



reccap-2

ESA Climate Space – RECCAP2

Project Scientific highlights (PSH) 30 06 2026

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Article published in National Science Reviews, June 2026

Ritter, F., Ciais, P., Senf, C., Santoro, M., Xu, Y., Pelissier-Tanon, A., Schwartz, M., Fayad, I., Carvalhais, N., Brandt, M., Fensholt, R., Besnard, S., & Avitabile, V. (2026). *Alarming decline in the carbon sink of European forests driven by disturbances*. **National Science Review**. <https://doi.org/10.1093/nsr/nwag354>

This study provides the first observation-constrained, high-resolution assessment of the future evolution of the European forest carbon sink by integrating ESA Climate Change Initiative (CCI) Biomass products, satellite-derived disturbance maps, and national greenhouse gas inventories. The results reveal that Europe's forest carbon sink is projected to decline by **39% between 2010 and 2030**, primarily because increasing natural disturbances (fires, storms, bark beetles and drought-related mortality) and continued harvesting are outpacing forest recovery. Under current trends, the EU-27 forest sink is expected to fall **27% short of the carbon sequestration target required to meet the 2030 LULUCF objectives**. The study demonstrates that the EU commitment to plant three billion trees alone will be insufficient, and estimates that a **28% reduction in forest harvests from 2025 onwards** would be required to achieve the target under a business-as-usual disturbance regime.

The work showcases the value of **ESA Earth Observation products** for operational carbon-cycle monitoring. ESA CCI Biomass maps provided consistent continental-scale estimates of above-ground biomass, while satellite-derived disturbance datasets enabled spatially explicit modelling of biomass losses and recovery at **18 km resolution** across Europe. By combining these EO datasets with UNFCCC inventories in a novel data-driven carbon model (DDCM), the project delivers actionable information for climate policy, forest management, and monitoring of Europe's contribution to the global carbon budget. The study exemplifies the objectives of **ESA Climate Space RECCAP2** by advancing the integration of satellite observations into carbon budget assessments and improving our capacity to quantify how climate change and disturbances are altering the terrestrial carbon sink.

ESA is publishing a new story on CCI Website The paper had a good impact in the media

Article in press in Nature Geoscience, June 2026

Kowalski, K., Viana-Soto, A., Brandt, M., Ciais, P., De Keersmaecker, W., Fensholt, R., Pugh, T. A. M., Xu, Y., & Senf, C. (in press). *Accelerating biomass loss from forest disturbances across Europe*. **Nature Geoscience**.

This study delivers the **first spatially explicit, satellite-based quantification of aboveground biomass (AGB) losses from both natural disturbances and harvesting across all European forests** over the period 1985–2023. By integrating long-term Landsat disturbance observations with high-resolution biomass maps derived from Earth Observation, the study estimates that European forests lost **6.5 ± 0.8 Pg of aboveground biomass** during the last four decades. Most importantly, it reveals a **45.6% increase in biomass losses after 2018**, driven by climate-induced disturbances such as bark beetle outbreaks, windstorms and drought impacts occurring in Europe's biomass-rich temperate forests.

The study demonstrates that biomass losses are increasing faster than disturbance area alone would suggest. In particular, the sensitivity of biomass loss to disturbance has risen sharply in temperate forests since the mid-2010s, indicating that even relatively small increases in disturbance area can now produce disproportionately large carbon losses because disturbances increasingly affect forests with high biomass stocks. These findings provide new evidence that climate change is fundamentally altering disturbance regimes and weakening the capacity of European forests to function as an effective carbon sink.

The work highlights the unique contribution of **ESA Earth Observation** to continental carbon monitoring. By combining the European Forest Disturbance Atlas with high-resolution satellite-derived aboveground biomass products, the study establishes an operational framework for translating observed forest disturbances into biomass and carbon losses across

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Europe. These advances directly support the objectives of the **ESA Climate Space RECCAP2** project by improving observation-based assessments of forest carbon dynamics, strengthening the monitoring of disturbance impacts, and providing critical information for evaluating the resilience of Europe's forest carbon sink under accelerating climate change.

ESA is publishing a new story on CCI Website

Vanity Fair

The immodest coordinator of the project is [most cited climate scientist in the world](#) for what it is worth, from COSMOS Carbon Brief new database