Modelling and prediction of daily, pan-European estimates of PM2.5 and PM10 based on Quantile Machine Learning applied to different mode Aerosol Optical Depth and reanalysis data from 2003-2020

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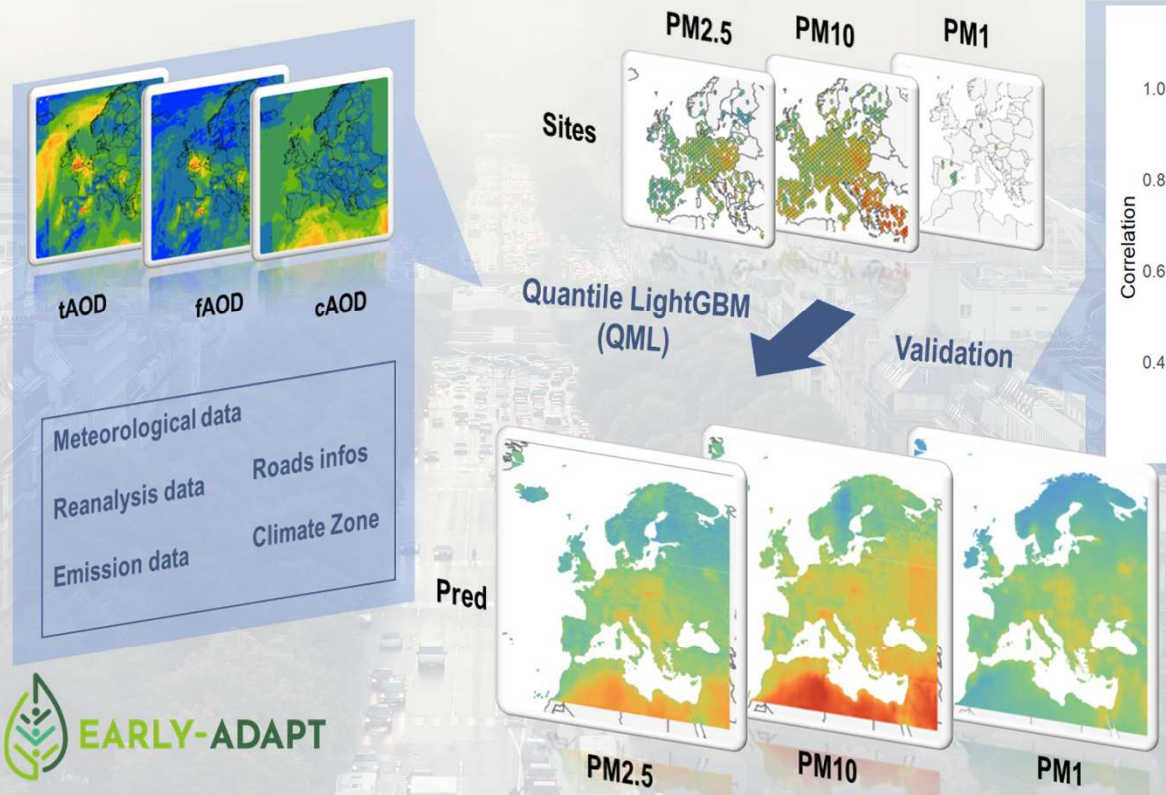
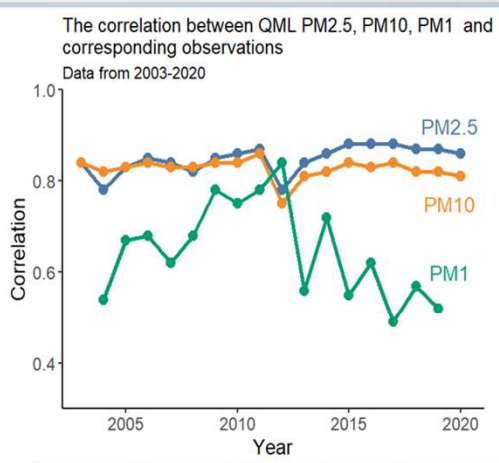
Introduction:

- Epidemiological studies conducted in Europe typically rely on ground-level daily measurements of air pollutants.
- Uneven distribution and discontinuous daily measurements of ground-level sites pose a significant challenge.

Method:

- utilizes Aerosol Optical Depth (AOD) componential products (fAOD and cAOD)
- distance-weighted loss functions that assign a higher penalty weight to places with fewer sites.
- generated 18-year daily estimates and 95% predictive intervals using this method.





Results:

- PM2.5, PM10, and PM1 models achieved an out-of-sample r-squared (R2) of 0.69, 0.63, and 0.49
- outperformed PM2.5 and PM10 estimates from CAMSRA (R2 = 0.25-0.35) and MERRA-2 (R2 = 0.22-0.33).
- opens up new avenues for conducting large-scale, high-resolution epidemiology studies.

More details, Pls Scan it!