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International research efforts on Carbon Dioxide Removal technologies: A Bibliometric Analysis 3rd International Conference on Negative CO₂ emissions

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Abstract

In order to understand the recent evolution of Carbon Dioxide Removal (CDR) research efforts we:

- Conducted a **systematic literature review** of 7,893 CDR research publications in 2012-2023 based on the search query in Minx et al. (2017, 2018)
- Examined **geographic distribution and contributors**
- Analyzed national and regional **funding allocation**
- Observed **collaborative patterns** and the formation of research communities

CDR research: what and where?

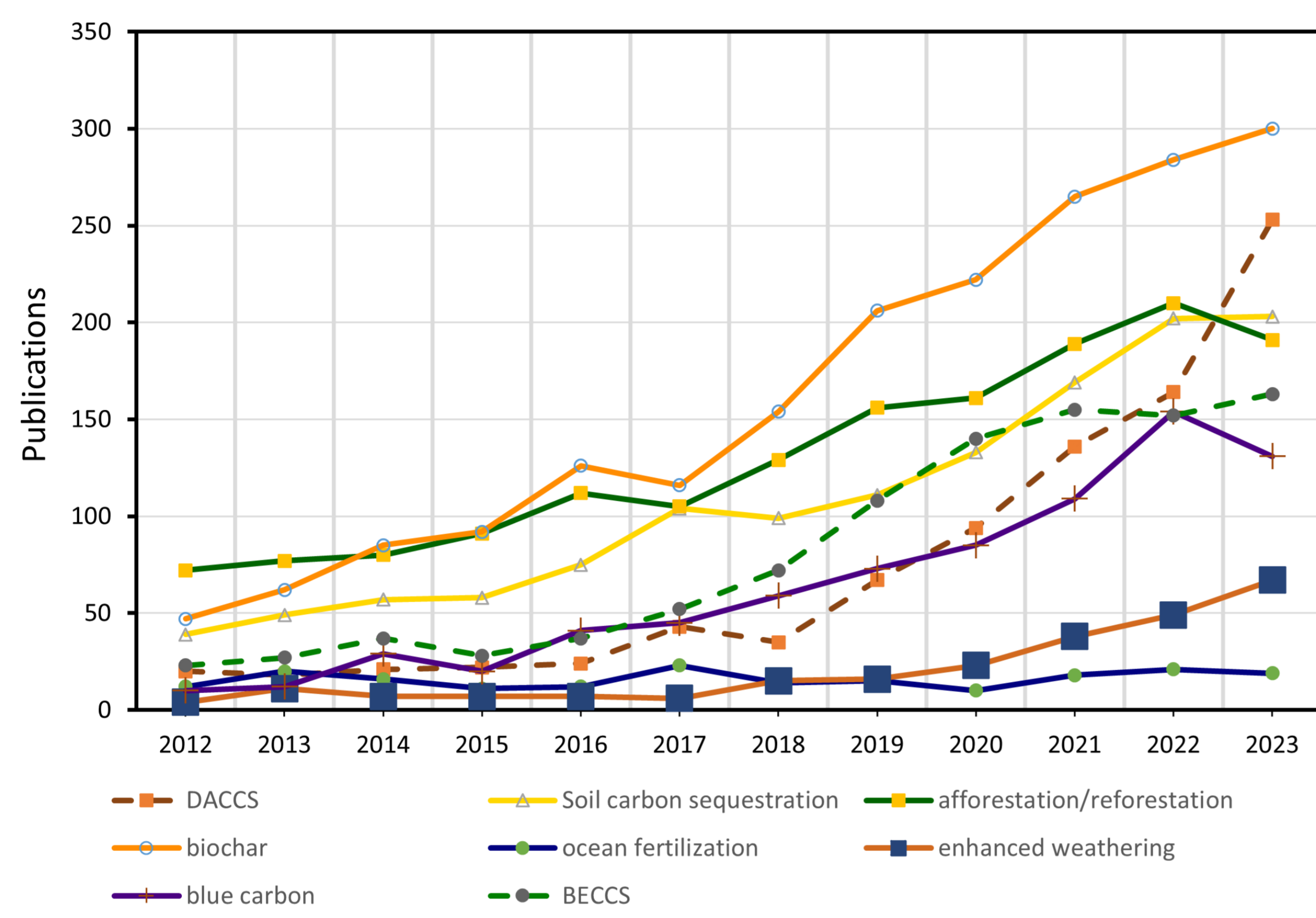


Fig. 1: Number of articles published per year for each type of CDR option

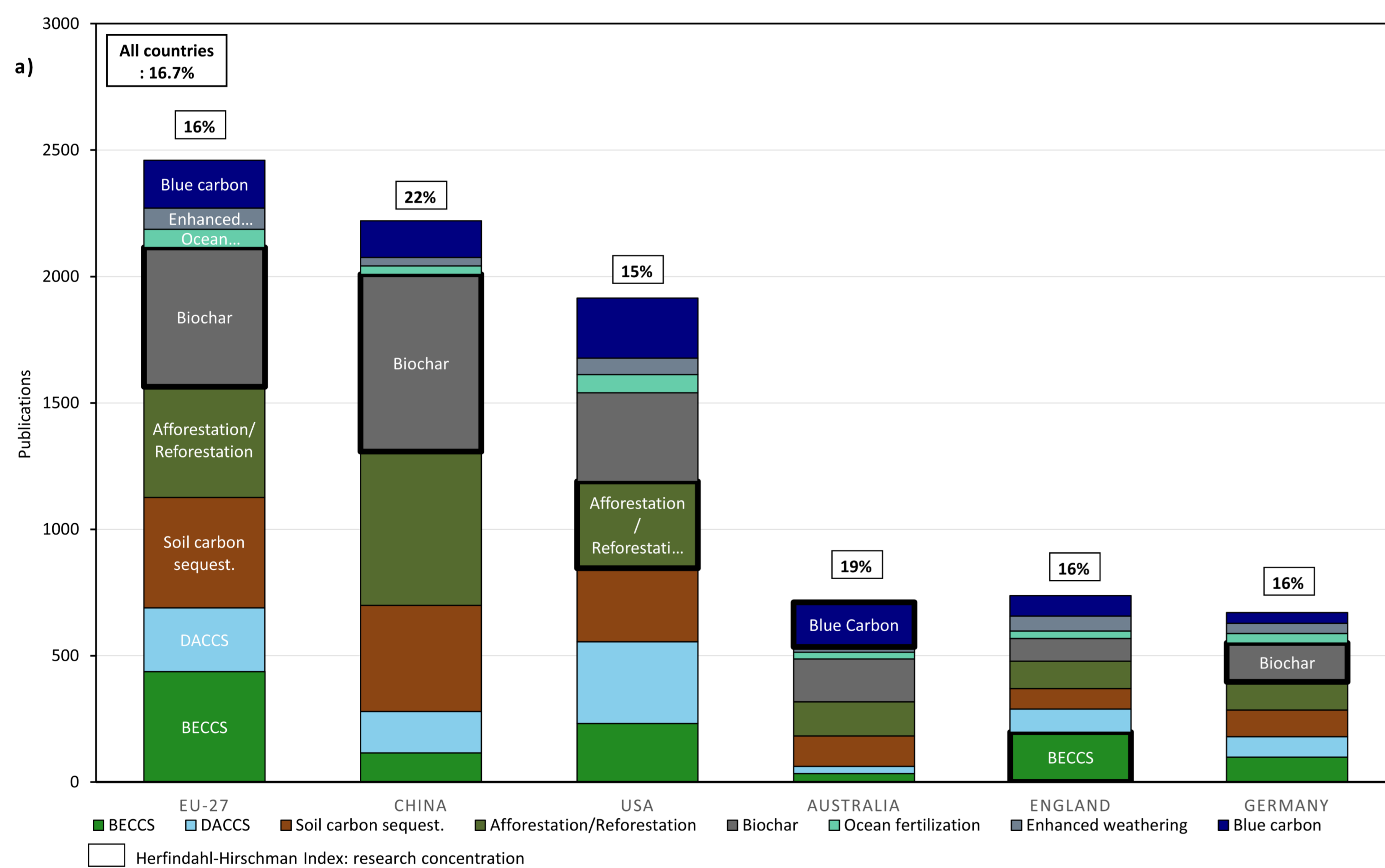


Fig. 2: Number of articles published per year for each type of CDR option in the top 5 publishing countries and EU-27.

Key findings

- Significant growth in CDR publications is observed after **2015** and **2018**, driven by **Europe, China, and the US**.
- **Biochar, afforestation/reforestation, and soil carbon sequestration** are among the most researched CDR options, with **DACCS, BECCS, and Blue Carbon** also receiving substantial attention, especially in 2023.
- Our review highlights **different national funding approaches** for CDR: in China, the research is largely funded nationally. In the US and in the EU, public funding covers less than a third of CDR research.
- Regarding collaborative patterns in CDR research, our econometric analysis reveals positive factors for collaboration, including **common language, social/economic proximity, student exchange programs, and national climate change policy pledges**.

Minx J. C., Lamb W. F., Callaghan M. W., Bornmann L., and Fuss S. (2017). "Fast growing research on negative emissions". Environmental Research Letters 12.3, p. 035007.

Minx J. C., Lamb W. F., Callaghan M. W., Fuss S., Hilaire J., Creutzig F., Amann T., Beringer T., Oliveira Garcia W. de, Hartmann J., et al. (2018). "Negative emissions—Part 1: Research landscape and synthesis". Environmental Research Letters 13.6, p. 063001.

Public funding for CDR

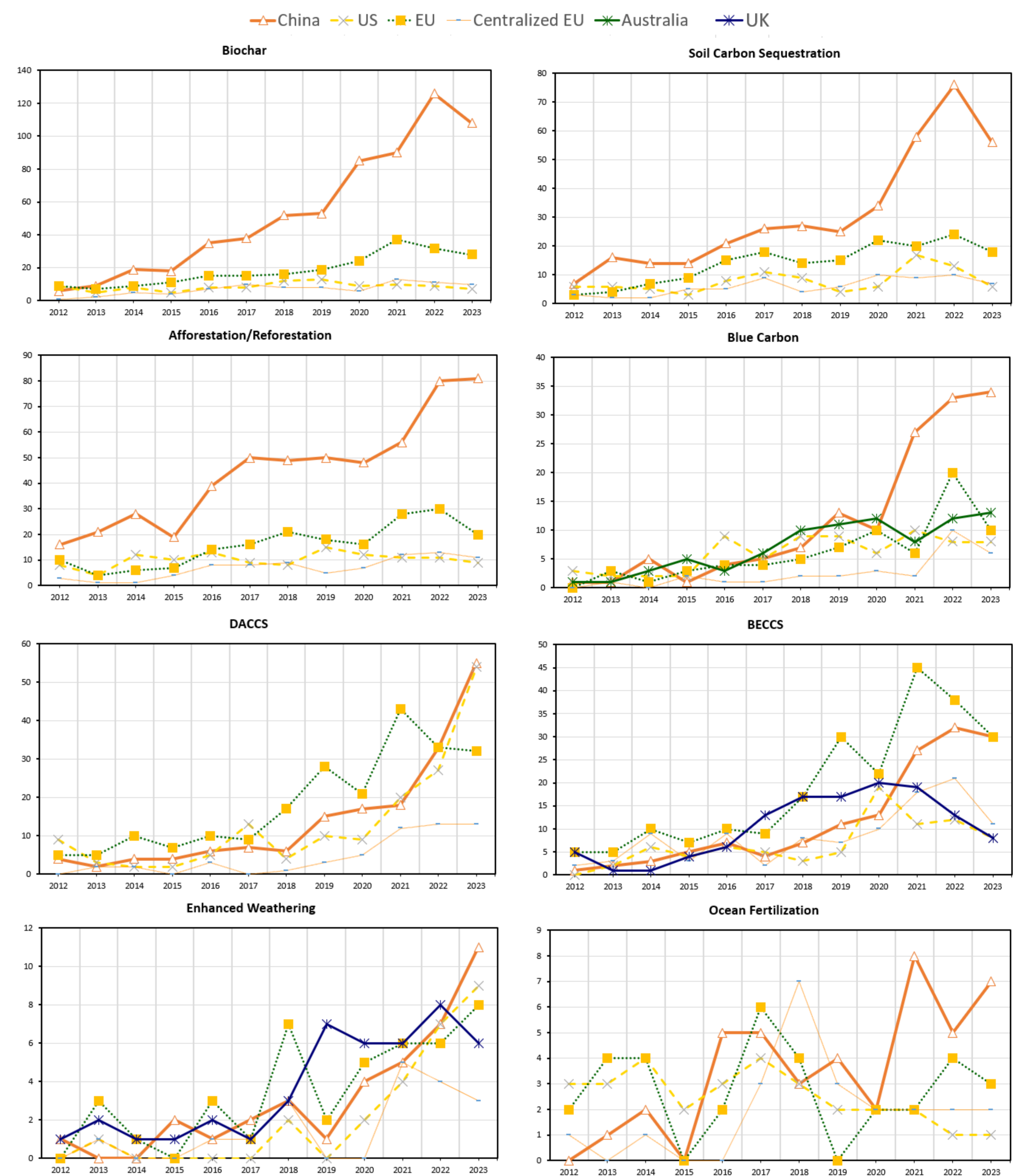


Fig. 3: Number of publications funded by national and regional funds across different CDR technologies by China, the US, the EU (inc. funding from EU bodies), the UK, and Australia.

Collaborative patterns

Explore collaborative patterns in CDR research by country, institution, or author by scanning the following QR-codes.

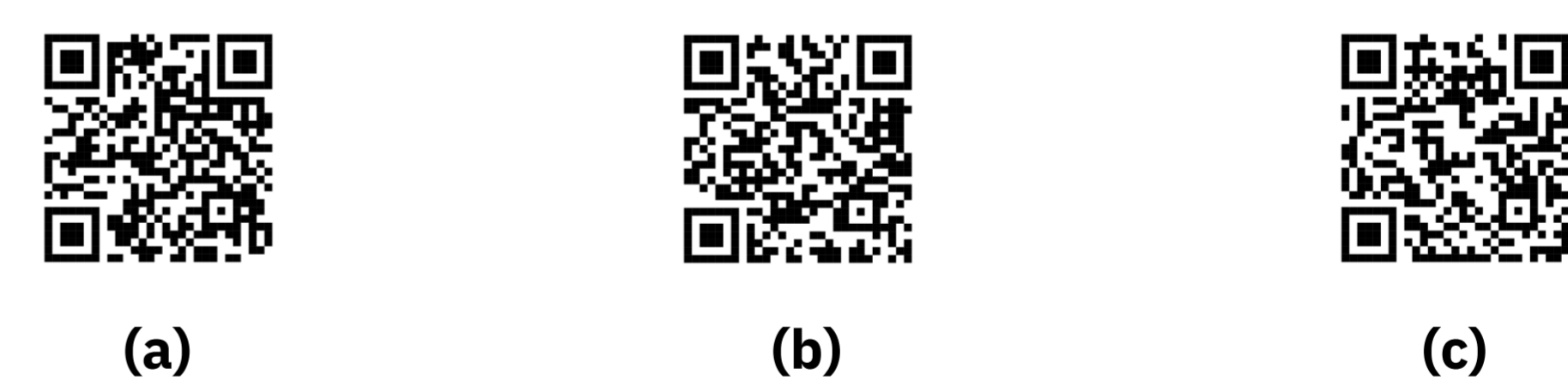


Fig. 4: Collaborative patterns in CDR research. (a) **National collaborations** between the most active countries. (b) **Institutions collaborations**. Each color represents a community. The closer a node is to another, the closer they are in the academic world. No lines between two nodes does not mean zero collaboration, only not a strong connections between the two. Only the 5% institutions (in terms of publications) are represented. (c) **Author collaborations**. Each color represents a community. The closer a node is to another, the closer they are in the academic world. No lines between two nodes does not mean zero collaboration, only not a strong connections between the two. Only the 1% authors (in terms of publications) are represented. The QR-codes are valid until June 22.