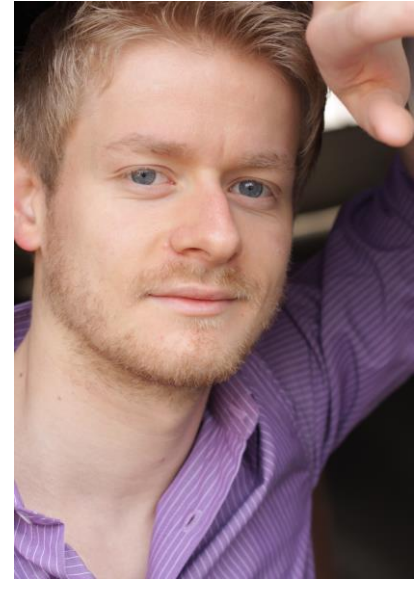


Convergence between ANPP estimation methods – A practical solution to the comparability dilemma



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Introduction

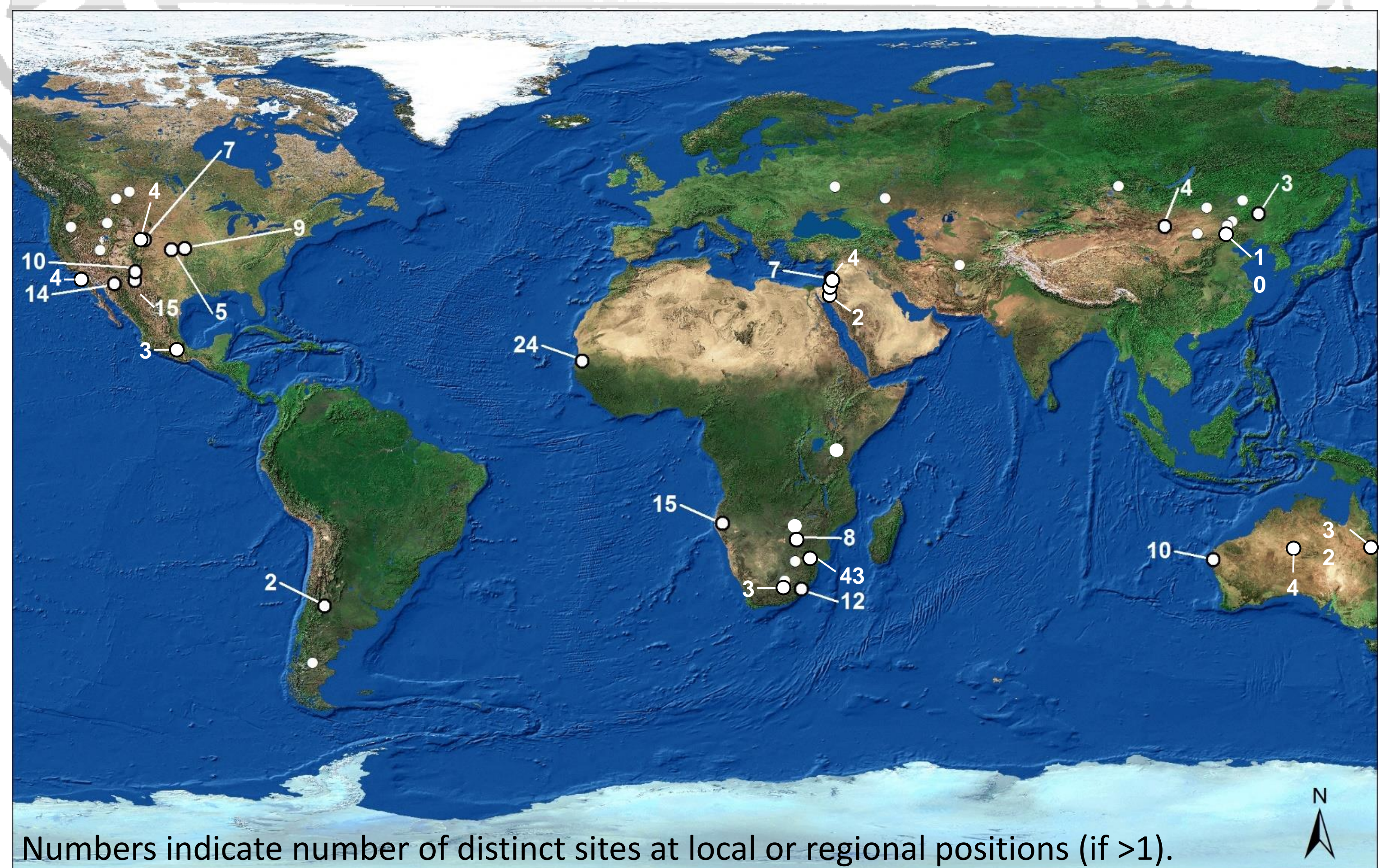
Aboveground net primary production (ANPP) is a key ecosystem characteristic and of fundamental importance for essentially all aspects of matter and energy fluxes in terrestrial ecosystems. Despite partial consensus on ‘best practice methods’ for ANPP estimation, various methods are available and in use [1,2]. Unfortunately, ANPP estimates of these methods differ in their magnitude, variability and their tendency to over- or underestimate primary production. Despite the large number of published ANPP data, this incompatibility of estimates de facto leads to a scarcity of comparable ANPP data for assembled large-scale studies – a *comparability dilemma*. With this study we aimed to overcome this dilemma by establishing conversion rates between the most commonly used ANPP estimation methods.

Material & Methods

The study is based on a global ANPP dataset assembled from arid to mesic sites, comprising long-term (≥ 5 yr) monitoring or experimental data [1,3]. The complete dataset comprises >4400 years of ANPP data from >300 sites worldwide (Fig. 1). Analyses are based on a subset of 89 sites which allowed calculation of at least two common ANPP estimation methods [1,2].

We assessed the convergence between the seven most common ANPP methods by statistical and theoretical criteria. Generalized least squares regression was used to establish conversions between all 21 combinations. Their principal comparability was assessed on basis of theoretical criteria (calculation process: peak vs. incremental) and the biomass component(s) considered (live, senescent and moribund). ANCOVAs were used to test for confounding effects of biome and climate.

Figure 1: Global ANPP dataset from arid to mesic sites



Results

ANCOVAs revealed that biome had no confounding effect on conversions, while six out of 21 method combinations were systematically influenced by climate (dry vs. humid). Thus a total of 27 conversion formulae was established (Fig. 3 and handout). Although models were significant, only 16 out of 27 conversions can be recommended, based on the assessment via statistical (R^2 values) and theoretical criteria (method comparability, see above and [1]).

Figure 3 depicts selected conversions. These represent combinations of the most frequently used ANPP methods (Methods 1, 2a, 2b and 4, see Fig. 2) and an often recommended ‘best practice’ method (Method 5).

Figure 2: Illustration of ANPP methods

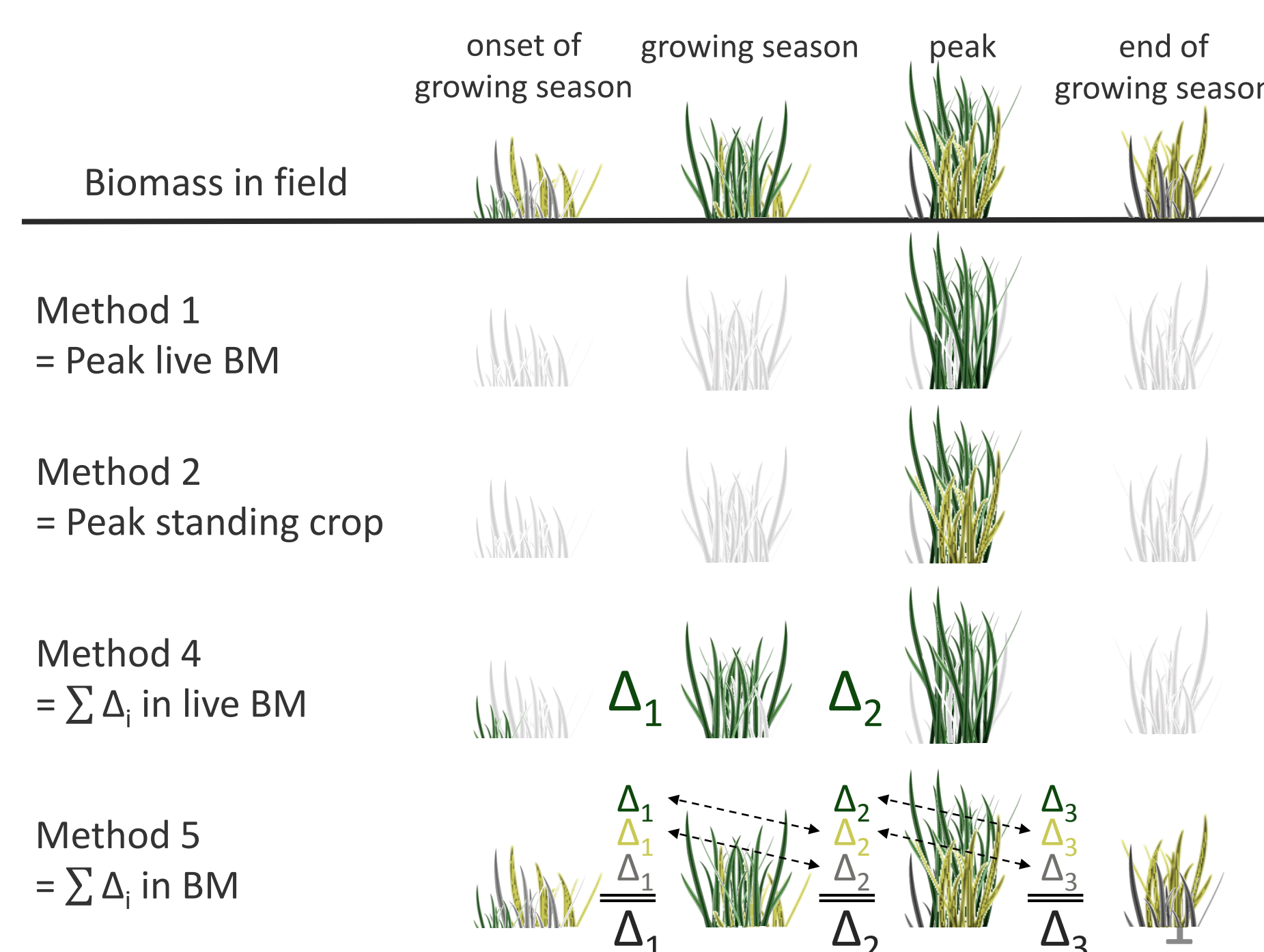
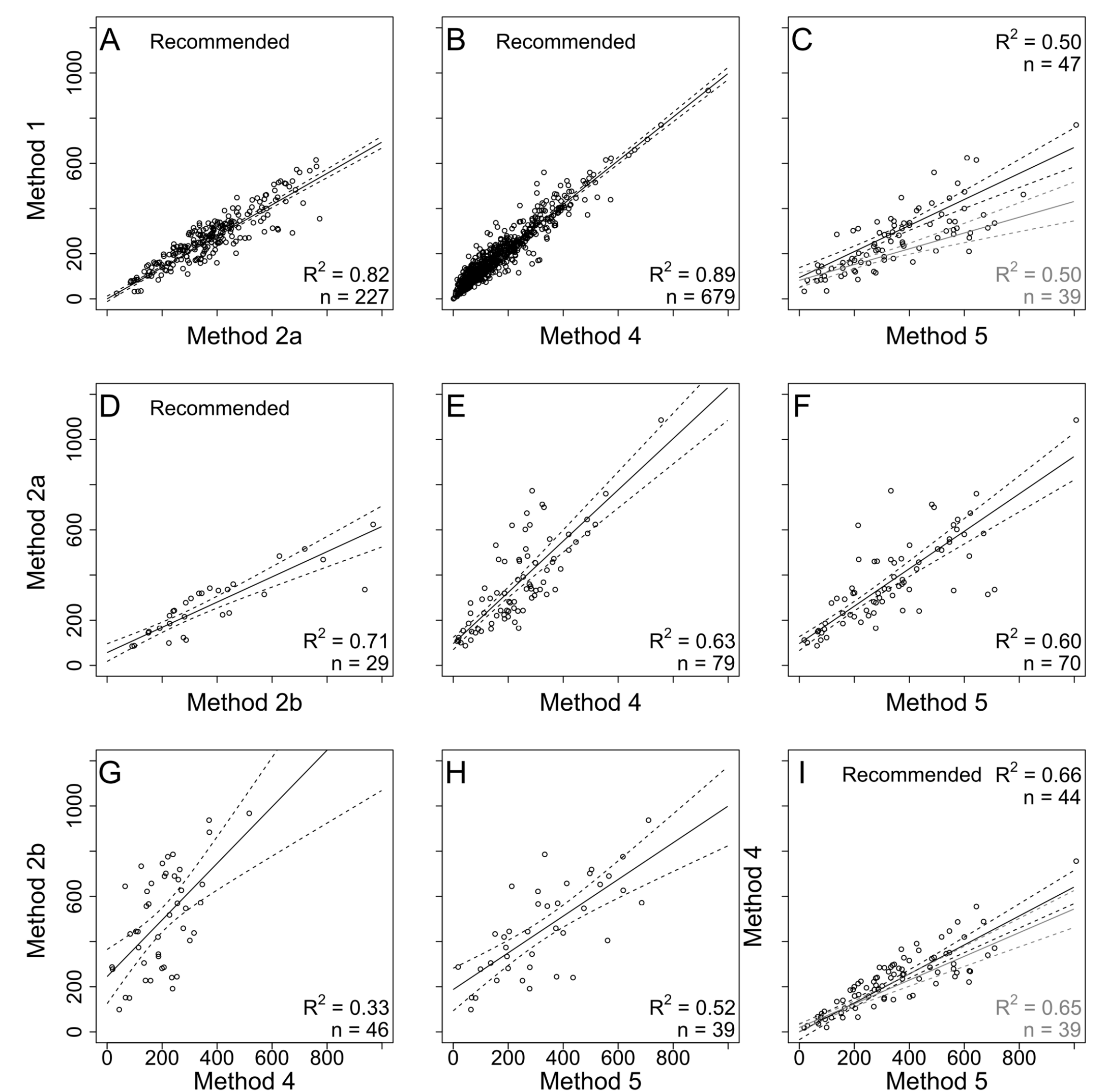


Figure 3: Established conversions (excerpt)



Conclusions

Our established conversions offer an easy and straightforward way to recalculate and compare between ANPP estimates derived by divergent estimation algorithms and thus a solution to the *comparability dilemma*.

Authors who wish to assemble large-scale ANPP datasets, or more general, studies combining ANPP data from various sources, can surely benefit from this approach.

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