

# SEEDS - Sentinel EO-based Emission and Deposition Service



# Added value of SEEDS $\text{NH}_3$ emission products for daily forecasts

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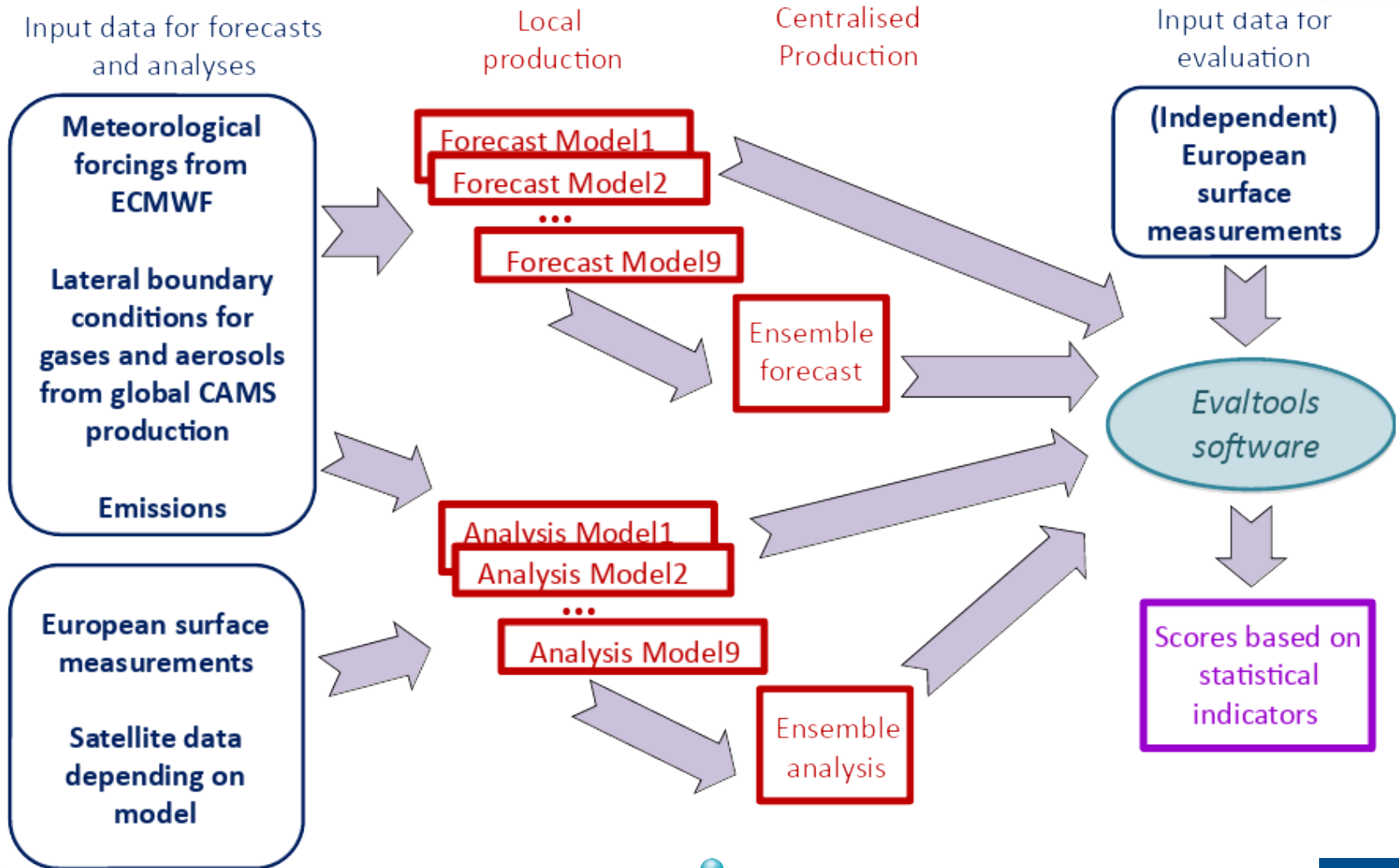
# General objective



- Assessment of the impact of the SEEDS products (WP1, WP2, WP3 and WP4) on the Copernicus Atmosphere Monitoring Service (CAMS) operational regional analyses and forecasts
- Test the SEEDS products as if they were delivered operationally



# General design of the CAMS regional production



# Configuration used to test products



## Current MOCAGE setup for CAMS2-40 (U7) (At project beginning)

- Forecasts/analyses from ECMWF + forecasts/analyses chemical BC
- MOCAGE forecast initialized from an assimilation cycle (satellite obs)
- MOCAGE cycle mo11 used
- Regional Emissions from CAMS-REG-APv5.1 (2018) + MEGAN for Isoprene
- Global domain : Arpege 1x1° + CAMS-GLOB-ANT/CAMS-GLOB-BIO/CAMS-GLOB-OCE (2020)

## Selected MOCAGE setup for SEEDS (U0)

- Forecasts/analyses from ECMWF + forecasts/analyses chemical BC
- MOCAGE forecast initialized from day before forecast
- MOCAGE cycle mo11 used (cycle mo07 in 2019)
- Regional Emissions from CAMS-REG-APv2.2 (2015) + MEGAN for Isoprene
- Global domain : Arpege 1x1° + MACCity (2016)/RCP60 (2016)/MEGAN-MACC (2010)
  - **MOCAGE o-suite in 2019** (except for source code)



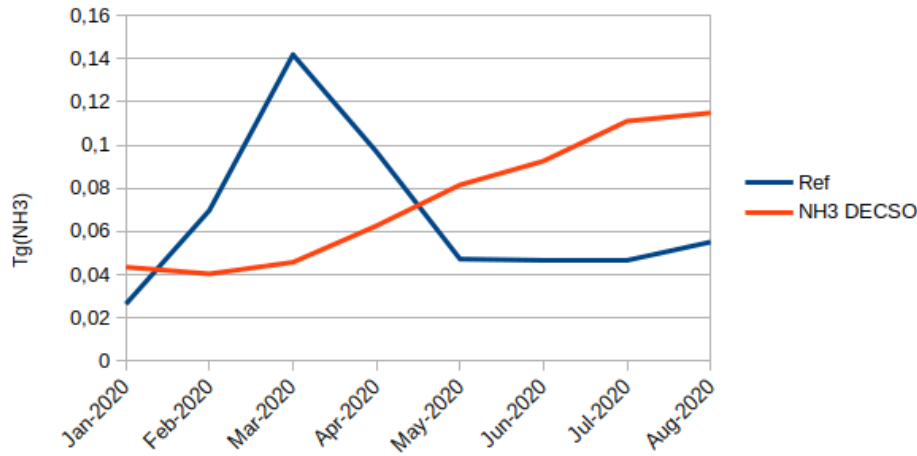
# General overview of simulations for NH<sub>3</sub> emission products

Product to test	MOCAGE simulation mode
Reference run	Hindcast (24h)
	Analysis (24h)
NH <sub>3</sub> emissions	Analysis (24h)
	Hindcast (24h)

# NH<sub>3</sub> emissions

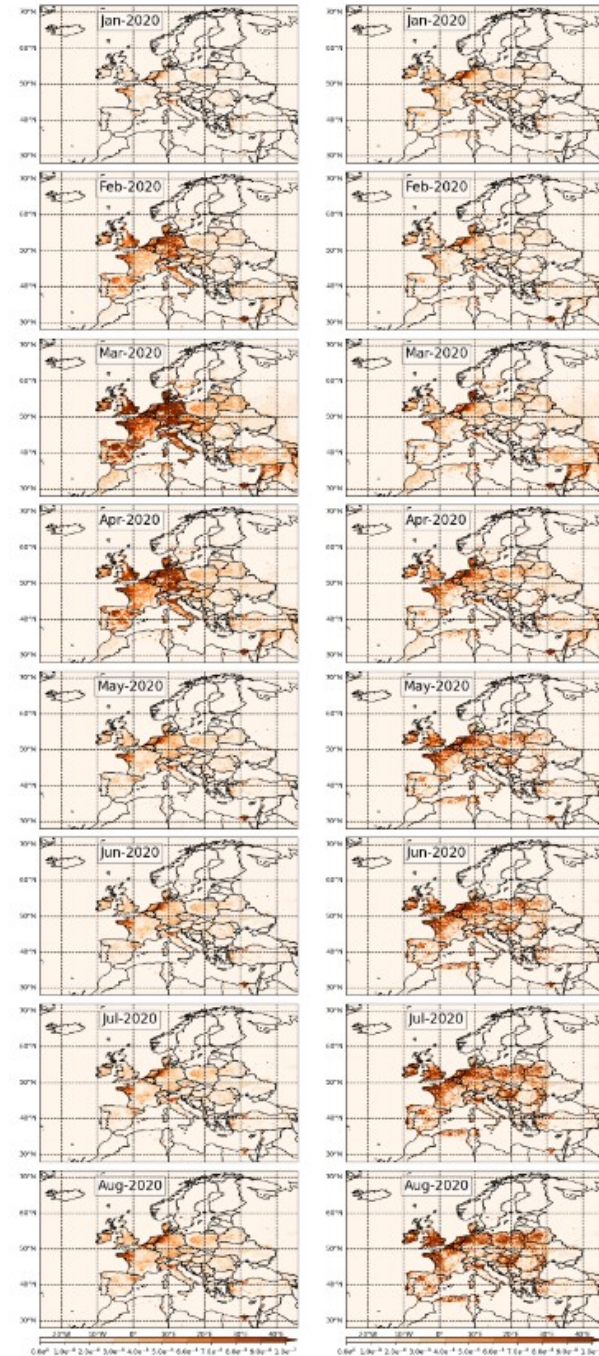
CrIS observation data = Covid period

Comparison of total NH<sub>3</sub> emission over DECSO domain

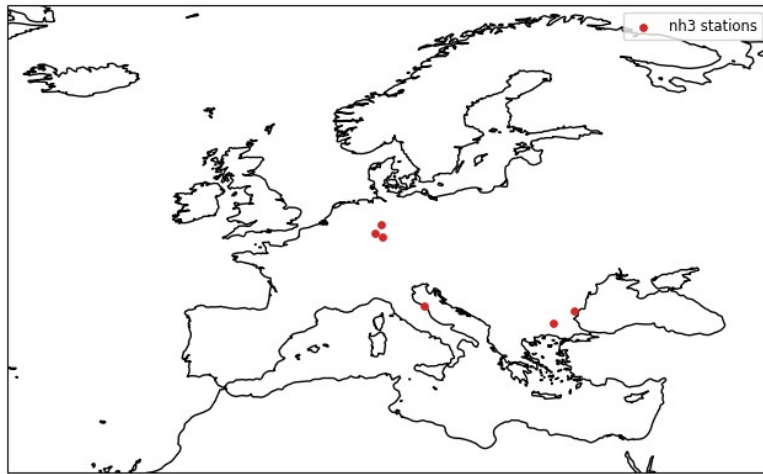


GGO3  
Surface\_EM\_NH3 - 2020\_

GHPV  
Surface\_EM\_NH3 - 2020\_

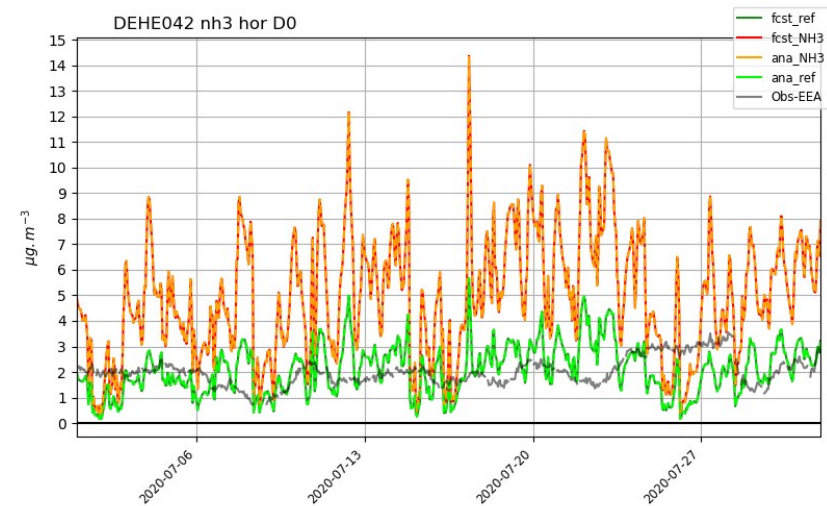
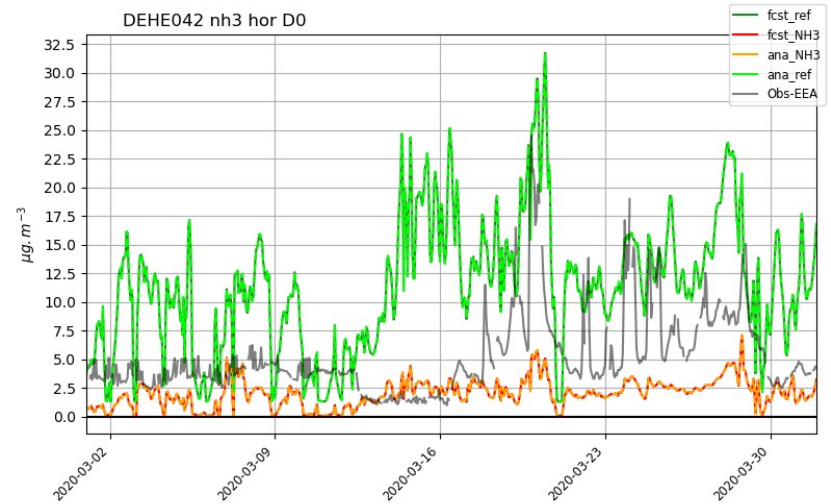


# NH<sub>3</sub> emissions - Impacts on NH<sub>3</sub>



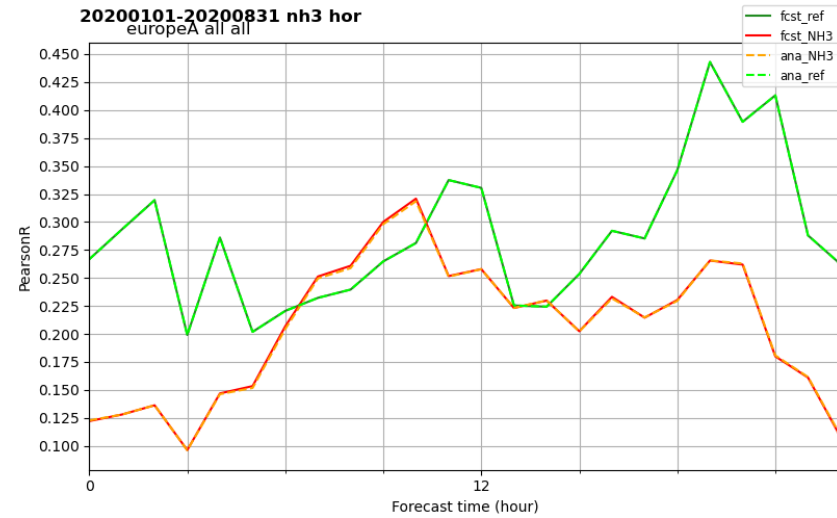
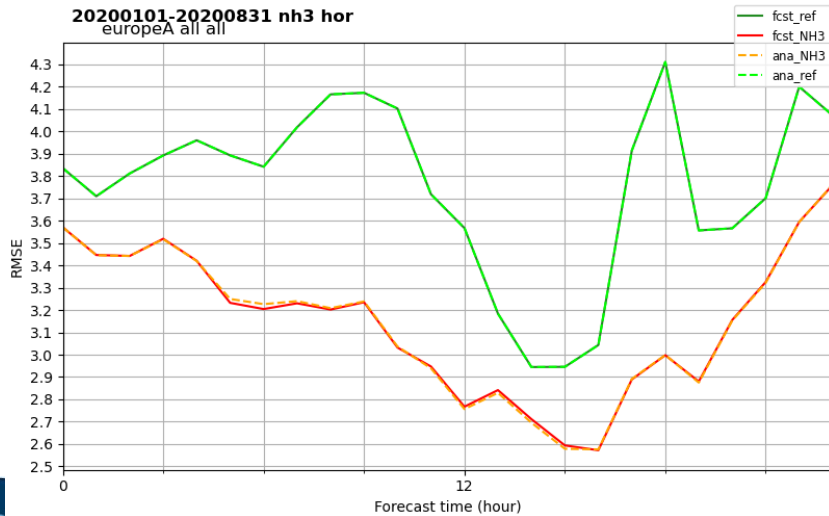
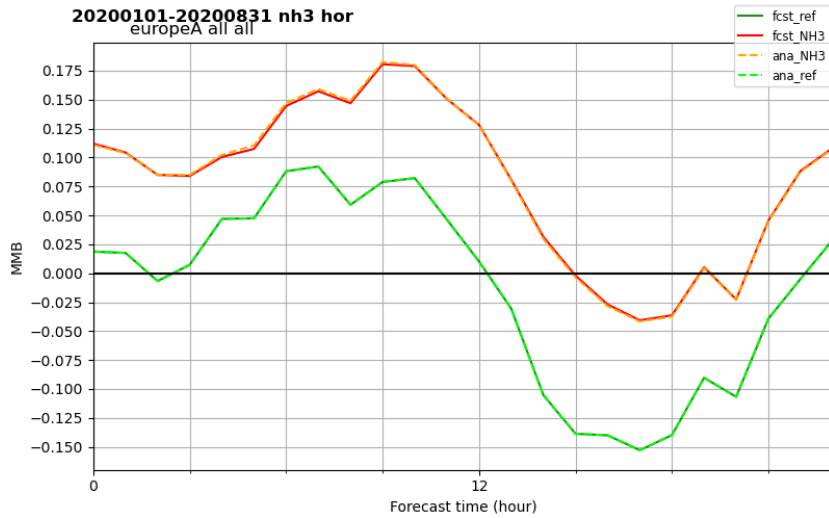
Number of stations : 6

Very few stations on EEA database

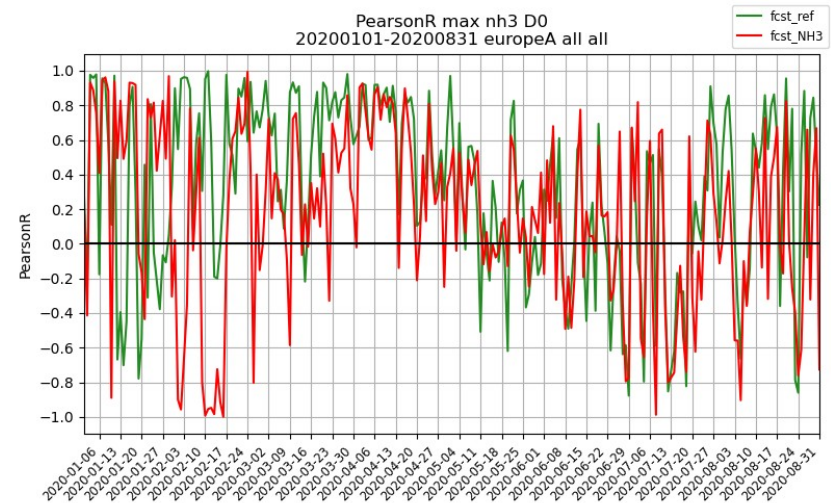
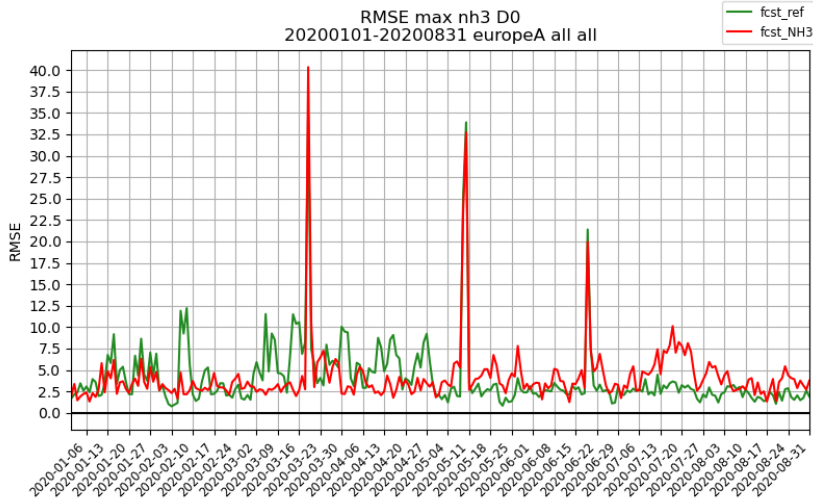
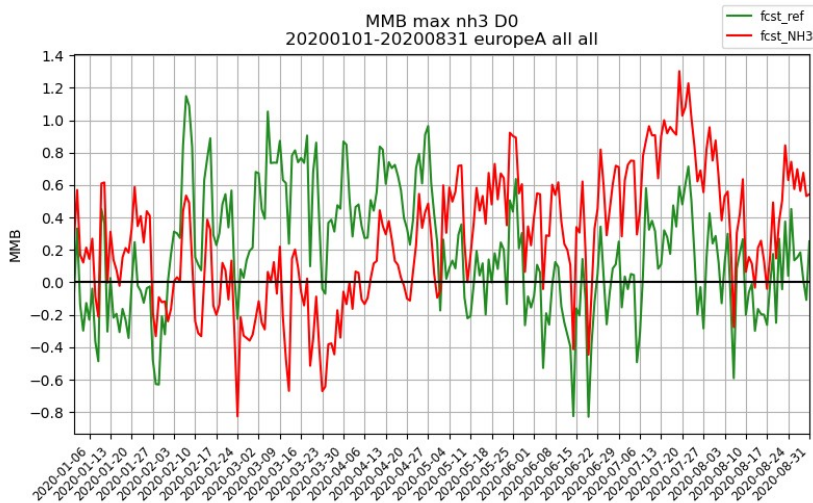




# NH<sub>3</sub> emissions - Impacts on NH<sub>3</sub>

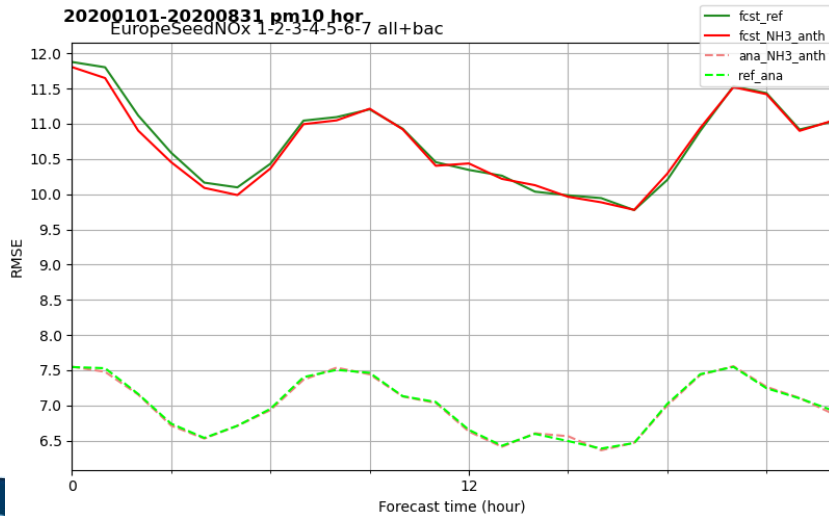
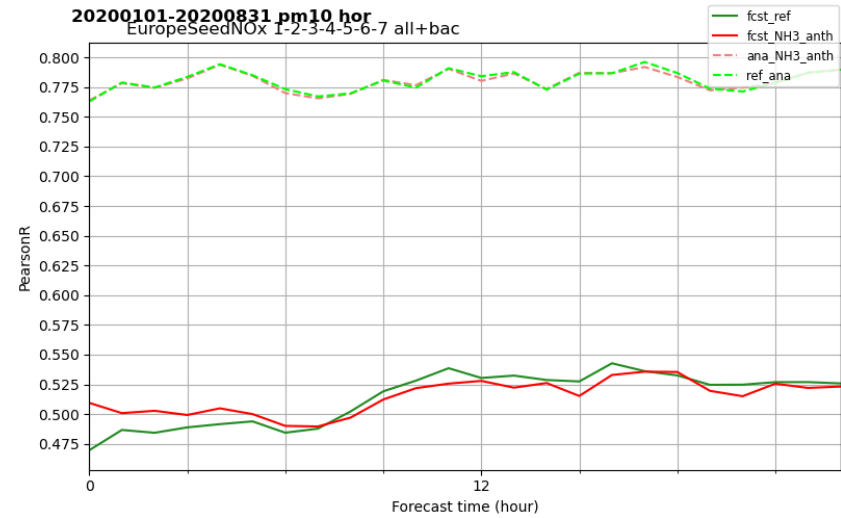
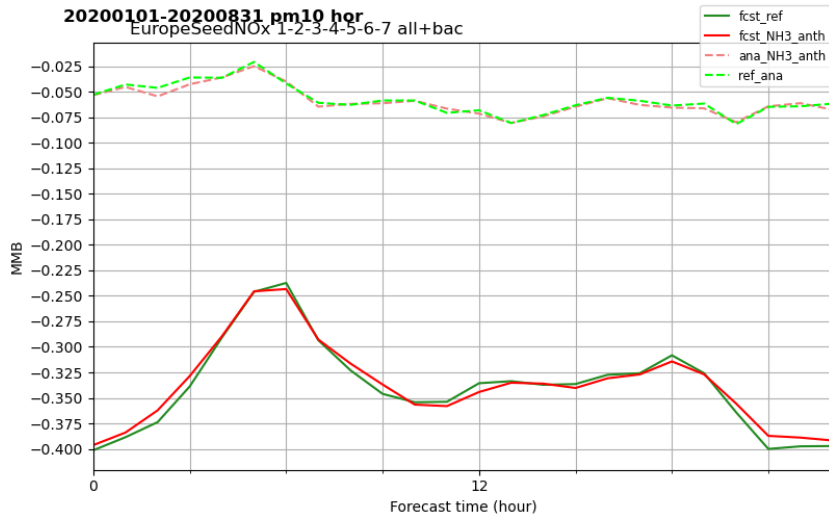


# NH<sub>3</sub> emissions - Impacts on NH<sub>3</sub>



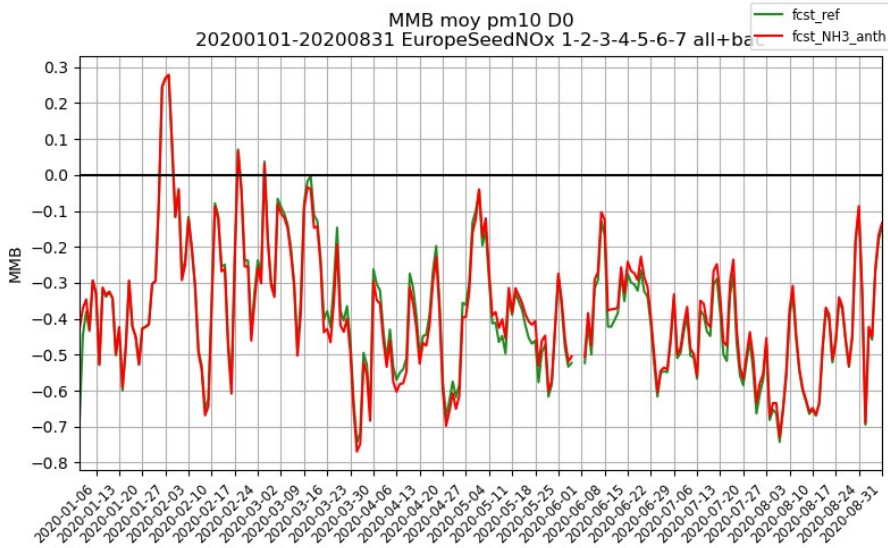
Lower biases during spring, higher during summer

# NH<sub>3</sub> emissions - Impacts on PM

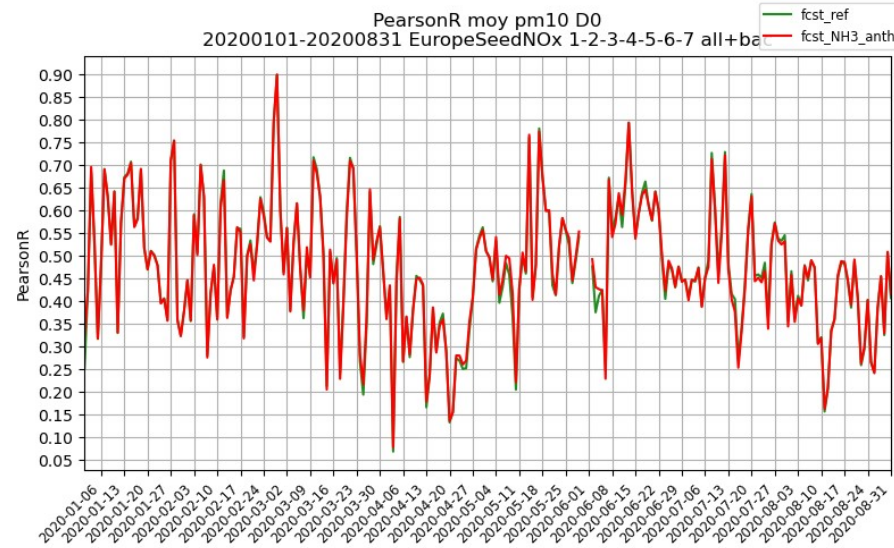


# NH<sub>3</sub> emissions - Impacts on PM

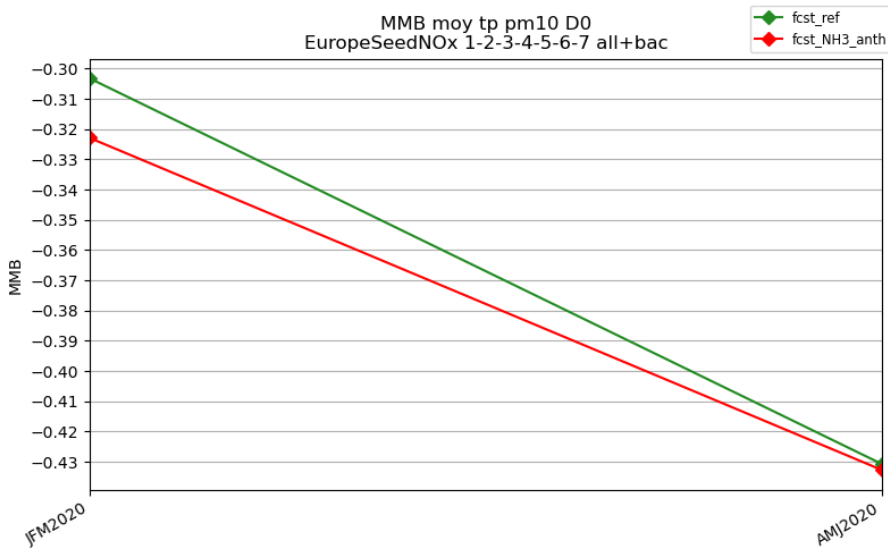
MMB moy pm10 D0  
20200101-20200831 EuropeSeedNOx 1-2-3-4-5-6-7 all+ba



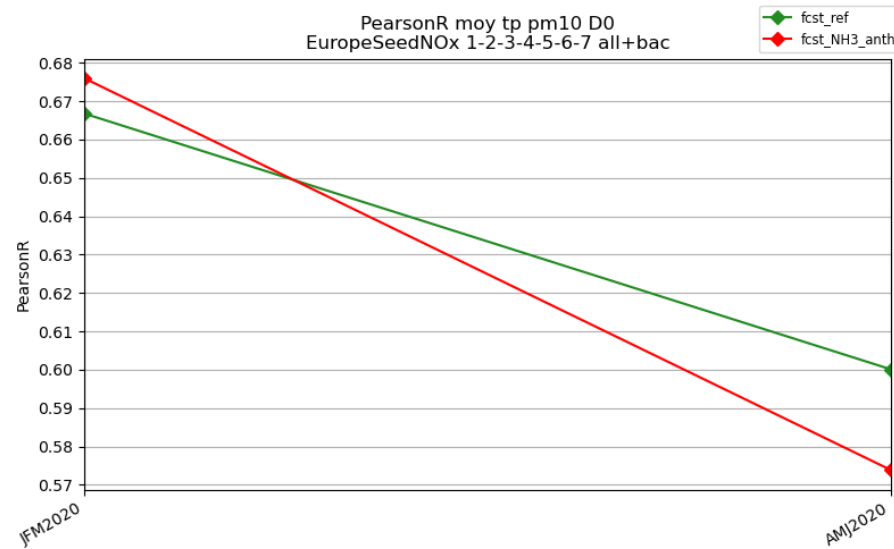
PearsonR moy pm10 D0  
20200101-20200831 EuropeSeedNOx 1-2-3-4-5-6-7 all+ba



MMB moy tp pm10 D0  
EuropeSeedNOx 1-2-3-4-5-6-7 all+ba

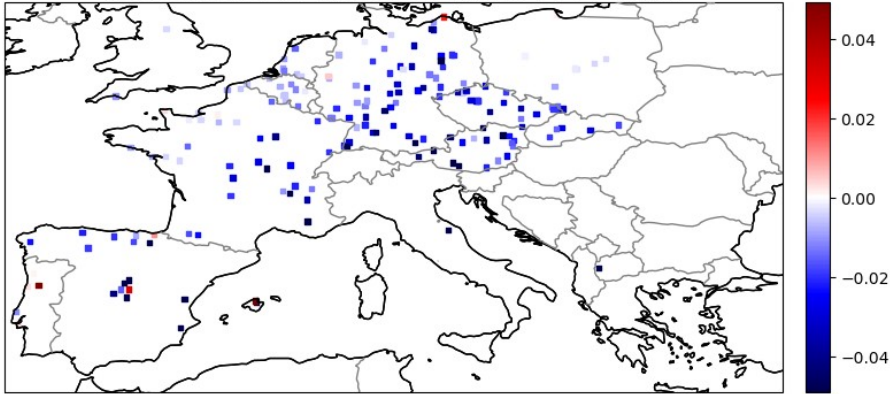


PearsonR moy tp pm10 D0  
EuropeSeedNOx 1-2-3-4-5-6-7 all+ba



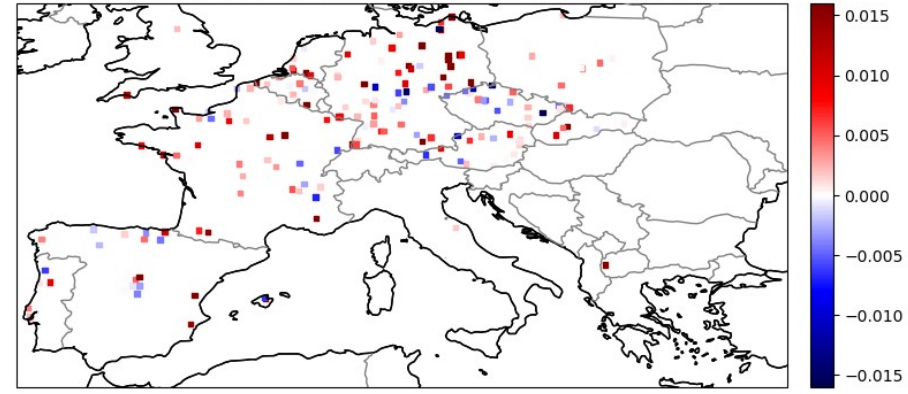
# NH<sub>3</sub> emissions - Impacts on PM

MMB max pm10 fcst\_ref-fcst\_NH3\_anth D0  
20200315-20200430 EuropeSeedNOx 1-2-3-4-5-6-7 all+bac



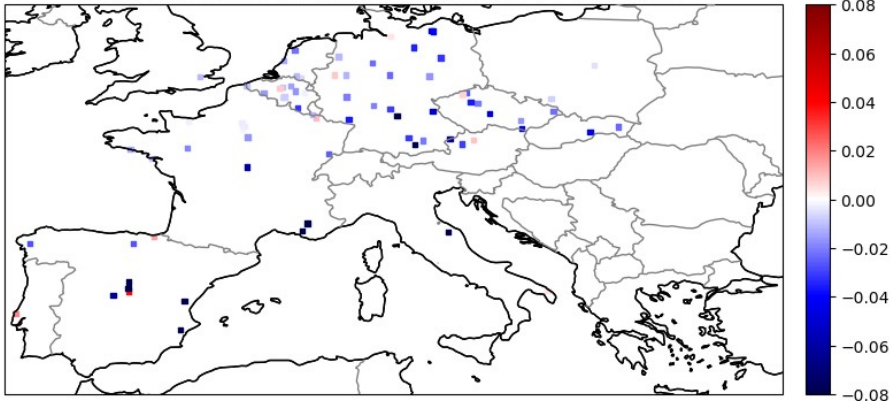
185 processed stations over 186  
min: -0.12, avg: -0.02, max: 0.06

PearsonR max pm10 fcst\_ref-fcst\_NH3\_anth D0  
20200315-20200430 EuropeSeedNOx 1-2-3-4-5-6-7 all+bac



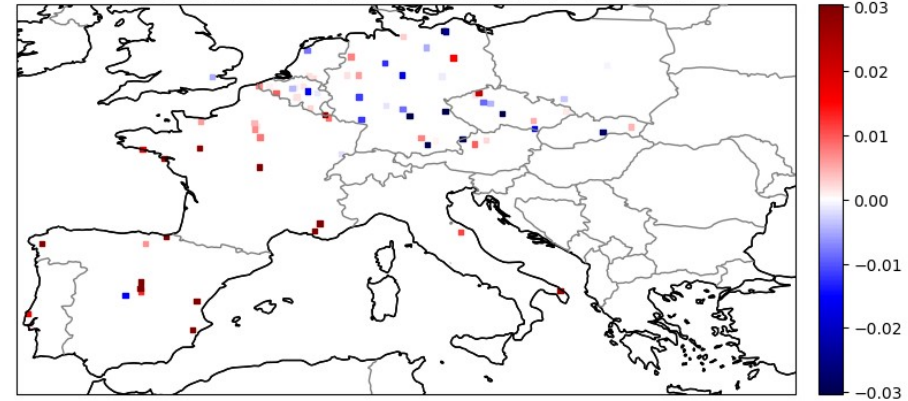
185 processed stations over 186  
min: -0.02, avg: 0.0, max: 0.05

MMB max pm25 fcst\_ref-fcst\_NH3\_anth D0  
20200315-20200430 EuropeSeedNOx 1-2-3-4-5-6-7 all+bac



80 processed stations over 83  
min: -0.19, avg: -0.03, max: 0.04

PearsonR max pm25 fcst\_ref-fcst\_NH3\_anth D0  
20200315-20200430 EuropeSeedNOx 1-2-3-4-5-6-7 all+bac



80 processed stations over 83  
min: -0.06, avg: 0.01, max: 0.1

## Conclusions and perspectives

Difficult to analyze due to very few measurement stations for  $\text{NH}_3$

=> statistics have to be taken with care!

=> limited impact on PM (PM10 or PM2,5)

=> check MOCAGE  $\text{NH}_3$ /PM conversion

Check with other measurement network

=> EMEP, but mainly daily values, not hourly