

Land-use change emission capabilities with the NASA LPJ-Earth Observation Simulation model (LPJ-EOSIM)

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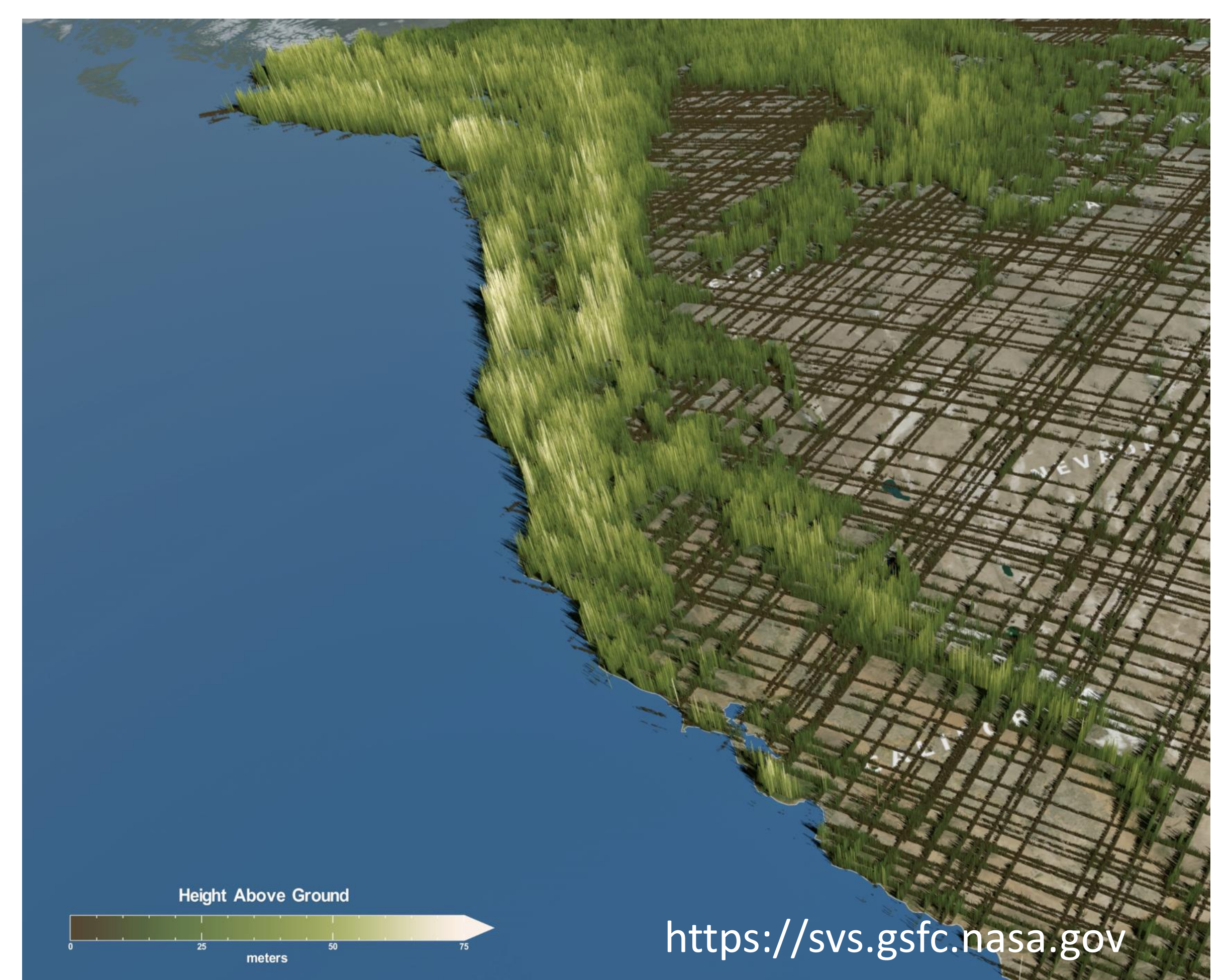
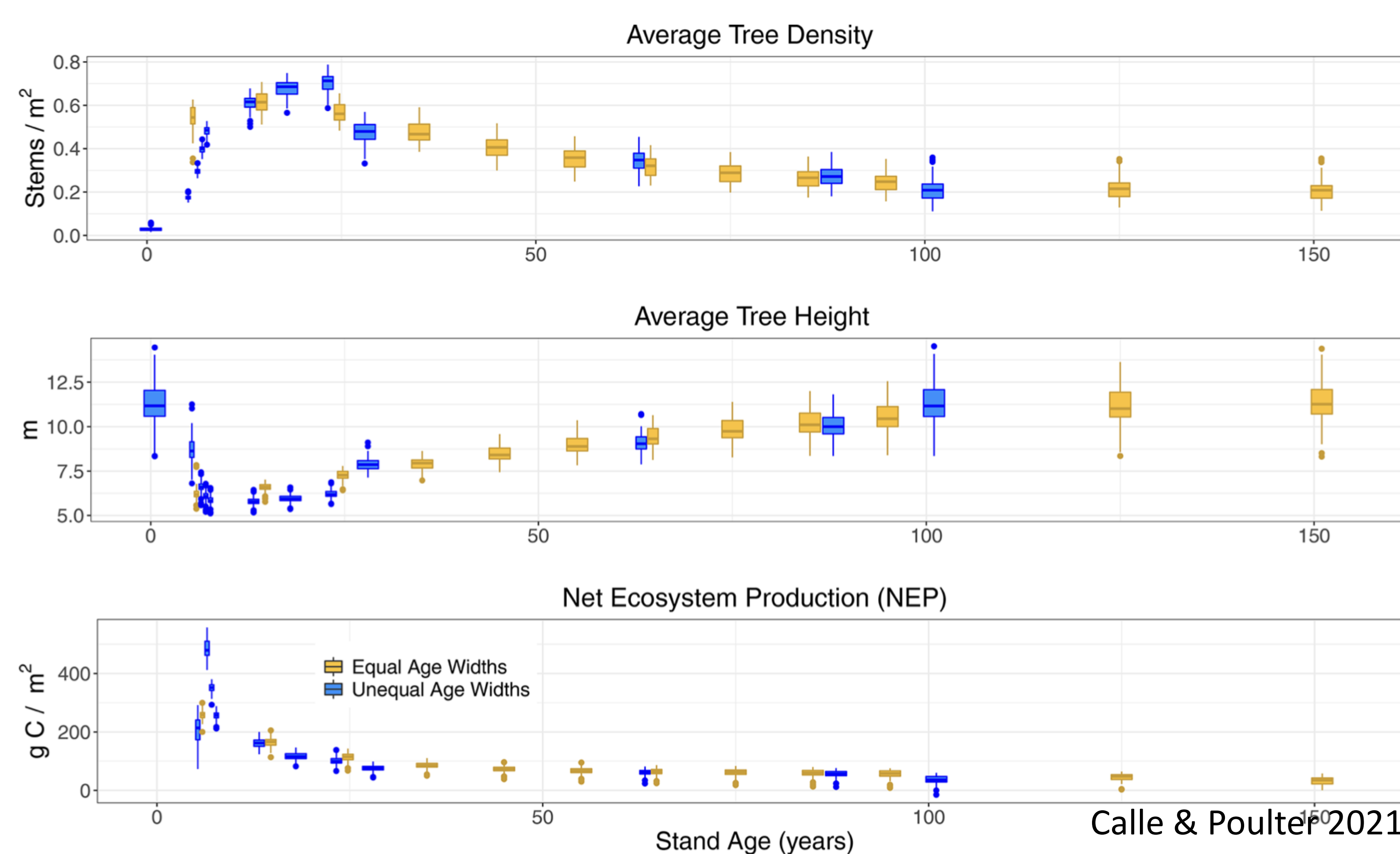
Process-representation of land use emissions

Motivation

- LPJ-EOSIM represents as complete set of land use and land-cover change emission and removal processes as possible to answer:
 - What are the emissions and removals of CO₂ during and following **land-use transitions**?
 - What are the harvested crop and wood **product pools and fluxes**?
 - How does **forest stand age** affect trends, variability and status of the land carbon sink?
- Applications
 - LPJ-EOSIM has contributed land carbon fluxes to **TRENDY** V1 through V13, as well as in the REgional Carbon Cycle Assessment and Processes study (**RECCAP** 1 and 2).
 - Factorial simulations of LPJ-EOSIM have been used to estimate **loss of additional sink capacity** (LASC) to help reconcile land cover change emission estimates.
 - An ensemble of LPJ-EOSIM net-biome production datasets are available in **near-real time** at www.earth.gov/ghgcenter using climate reanalyses & the **Land-Use Harmonization** product.

Key Results

LPJ forest carbon age dynamics (left) and Global Ecosystem Dynamics Investigation (right)



Ongoing research

- Integration of satellite derived biomass information to optimize model initialization and to calibrate forest regrowth data
- Evaluation of LPJ-EOSIM forest age with the Global Forest Age Database (GFAD) and to support mature and old-growth forest mapping initiatives

References

Calle, L. and Poulter, B.: Ecosystem age-class dynamics and distribution in the LPJ-wsl v2.0 global ecosystem model, *Geosci. Model Dev.*, 14, 2575–2601.
 Friedlingstein, P., et al.: Global Carbon Budget 2023, *Earth Syst. Sci. Data*, 15, 5301–5369, <https://doi.org/10.5194/essd-15-5301-2023>, 2023.