## Regional-Scale Air Pollution Source Identification Using Backward **Particle Dynamics**



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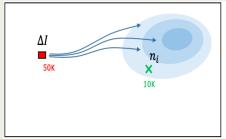
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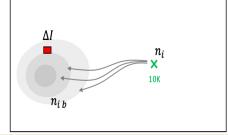


- The algorithm localizes the source and estimates intensity over time.
- We make use of the weather regional forecast model WRF for airflow simulation and of Lagrangian particle dispersion simulation software FLEXPART-WRF for pollution advection simulation both forward and backward in time.
- Our algorithm produces the semi-empirical heatmap of possible pollution source locations with marked point of the biggest probability and estimative emission intensity at this point as a function of time.

The algorithm is tested on several semi-synthetic and practical real cases and compared with other

solutions in this field.



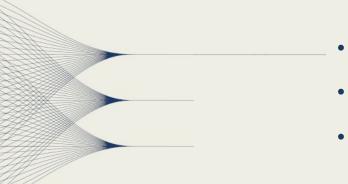


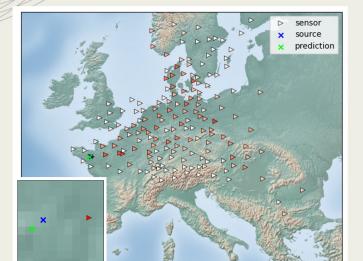
ttps://remon.irc.ec.europa.eu/Past-Activities/ETEX-subsite 1] Wang, Jilin, et al. "Inversion method for multi-point source pollution identification: Sensitivity analysis and application to European Tracer Experiment data." Atmospheric and Oceanic Science Letters (2022) [2] Zhao, Yungang, et al. "Source Reconstruction of Atmospheric Releases by Bayesian Inference and the Backward mospheric Dispersion Model: An Application to ETEX-I Data." Science and Technology of Nuclear Installations (2021) [3] Andronopoulos, Spyros, and Ivan V. Kovalets, "Method of source identification following an accidental release at an unknown location using a lagrangian atmospheric dispersion model." Atmosphere (2021) [4] Tomas, Jasper M., et al. "Detection of radioactivity of unknown origin: Protective actions based on inverse

\*)Marija Filippova, Oleg Bakhteev, Fedor Meshchaninov, Evgeny Burnaev, Vladimir Vanovskiy. Regional-Scale Air Pollution Source Identification Using Backward particle dynamics. Atmospheric Environment, 2025.

Algo	Distance, km	Time, IOU
Our	6.4	0.57
[1]	4.7	-
[2]	66.7	-
[3]	108	0.57
[4]	156	-









modelling," Journal of environmental radioactivity (2021)