Artificial Intelligence and Eddy Covariance: a review

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1 INTRODUCTION:

- The Eddy Covariance (EC) method allows us to monitor carbon, water, and energy fluxes between Earth's surface and atmosphere (1).
- Innovative Artificial Intelligence (AI) can provide us with a set of solutions for achieving precise predictions, constant monitoring, risk evaluations, and other valuable advantages (2).

2 METHODS:

- The state-of-the-art integration of AI techniques with the EC method from the past two decades has been screened following PRISMA-ScR guidelines and PCC formulation guidance for scoping review.
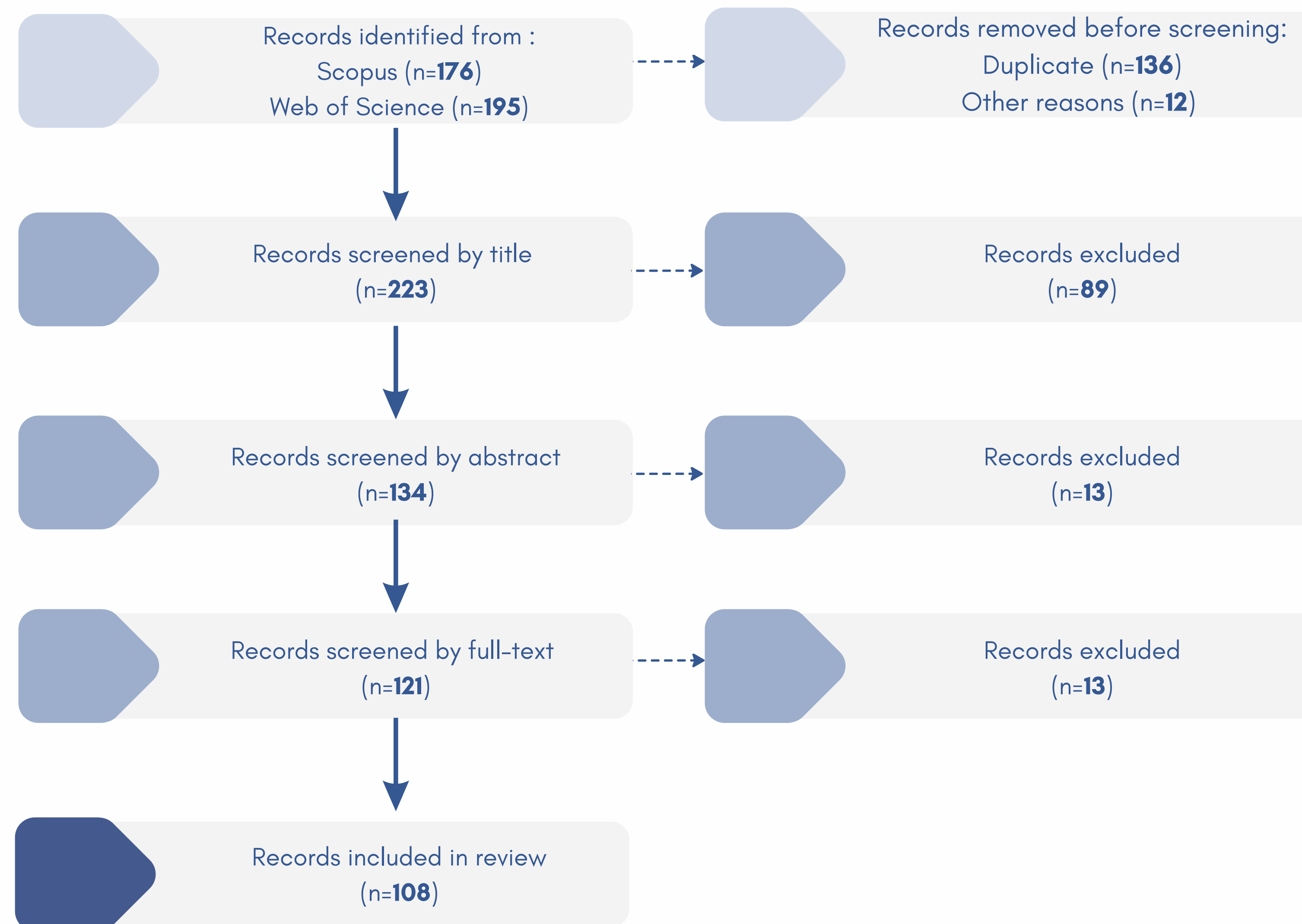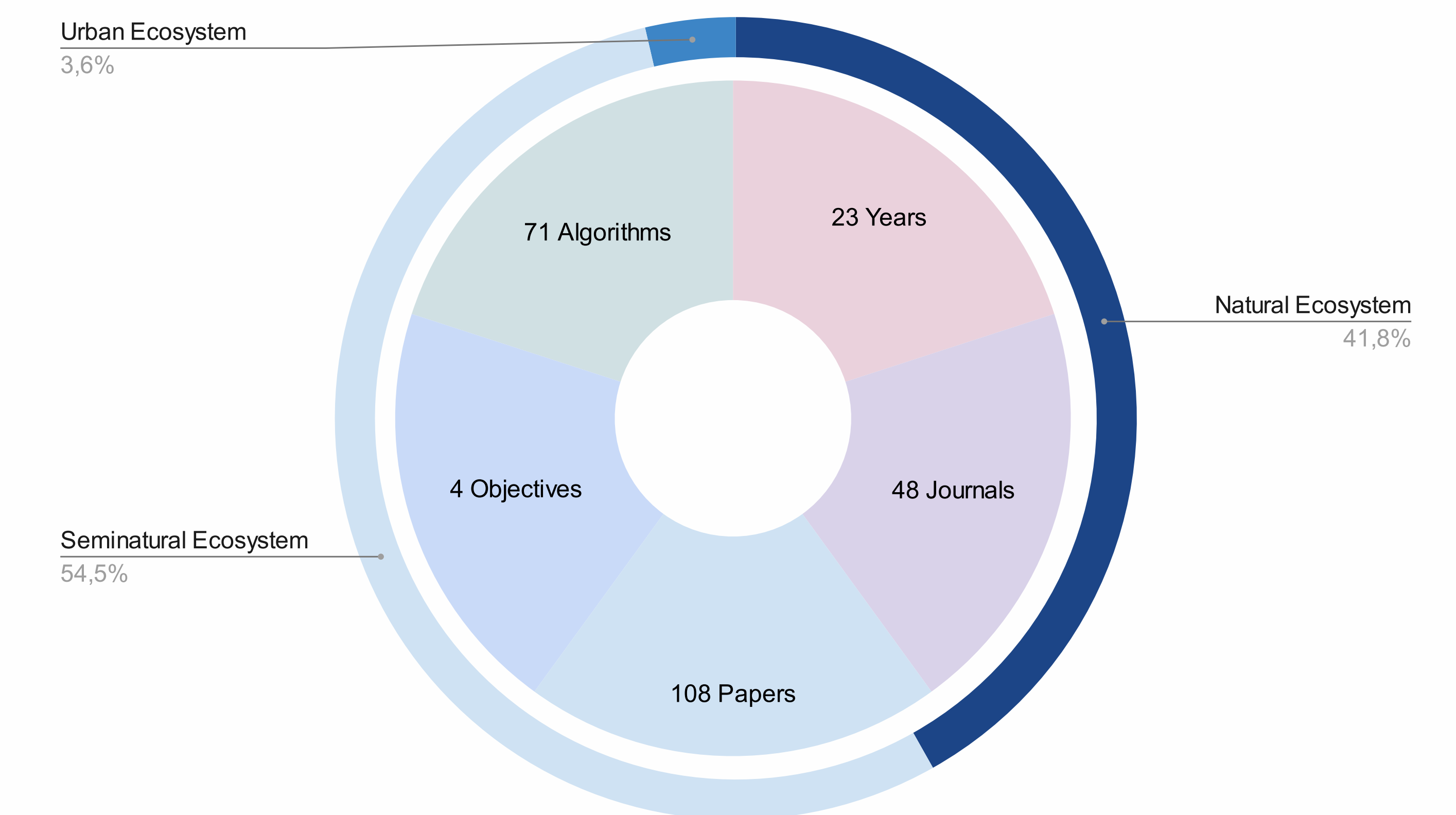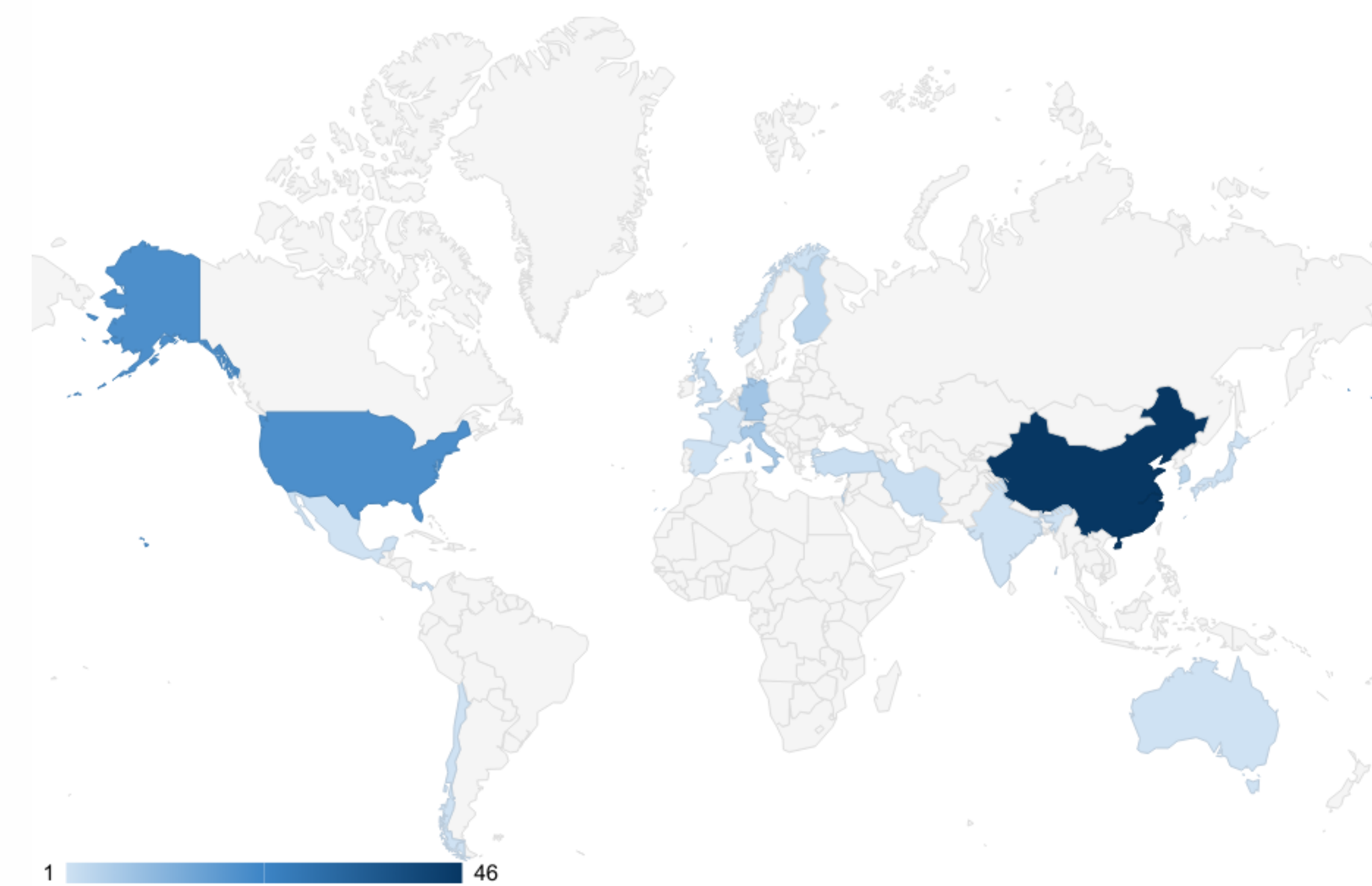

Figure 1 *PRISMA study flow diagram representing the selection process of the scoping review, based on (3). In each box, the number of records screened is reported.*

3 RESULTS:

AI represents a powerful tool for monitoring carbon, water, and energy fluxes, allowing a better understanding of ecosystem dynamics and their potential for climate change mitigation.
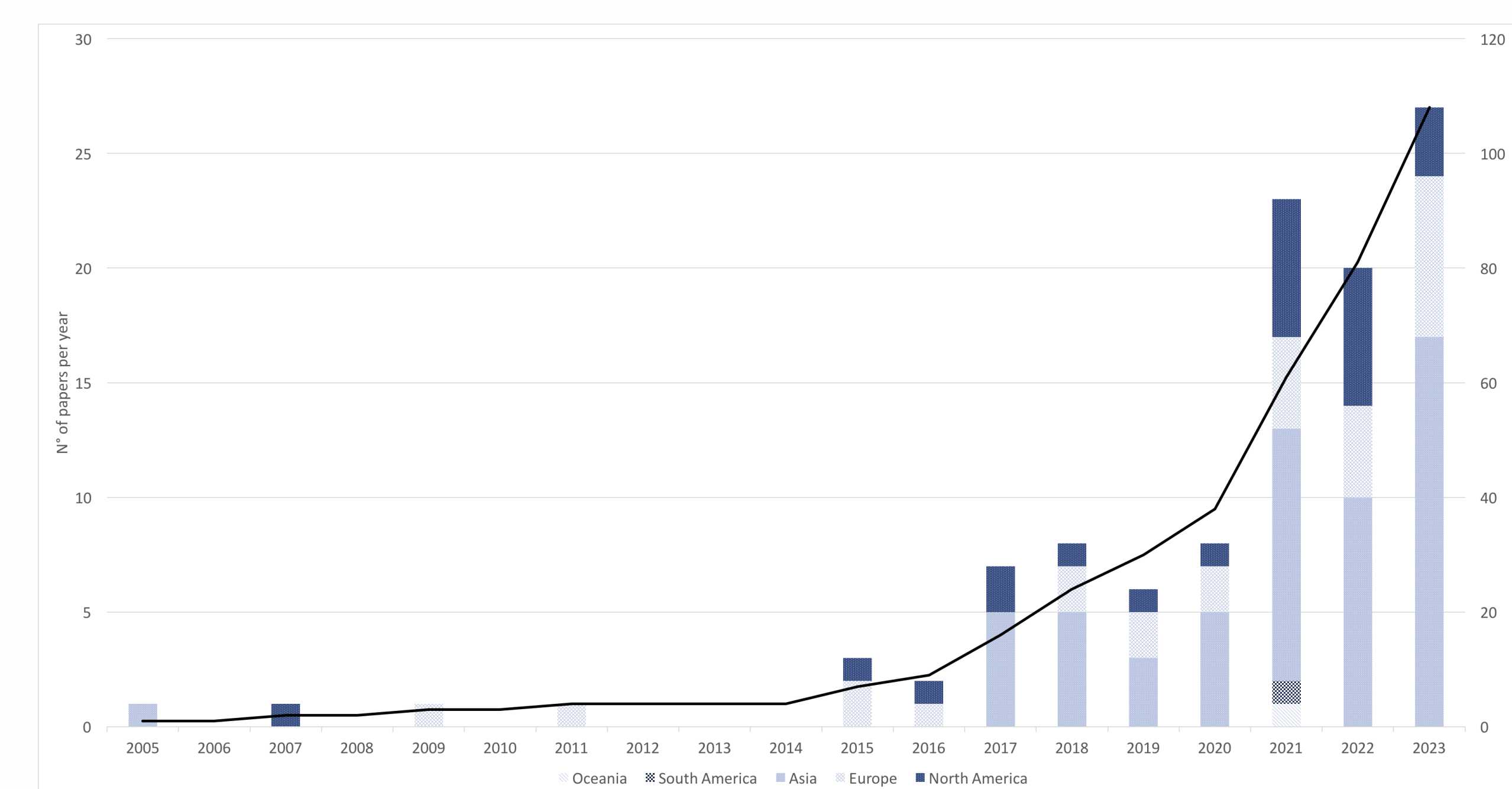

Figure 2 *Temporal trend of included records on AI works from 2005 to 2023. The line represents the cumulative total of the papers.*
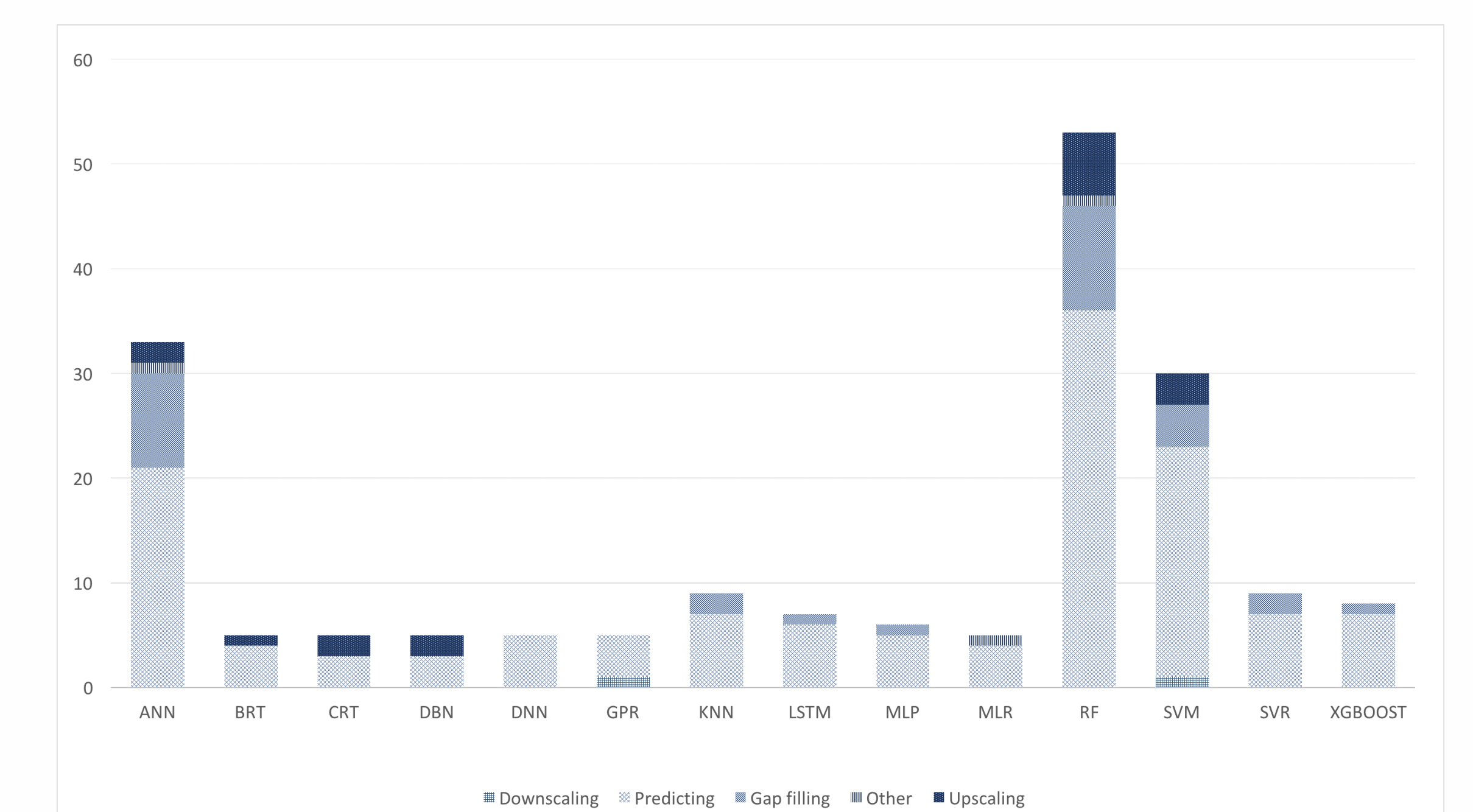
Figure 3 *Most utilised Machine Learning (ML) algorithms (<5). The different textures represent the applications of the algorithms.*

ESSENTIAL REFERENCES:
(1) Wang, L., Wu, B., Elnashar, A., Zeng, H., Zhu, W., Yan, N., 2021. Synthesizing a regional territorial evapotranspiration dataset for northern china. Remote Sensing 13, 1076.
(2) Konya, A., Nematzadeh, P., 2024. Recent applications of ai to environmental disciplines. A review. Science of The Total Environment 906, 67705.
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