

Approach to numerical modelling of oxidative potential with SILAM CTM

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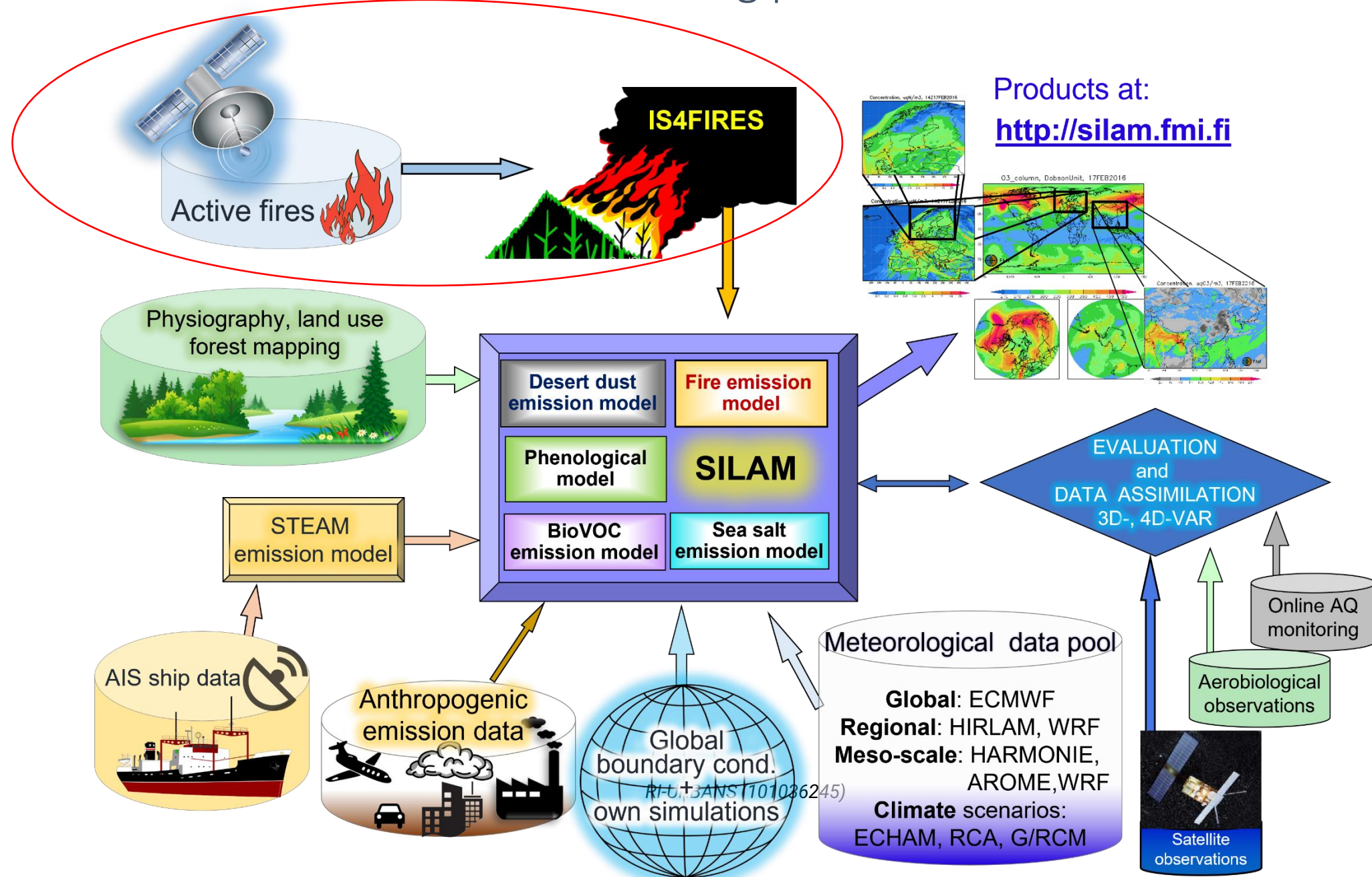
Outline

- Introduction
- Bottom-up OP modelling
- SILAM AQ forecast
- VFSP-WASE fire smoke
- Outcome this-far and questions to answer

OP modelling with SILAM

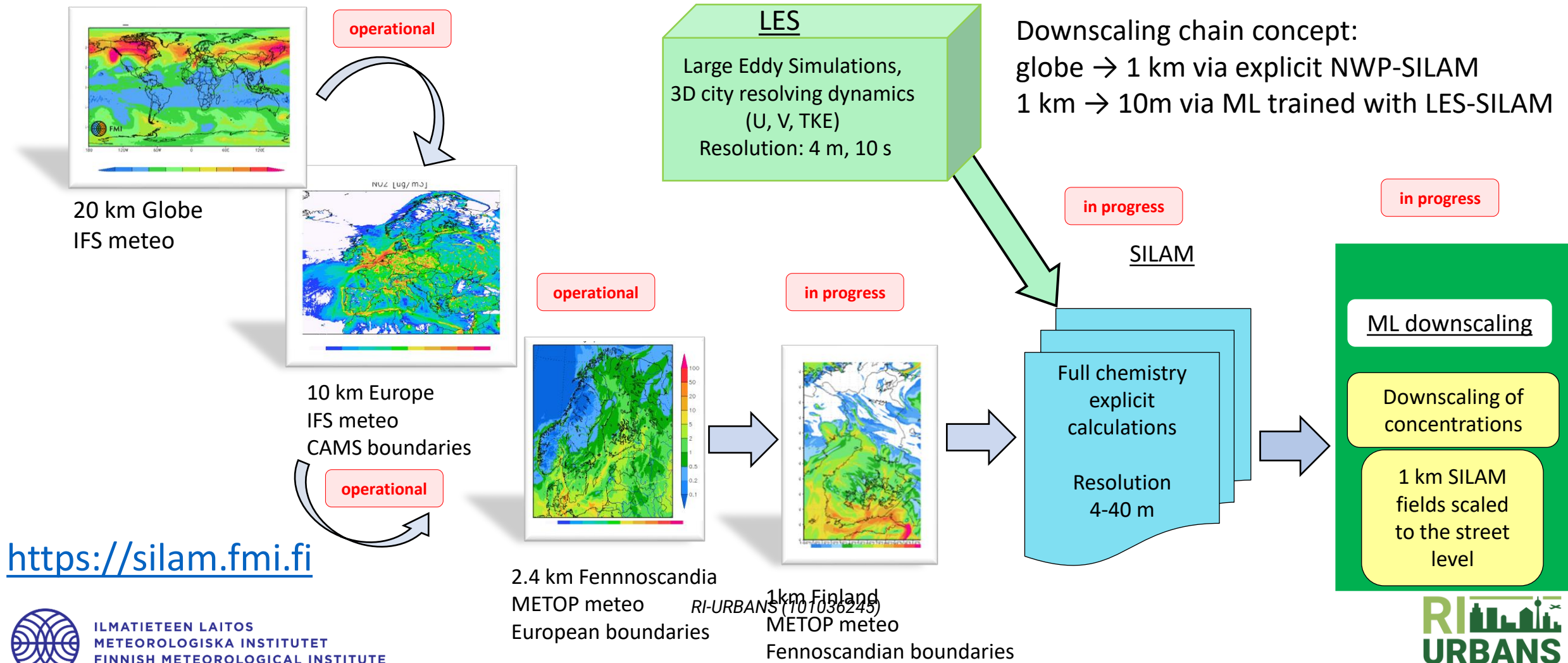
- Bottom-up, species-based
- Input:
 - SILAM operational AQ forecasts
<https://silam.fmi.fi> – globe, Europe, Fennoscandia, Finland
 - IS4FIRES-SILAM fire smoke predictions
<https://vfsp-wase.fmi.fi> - Eurasia, Europe, <https://silam.fmi.fi> – globe
- OP scaling factors from two assays (Weber et al, ACP, 2021):
 - DTT (dithiothreitol)
 - AA (ascorbic acid)

SILAM AQ assessment and forecasting platform



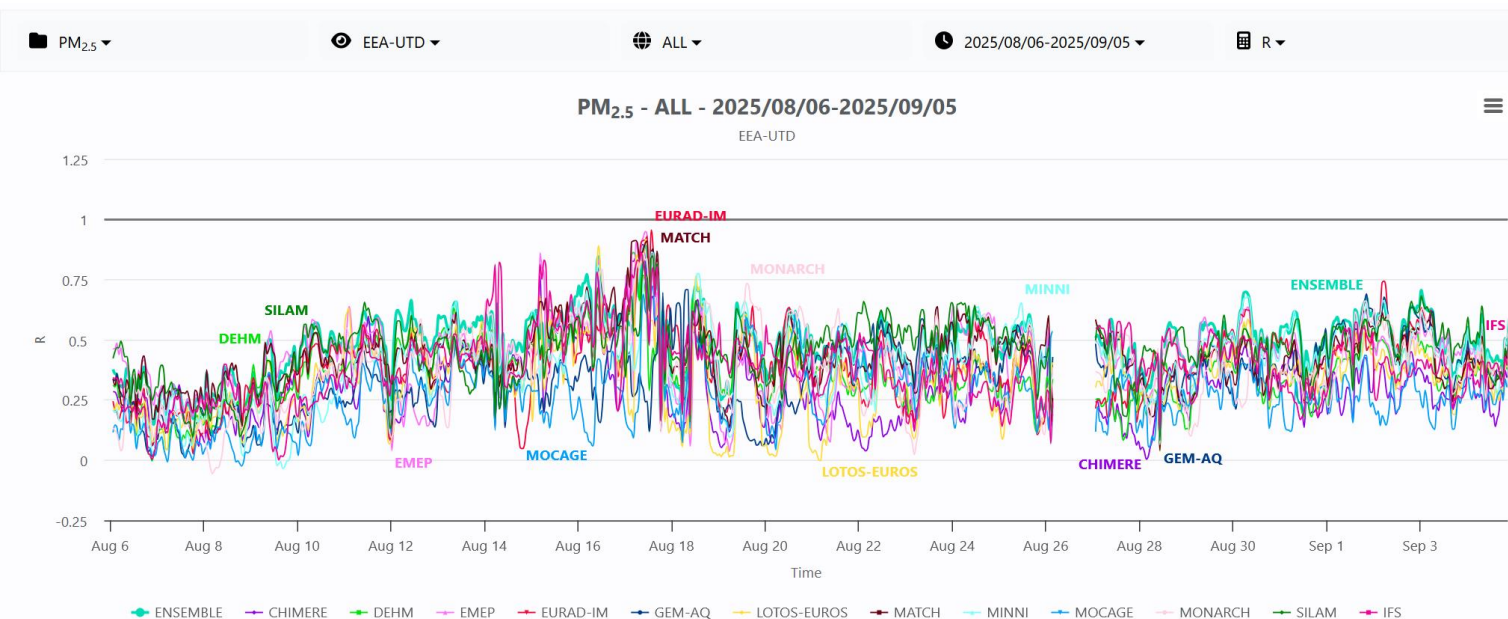
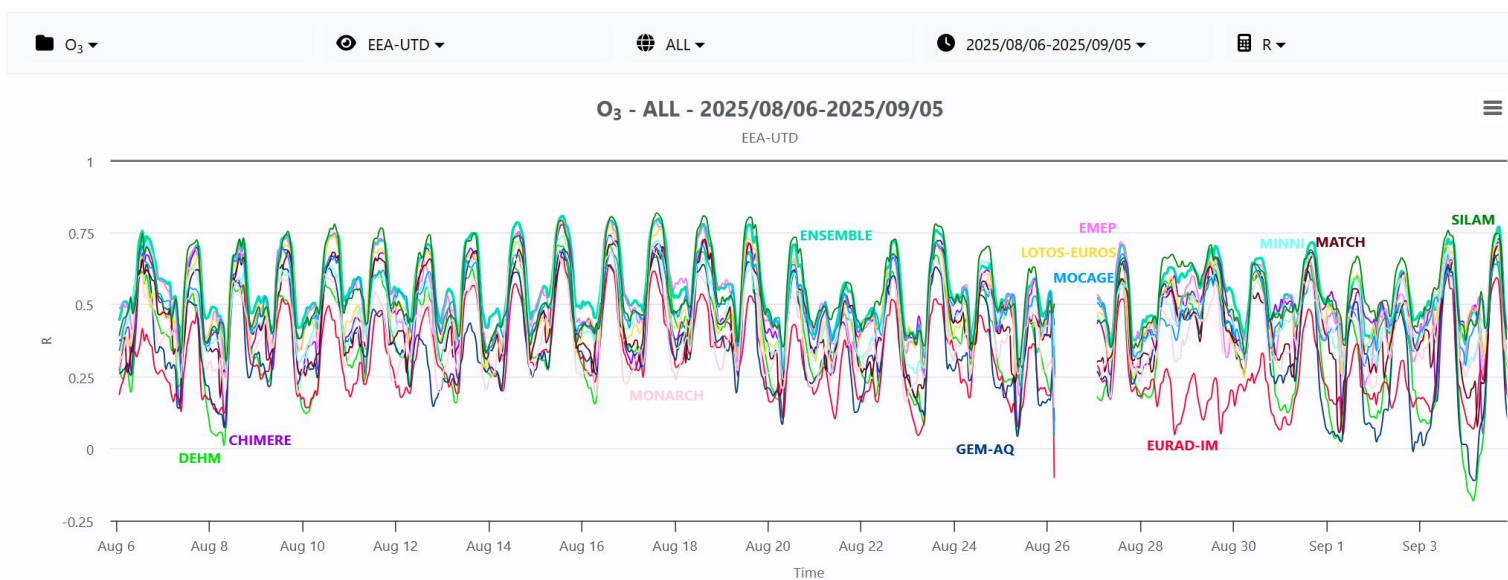
CAMS NCP Finland. SILAM downscaling chain

SILAM forecasting suites



SILAM quality control

- Independent
 - CAMS European evaluation
 - WMO GAFIS
 - North American
 - Asian
 - WMO SDS-WAS dust
 - Sahara + South Europe
 - Asia
 - ICAP PM, AOD
- Regional (partly) independently running SILAM copies
 - **AQ**: Kazakhstan, Moscow region, India, Vietnam, Tanzania (TMA), Rwanda (REMA/MeteoRwanda), Indonesia, Macedonia (zoom from Europe), Kyrgyzstan (zoom from Europe)
 - **Pollen**: Austria, Belgium, Bavarian ePin, the Hague
- Own
 - In-situ: Europe, global (offline; online in progress)
 - Aeronet global, offline
 - Satellites globe (online)



CAMS – Europe, 2025

GAFIS – US+Canada, 2025 Q2

Multi Model Air Quality Performance Indices (AQPI)

Domain: NAQFC–RAQDPS intersection (Southern Canada and cont. US)

Agency	System	O ₃			NO ₂			PM _{2.5}		
		Apr	May	Jun	Apr	May	Jun	Apr	May	Jun
ECCC	RAQDPS	87	89	89	70	73	72	57	63	66
NOAA	NAQFC	86	88	87	-	-	-	64	65	75
ECMWF	IFS-CAMS	90	90	87	70	71	69	59	63	74
NASA	GEOS-CF	84	83	78	62	59	57	35	37	52
FMI	IFS-SILAM	88	89	87	68	69	66	65	71	65

Legend	AQPI (%)
Excellent	[90, 100]
Very Good	[80, 89]
Good	[70, 79]
Acceptable	[60, 69]
Poor	[50, 59]
Very Poor	≤ 49

2025 Q2 (Apr, May, Jun)

$$AQPI[O_3, NO_2, PM_{2.5}] = 100 \cdot \text{avg}[FAC2, R, 1 - |MFB/2|]$$

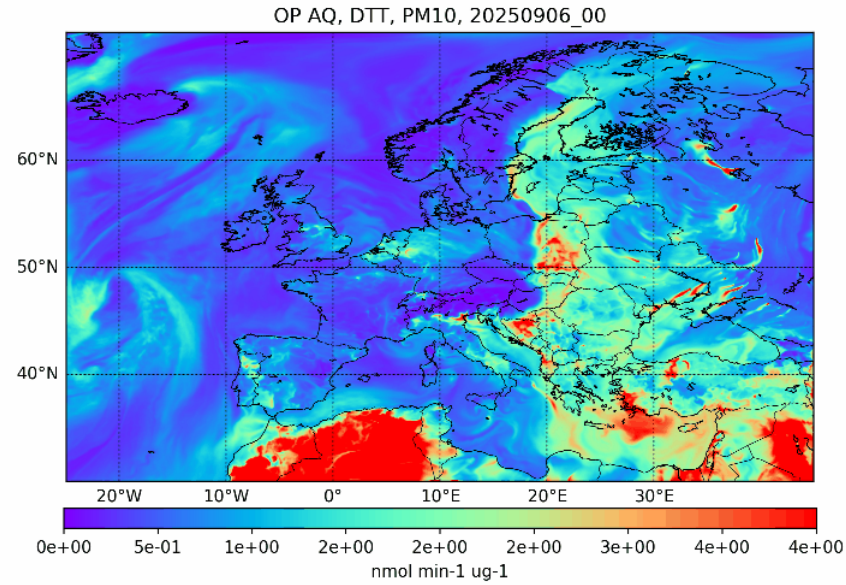
Outcome

- OP for Europe

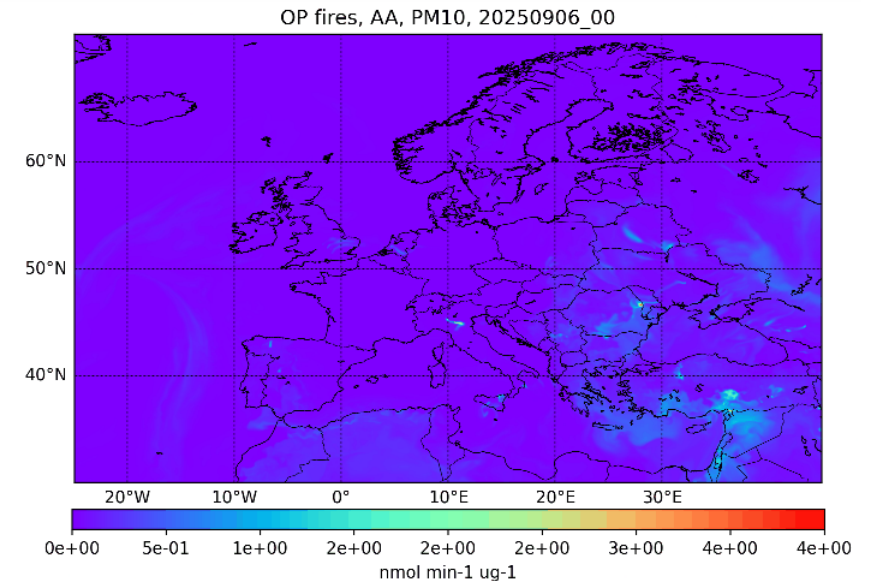
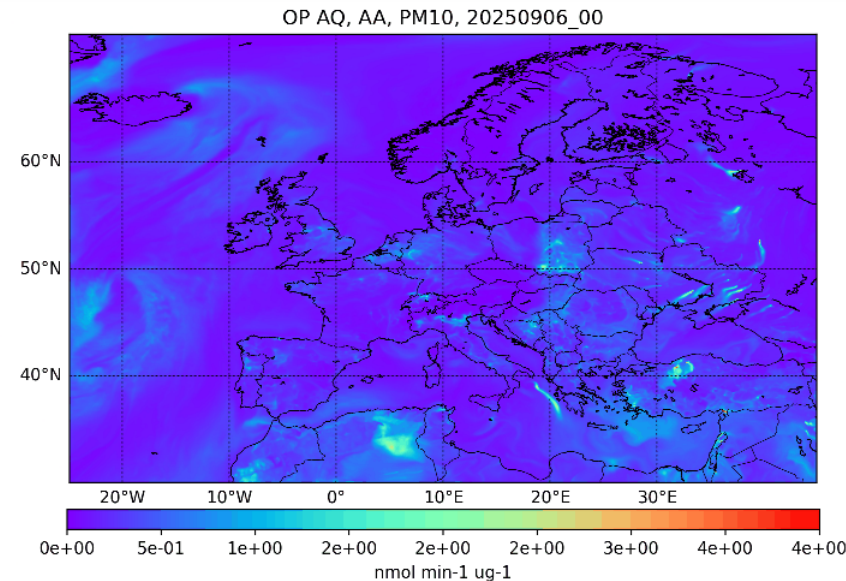
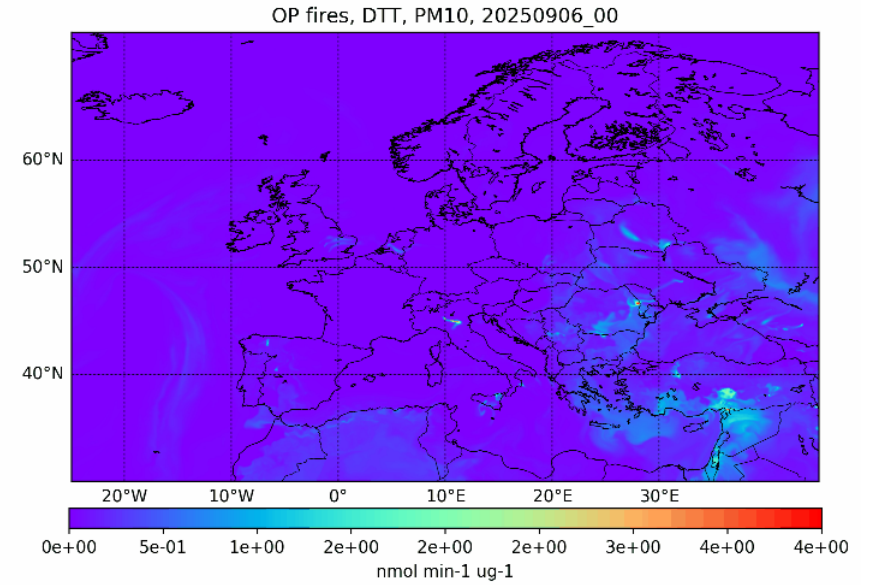
- DTT factors,
- PM₁₀

- AA factors,
- PM₁₀

AQ with no fire-specific scaling

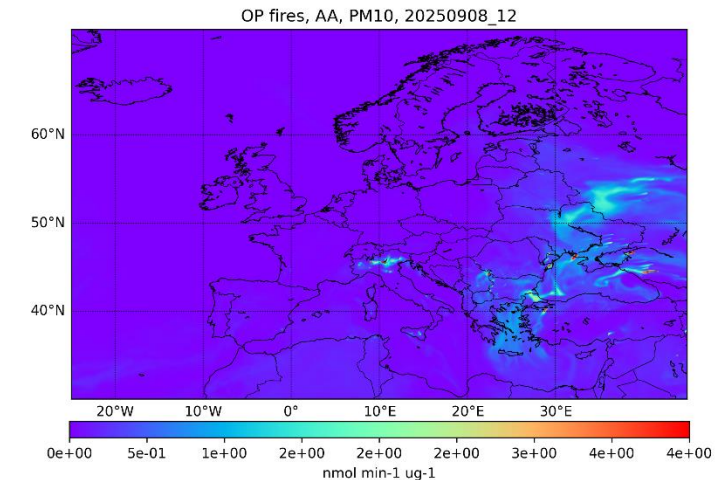
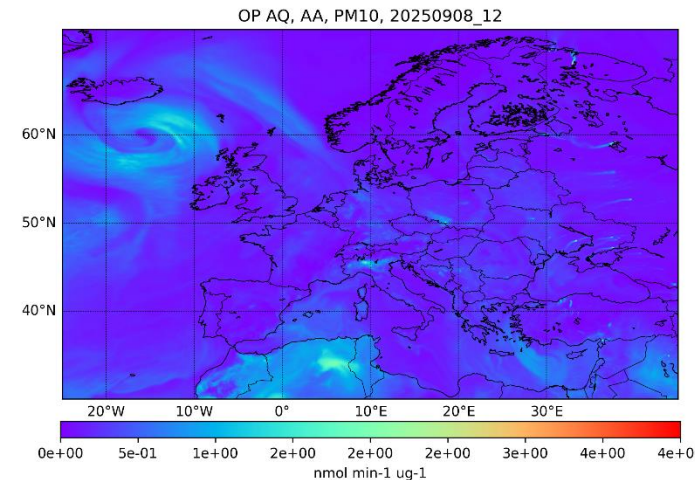
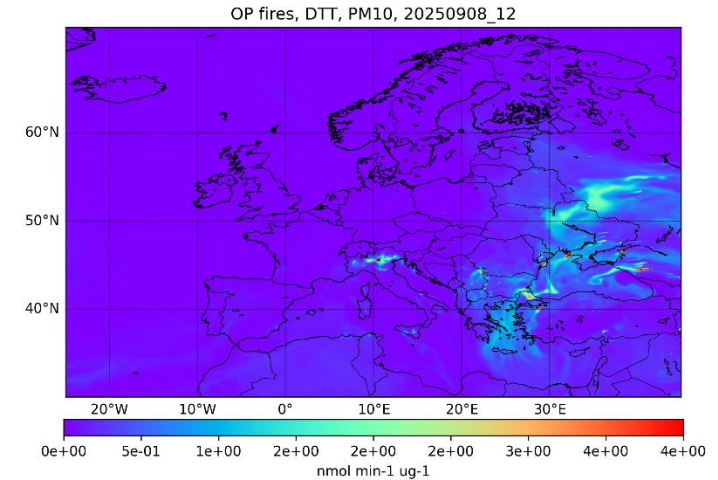
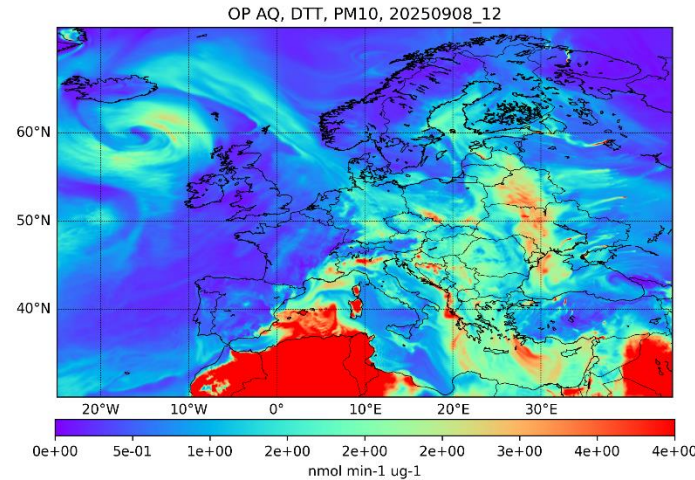


Fire smoke from VFSP-WASE



Questions to answer

- DTT or AA or ...?
- Evaluation ?
 - AQ and fires forecasts, NRT, retrospective
 - OP direct, retrospective
- Tagging ?
 - Fire smoke from VFSP-WASE
 - EC from diesel exhaust
 - Dust, sea salt
 - Primary biogenic particles
 - Secondary aerosols of all kinds



Thank you!

