



## **Does the European eddy flux tower network represent the climatic and ecophysiological diversity of Europe?**

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In analyzing the increase of greenhouse gas concentration in terrestrial atmosphere, the studies about the role of vegetation in the carbon exchange regulation are relevant. In this respect, a network using the eddy covariance technique to measure CO<sub>2</sub> and H<sub>2</sub>O exchanges between terrestrial ecosystems and atmosphere, has been established. When the network was established, 16 towers all located in forest ecosystems were maintained. In the past 15 years, the network grew and the current Carboeurope-IP monitoring network consists of more than 100 flux towers ([www.carboeurope.org](http://www.carboeurope.org)) located all over Europe aiming to represent the diversified of geographic regions, climatic and vegetation characteristics (Plant Functional Types). Because the growth of the network was driven by funding and administrative issues rather than scientific needs, we evaluated, in retrospective, the representativeness of the current network based on climatic and ecophysiological characteristics of the sites and the European territory.

We used a cluster approach based on the distance matrix of Self Organizing Maps (SOM) (Kohonen 2001), where the SOM was trained with 21 variables describing main meteorological and productivity characteristics and their inter-annual and seasonal variability of the European territory. A separate SOM was trained for each PFT and the representativeness of eddy towers sites has been evaluated on the basis of their positions on the SOM clusters map (i.e. the 21-D variable-space). The main underlying assumption was that the number of clusters within each PFT was similar to the current number of towers.

The analysis showed that the current network is representing the European domain quite well in respect to the variables considered, although North-Eastern and South-Eastern climatic and ecophysiological conditions are poorly sampled for several PFT. The same approach was used to propose a new tower arrangement that maximizes the network representativeness. Further, our results shown that use of data-driven clustering techniques like SOM can contribute to the evaluation of network representativeness with important impact in network design and analysis of model simulations based on the data derived from this monitoring network.

Kohonen T (2001) Self-Organizing Maps. Springer-Verlag, Berlin.