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Document généré le 04/07/2025 depuis l'adresse https://www.documentation.eauetbiodiversite.fr/notice/som-clustering-of-21-year-data-of-a-small-pristine-boreal-lake0.

SOM clustering of 21-year data of a small pristine boreal lake

In order to improve our understanding of the connections between the biological processes and abiotic factors, we clustered complex long-term ecological data with the self-organizing map (SOM) technique. The available 21-year long (1990–2010) data set from a small pristine humic lake, in southern Finland, consisted of 27 meteorological, physical, chemical, and biological variables. The SOM grouped the data into three categories of which the first one was the largest with 12 variables, including metabolic processes, dissolved oxygen, total nitrogen and phosphorus, chlorophyll a, and taxonomical groups of plankton known to exist in spring. The second cluster comprised of water temperature and precipitation together with cyanobacteria, algae, rotifers, and crustacean zooplankton, an association emphasized with summer. The third cluster was consisted of six physical and chemical variables linked to autumn, and to the effects of inflow and/or water column mixing. SOM is a useful method for grouping the variables of such a large multi-dimensional data set, especially, when the purpose is to draw comprehensive conclusions rather than to search for associations across sporadic variables. Sampling should minimize the number of missing values. Even flexible statistical techniques, such as SOM, are vulnerable to biased results due to incomplete data.

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Obtenir le document : EDP Sciences
Mots clés : boreal lake, data partitioning, ecological complexity, long-term data, self-organizing map, lac boréal, partitionnement de données, complexité écologique, données à long terme, carte auto-organisatrice
Thème (issu du Text Mining) : BIOCHIMIE - CHIMIE
Date : 2017-08-21
Format : text/xml
Source : https://doi.org/10.1051/kmae/2017027
Langue : Anglais
Télécharger les documents : https://www.kmae-journal.org/10.1051/kmae/2017027/pdf
Permalien : https://www.documentation.eauetbiodiversite.fr/notice/som-clustering-of-21-year-data-of-a-small-pristine-boreal-lake0

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