

MEEP Report

Project: 1431

Project title: Mapping effects of environmental policies (MEEP)

Principal investigator: Moritz Drupp

Report period: 2025-05-01 to 2026-04-30

Global ERA5 dataset of meteorological instruments and controls

Building on the European 1 km inversions dataset assembled in the first project year, the second year shifted scope to a global analysis at 0.25° resolution over land, working from ERA5 reanalysis. The motivation is twofold: extending the geographic scope to estimate pollution costs globally rather than only across Europe, and moving towards a combined instrument that draws on temperature inversions, planetary boundary layer height, and wind direction simultaneously.

The processed dataset comprises:

- temperature inversions for 1999-2022, detected from hourly multi-level pressure data via the gradient $(T_{\text{upper}} - T_{\text{surface}})/(P_{\text{upper}} - P_{\text{surface}}) < 0$, evaluated at four pressure-difference thresholds below mean surface pressure (25, 50, 100, 200 hPa)
- planetary boundary layer height
- wind speed and wind direction
- meteorological control variables: relative humidity, total precipitation, surface pressure, total cloud cover, 2 m temperature

Daily-resolution outputs cover 1998-2023; monthly aggregates cover 1991-2020. Reference percentiles for 1991-2020 are computed for normalisation. Statistical indicators include mean, median, standard deviation, maximum, minimum, percentile counts for boundary-layer height, temperature and wind-direction bin counts, and quintile counts for the control variables.

Auxiliary global covariates

Two further global datasets were processed and regridded to the same 0.25° grid for direct merging with the econometric panel:

- ESA WorldCover remote-sensing land-cover data
- the NASA SEDAC Global Subnational Atlas of Deprivation Index

Resource usage

Computing time used: **759 node hours** (out of 4000 requested). /work storage used: **7.46 TB** (out of 15 TB requested).

The lower-than-planned utilisation reflects the move from 1 km European to 0.25° global

processing, which is less storage-intensive per grid cell while covering a much larger area, and a re-prioritisation of analyses described in the accompanying extension request.

Publications

No publications during the reporting period. The data publication on WDCC remains a project goal but is not yet ready for submission.