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Conference Abstract

Building Biodiversity Digital Twins

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Abstract

A digital twin is a replica of a system, process, or object realized as a digital version. Digital twins are widespread in engineering and aim to can help many kinds of organizations simulate real situations and their outcomes, ultimately allowing them to make better decisions. Digital twins combine cutting-edge modelling approaches with powers of supercomputers with data streams. These data resources, coming through the research infrastructures, depend on data standardization, efficient data models and workflows, and on FAIRness (Findability, Accessibility, Interoperability, Reusability) of these elements. Digital twin concepts have been applied to biodiversity data since 2022, most notably through the Biodiversity Digital Twin project. The outcomes of dynamic modeling based on the biodiversity data (which availability changes in volumes and quality) against the globally available changing environmental and human impact data are expected to form the basis for management of natural resources and aims to support biodiversity recovery. The BioDT consortium brings together a dynamic team of experts in biodiversity data and standards, high performance computing, and FAIR data to realize the first set of biodiversity Digital Twin prototypes.

Biodiversity evidence generated, standardized and shared from collections, systematic and long term surveys, eDNA and metabaroding, citizen science and other communities representing a range of biodiversity evidence types, can to be applied in the dynamic and interactive modelling solutions, known as digital tiwins. The Biodiversity Digital Twin project (and the twin approach in general) offers advanced simulation and prediction models to tackle global biodiversity challenges. This project is designed to address biodiversity dynamics through a set of use cases, providing insights and tools for

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conservation and restoration efforts. The BioDT project has revealed similarities and differences of applying Biodiversity Information Standards (TDWG) thinking and principles of data standardization to the communities with different levels of familiarity with standards and FAIR principles.

The presentation at SPNCH-TDWG 2024 covered the process of building biodiversity digital twins by the second project year and exposed the work along the gradient of data intensity, of data FAIRness, and of complience to the international data standards. The details of ten BioDT project stories are covered in the special issue of the Pensoft RIO journal on BioDT project (Afsar et al. 2024, Chala et al. 2024, Frøslev et al. 2024, Ingenloff et al. 2024, Groeneveld et al. 2024, Khan et al. 2024, Mikryukov et al. 2024, Ovaskainen et al. 2024, Rolph et al. 2024, Taubert et al. 2024).

Keywords

research infrastructure, eLTER, GBIF, DiSSCo, LifeWatch

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Conflicts of interest

The authors have declared that no competing interests exist.

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