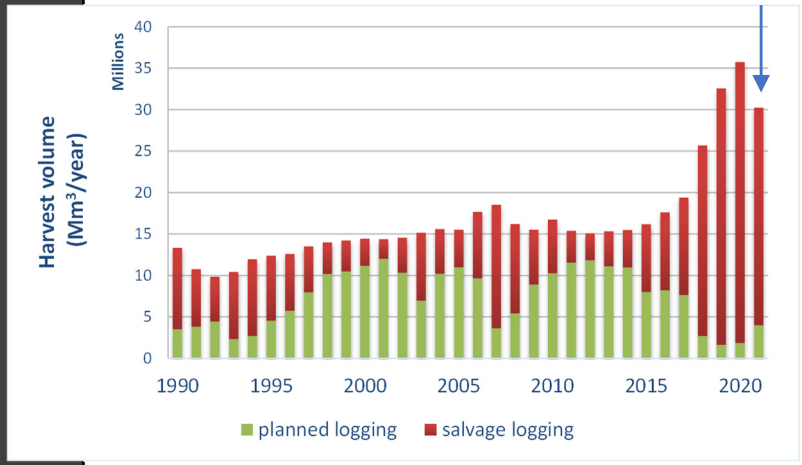
Harvest update for 2021



Remain optimistic!

- **Contact: emil.cienciala@ifer.cz**

IFER – Institute of Forest ecosystem Research

JRC LULUCF Workshop 2022

"*Towards 'fit for 55': updates in LULUCF reporting and accounting*"

20-21 June 2022, Varano Borghi, Varese, Italy