Interoperable digital twins of the ocean through aligned architectures

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Digital twins are designed to support decision-making and to make well-timed interventions that provide better outcomes. Thus, it is not only the digital twin itself that is important, but also the ease of creating actionable information or decisions, through policy, management or operational decisions. This implies the need for a well-formulated interface between the digital twin and a machine or human. Digital twins of the ocean comprise multiple geoscientific disciplines in itself and the thematic twins rely on both data and models based on science and technology that are interoperable. The EU Horizon2020 project ILIAD Digital Twin of the Ocean capitalizes on the explosion of new data provided by different Earth observation sources, advanced computing infrastructures (cloud computing, HPC, Internet of Things, Big Data, citizen science) in an inclusive, virtual/augmented, and engaging fashion to address all Earth data challenges. In addition, the EU is also building a broad foundational ecosystem for the European Digital Twin of the Ocean (EDITO) led by Mercator Ocean International, VLIZ et al. There are many other initiatives that work toward or in support of a Digital Twin of the Ocean, e.g. NOAA's National Centre for Environmental Information, the IOC Ocean Data and Information System ODIS, the IOC Ocean Best Practice System OBPS, the Ocean Data Action Coalition and the UN Data Coordination Group. DITTO, a Global Program of the UN Decade of Ocean Science for Sustainable Development (2021-2030) aims to develop and share a common understanding of digital twins of the ocean (DTO); to establish best practice in the development of DTOs; and advance a digital framework for DTOs to empower ocean professionals from all sectors around the world including scientific users, to effectively create their own digital twins. One of the activities to implement this is the Interoperability ArchitecTURes for a DigiTaL OcEan (TURTLE). This presentation gives an overview of the initiatives and introduces the strategy and some of the tools for making these systems interoperable.