Near-real time estimations of harvest for the EU MS

Challenges & opportunities offered by newer data

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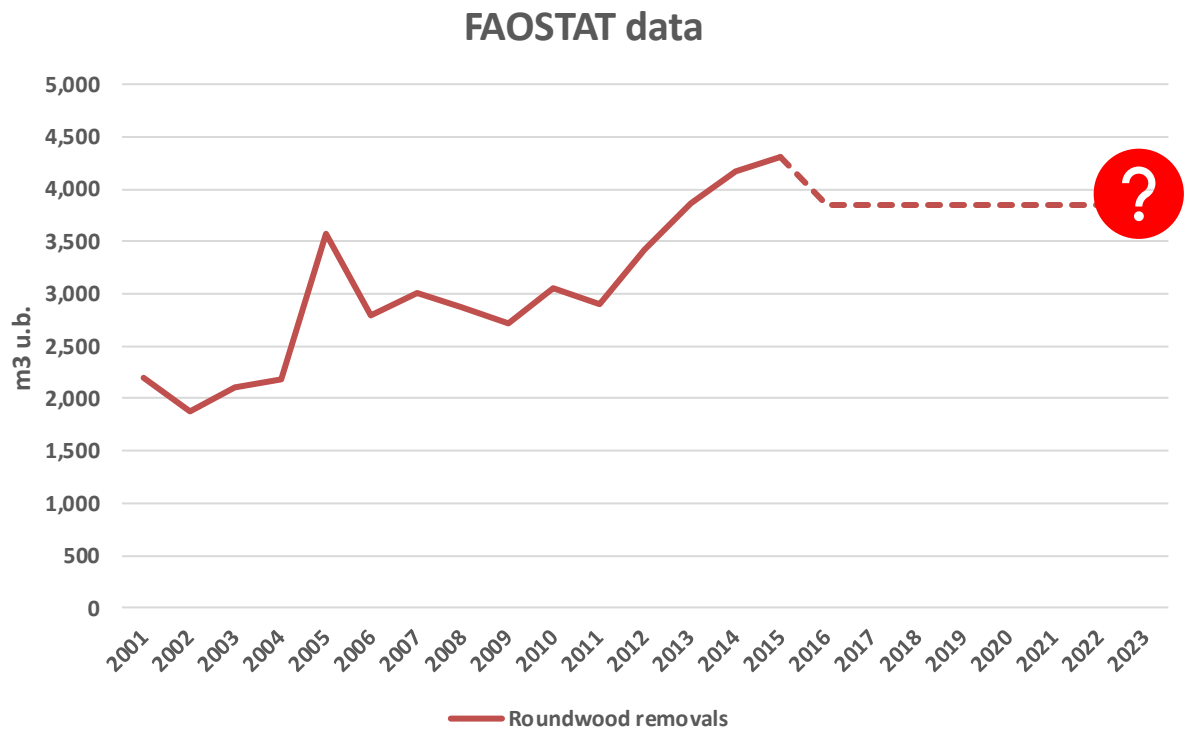
THE ISSUE:

- 1-2 years time lag on harvest data reported from FAOSTAT and/or country statistics
- data series reported from some countries not updated

THE QUESTION:

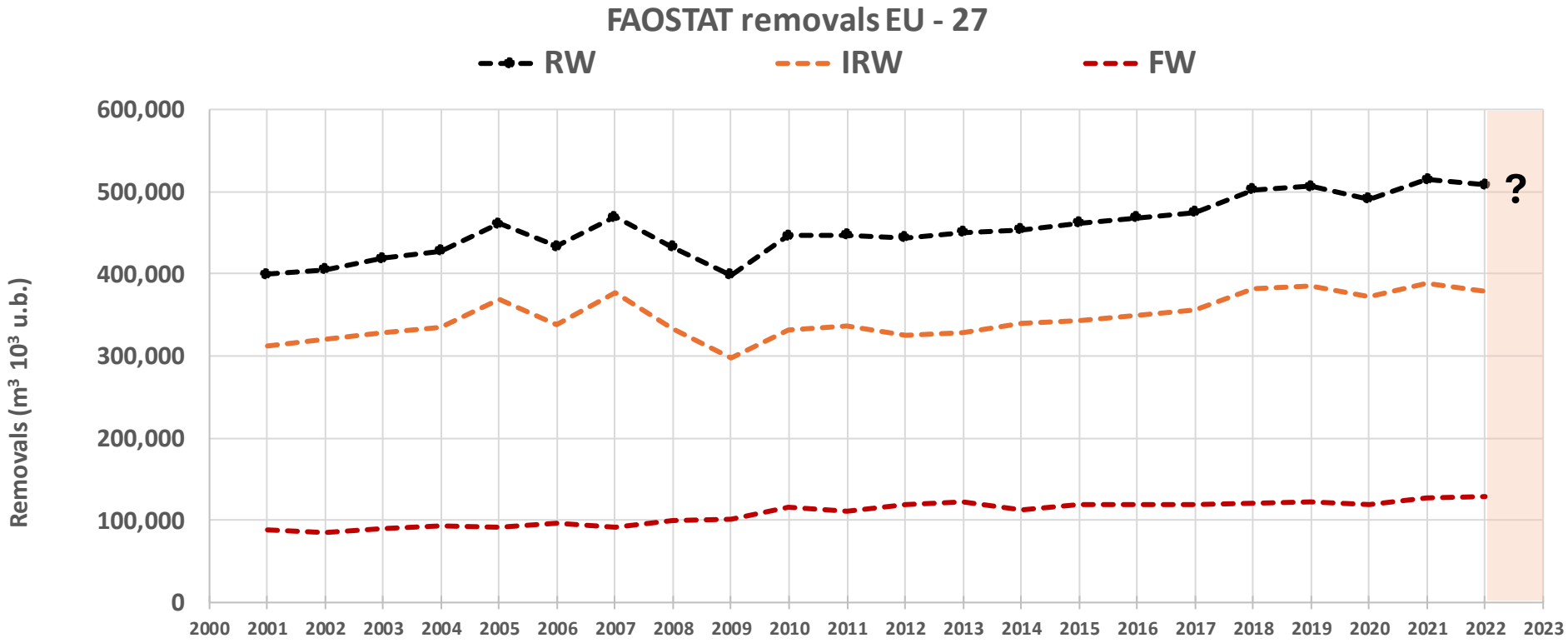
- Can we use Remote Sensing data to estimate the ongoing evolution of harvest within the latest 1-2 years and for the annualization of the sink?
- Can we use these data to complement or gap-fill historical harvest time series when missing?



ACTIVITY DATA:

FAOSTAT data sources*:

- Total EU roundwood removals (**RW**, m^3 u.b.), including industrial roundwood (**IRW**) and fuelwood (**FW**), as reported by EU Member States within the period 2000-2022

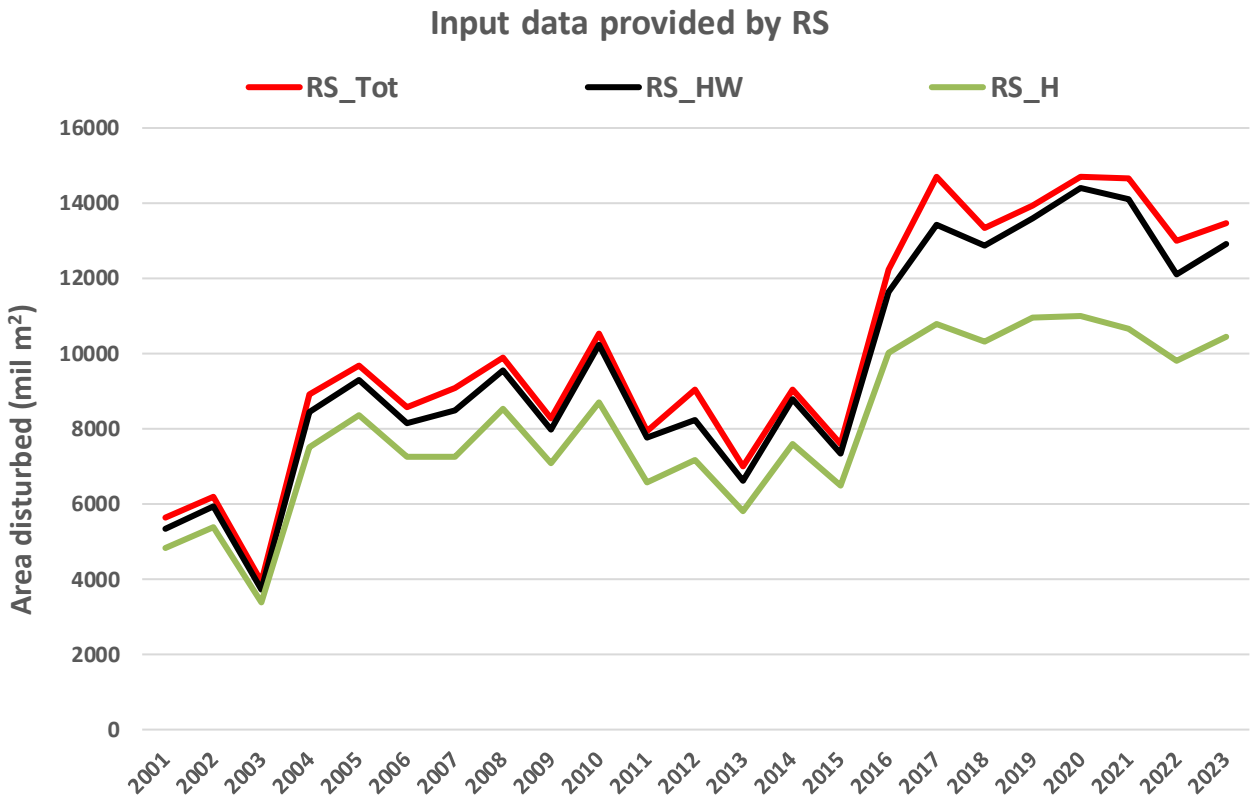


* Download 26 March 2024

ACTIVITY DATA:

Remote Sensing (RS) data sources:

- Forest losses **for the period 2001-2023** obtained by combining data from the Global Forest Change (GFC) maps with forest-area statistics from FAOSTAT.
- Using the methodology developed by Ceccherini et al. 2020, we defined for each country the minimum tree cover that qualifies as forest using the GFC maps.
- To quantify forest management (i.e. the Net Forest Harvest) we can also exclude losses due to forest fires and windstorms:

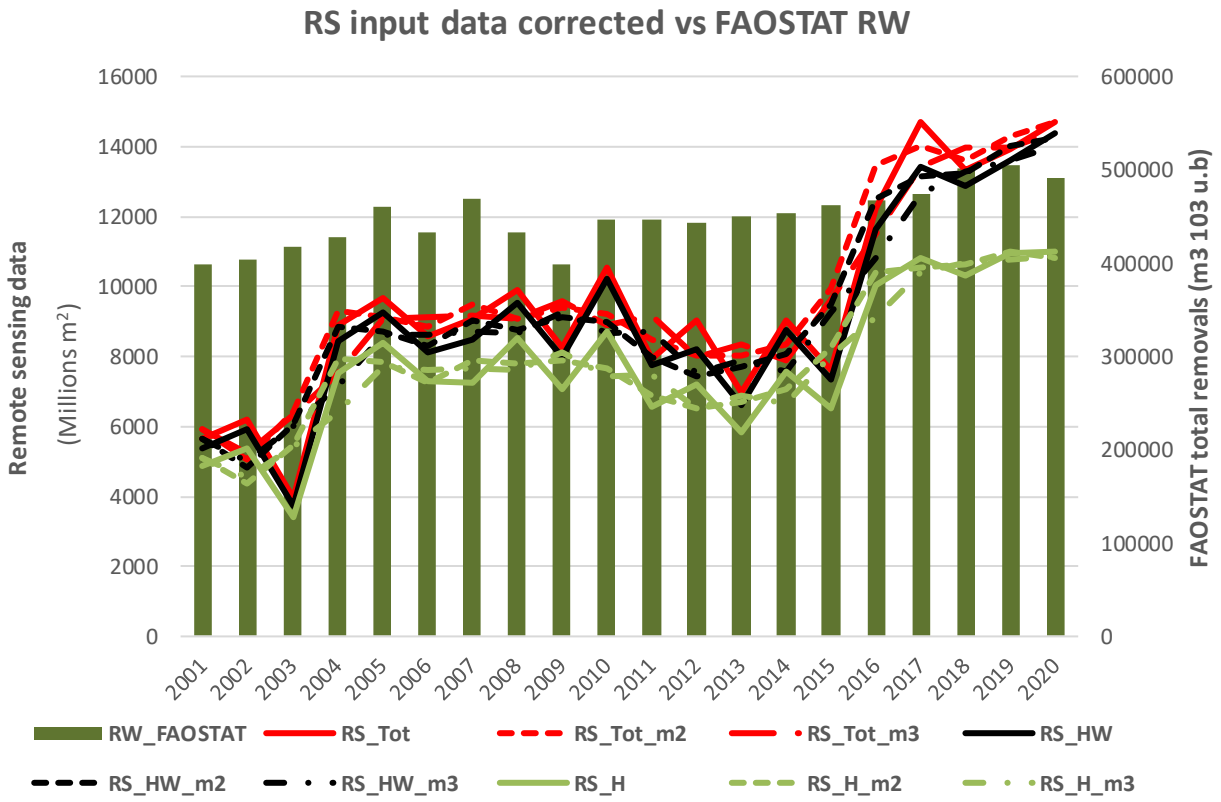


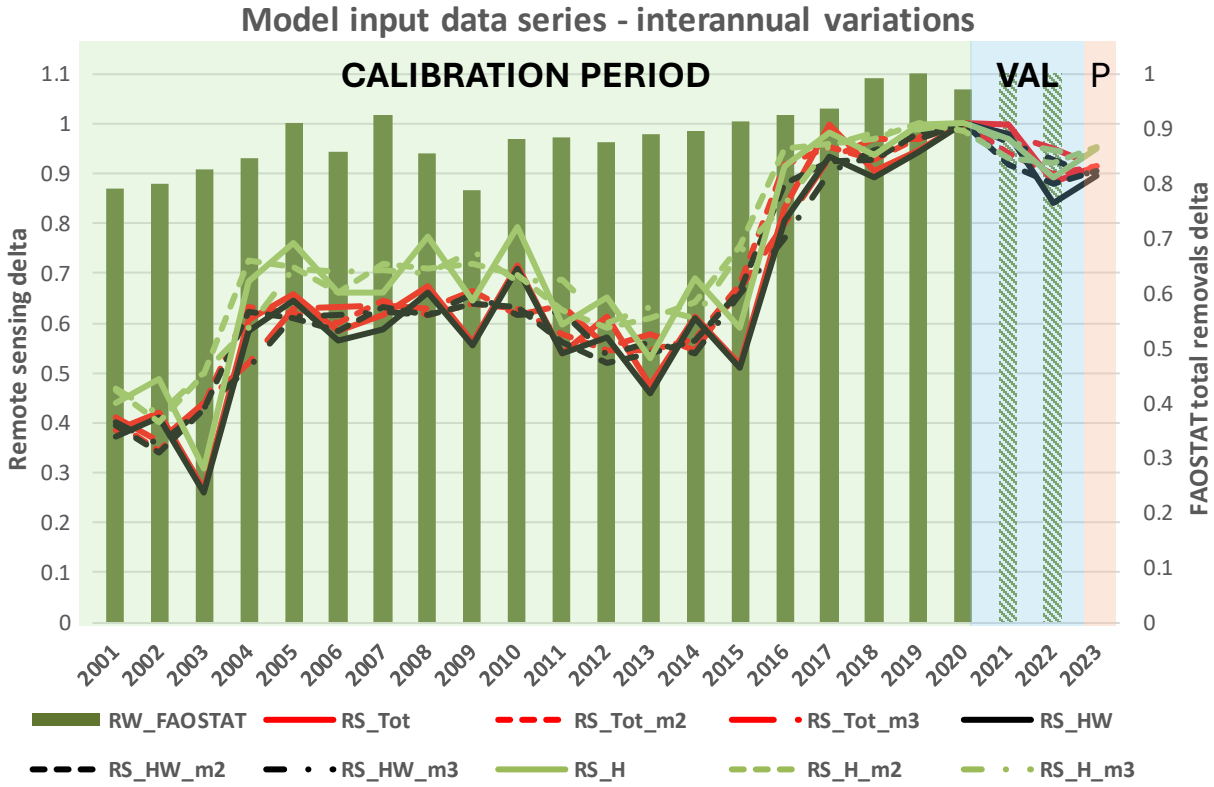
Original RS (raw) data = **Total disturbance events**	**RS_Tot**
Original RS data excluding fire = **Harvest + windstorms**	**RS_HW**
Original RS data excluding fire & windstorms= **Net Harvest**	**RS_H**

METHODS:

For each MS and for EU27, we tested 9 different linear regression models (*SAS, ProcReg*), applied within the calibration period 2001 – 2020, comparing FAOSTAT relative interannual variations versus:

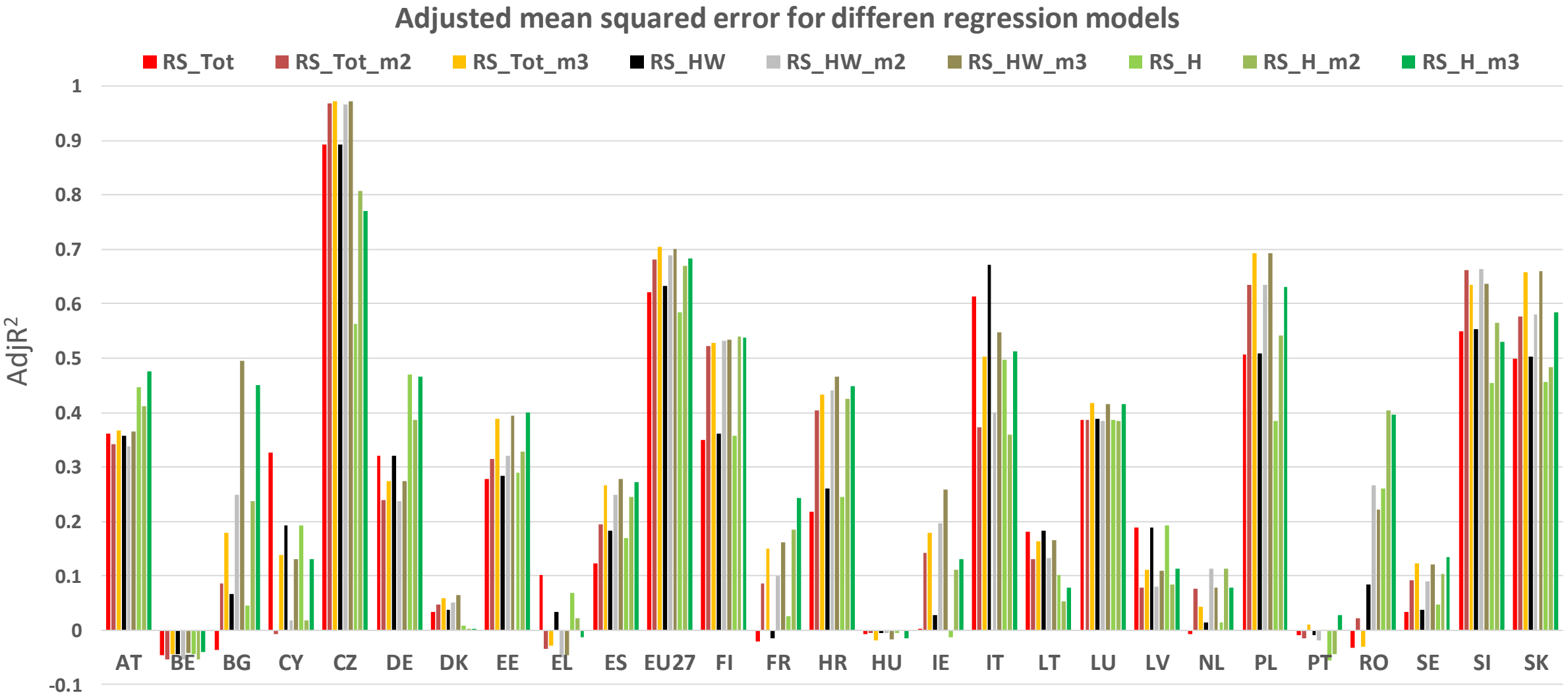
Relative interannual variations derived from remote sensing data considered as:	MODEL	Raw data	2-yrs moving average	3-yrs moving average
Original (raw) data = **Total disturbance events**	Total	RS_Tot	RS_Tot_m2	RS_Tot_m3
Original data excluding fire = **Harvest + windstorms**	Harwind	RS_HW	RS_HW_m2	RS_HW_m3
Original data excluding fire & windstorms= **Net Harvest**	Harvest	RS_H	RS_H_m2	RS_H_m3





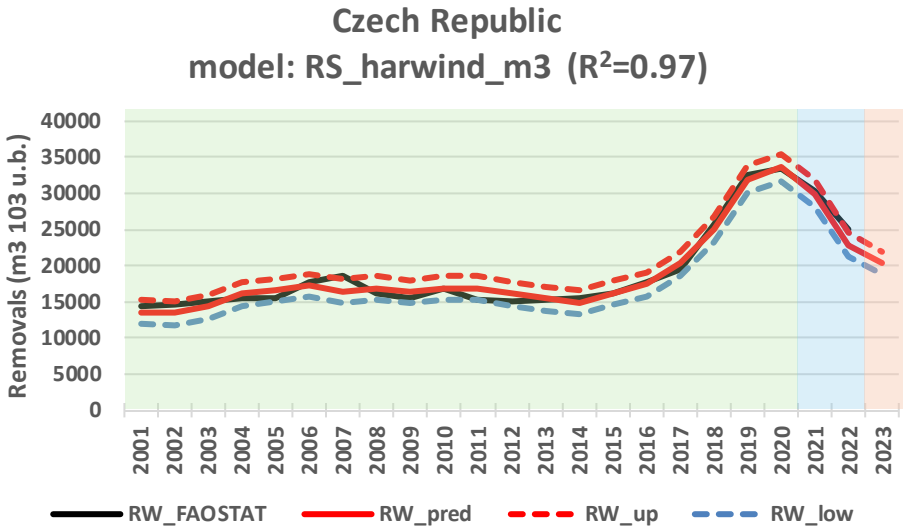
METHODS:

For each MS and for EU27, we selected the model with the best fit with FAOSTAT relative interannual variations within the calibration period 2001 - 2020:



RESULTS:

For each MS and for EU27, we estimated the expected removals (with 90% confidence intervals) by multiply the values predicted by the "best regression" model by the maximum removals reported by FAOSTAT within the calibration period 2001-2020

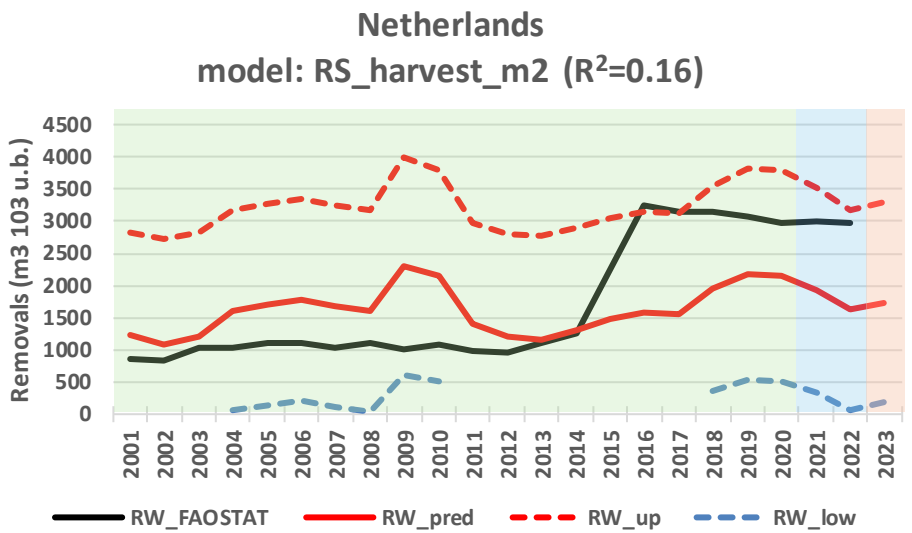


CALIBRATION PERIOD

VALIDATION PERIOD

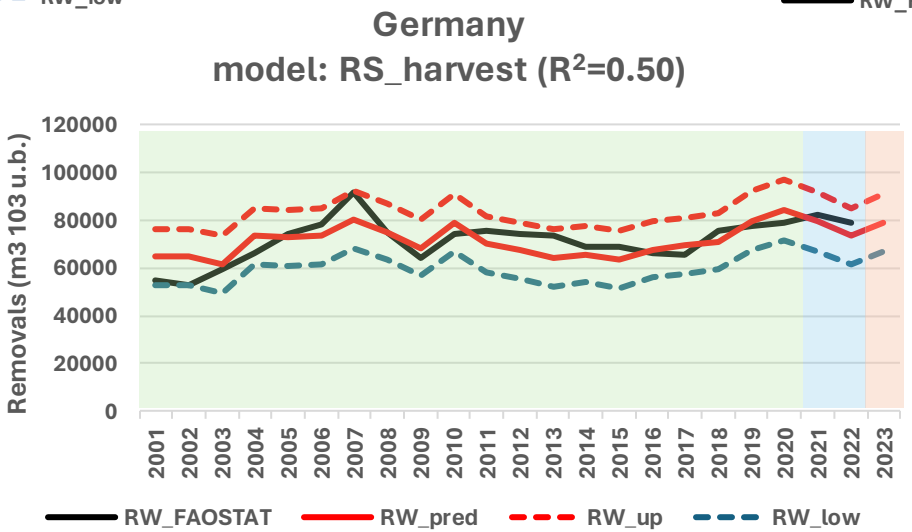
PROJECTION

5 MS + EU27 with AdjR² > 0.60



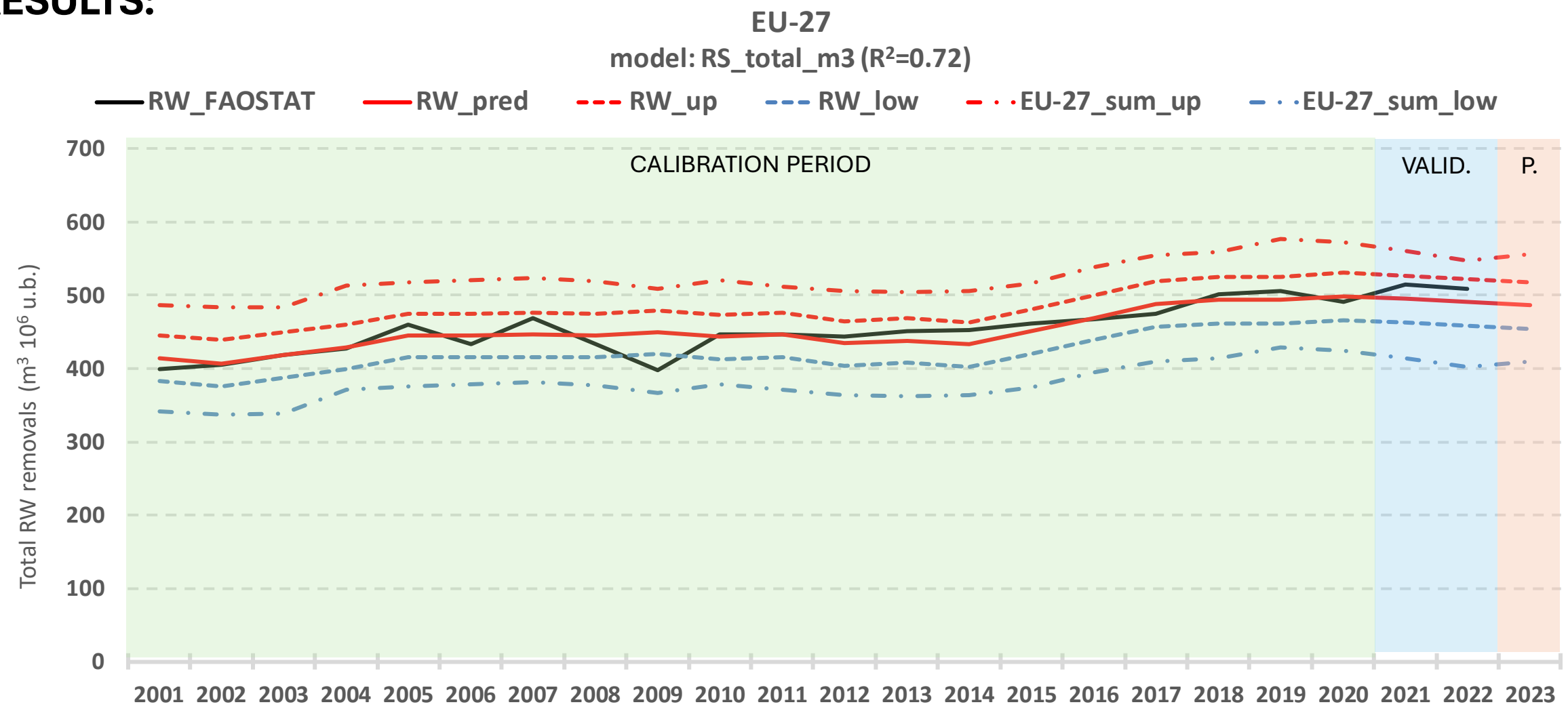
13 MS with AdjR² < 0.40

1 MS not considered (lack of data)



8 MS with 0.60 ≤ AdjR² ≤ 0.40

RESULTS:



For EU-27, confidence intervals* can be determined according to the 'best' regression model (*RS_total_m3*: RW_up, RW_low) or as the cumulate confidence intervals estimated at country level for 26 MS (EU-27_sum_up, EU-27_sum_low).

* average values do not differ

CHALLENGES & OPPORTUNITIES:

- ✓ RS data can easily provide a **near-real time assessment of the ongoing evolution of harvest activities and forest carbon sink** and of the impact of natural disturbances, at national (sub-national) and **EU level where harvest in 2023 seems to be quite stable**
- ✓ If calibrated against consistent time series (i.e. harvest removals detected from direct data collections) RS data **can be used to complement other data sources, i.e. to infer historical inter-annual variations of the annual harvest rate** and to **assess data uncertainty**

HOWEVER:

- ➢ **RS is not a validation approach**, i.e. it cannot provide an independent validation of other data sources (i.e. missing or partial data cannot be fully supplied by RS)
- ➢ RS approach has limitations in the detection of small-scale silvicultural practices: **GFC is not able to reliably capture partial removal of trees caused by forest thinning**, selective logging, short cycle forestry and changes occurring below the canopy cannot be detected by optical instruments.
- ➢ **Salvage logging carried out after larger natural disturbance events cannot be directly detected by RS**.
- ➢ The GFC dataset is based on the Landsat archive, and the temporal coverage for the first years is sparser, which can cause artefacts when calculating trends. Also, the GFC product is not fully consistent over the entire 2000-onward period. The ingestion of Landsat 8 from 2013 onwards leads to improved detection of global forest loss. For this reason, **care must be taken when analyzing time series of forest loss before and after the year 2016**.

Thanks for your attention!