Digital Twins of the Ocean

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Disclaimer (personal)

- I'm new to this.
- I'm not presenting any official view. I don't represent any organization in this talk.
- I'm not going to talk about official things (because I don't know much about them).

This talk is mostly *technical* (in a broad sense of the word).

DITTO Summit

https://www.g7fsoi.org/digital-twin-ocean-summit

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Digital Twins

What are they?

- Data (observed & simulated)
- (a network of) data servers (hardware, software, organization)
  - Infrastructure of data exchange.
  - Protocols (licensing, format, metadata, etc.)
  - User interface (query, download, visualize, etc.) for researchers, stakesholders, and the public.
  - The data server has to be efficient (software, hardware, data structure, etc.).
- (Well organized) tools to generate data (GCMs, submodels, virtual Lagrangian floats, obs. data management, etc.)

Digital Twins (cont'd)

- Analytics: Extract useful information from the data
  - R & D of methods.
  - (Well organized) tool sets (EOF, machine learning, etc.)
  - User interface (interactive simulation, interactive analysis, etc.) for researchers, stakesholders, and the public.
  - Tools/frameworks to build analytics quickly.
  - Provide CPU times to remote users.
- Coordination between different digital twins.

DITTO

Digital Twins of the Ocean.

- DITTO is *not* a funded project.
- It will *not* build a Twin.
- It is a forum to exchange information and seek potential seeds for collaboration.

$\Rightarrow$ (hopefully) funding.

Where are we?

Presentations at the Summit included

- Methods: GCMs, machine learning, analyses
- Projects to provide analytics to stakesholders, policy makers, or the public.
- Technologies as a component of Twins: Visualization, user interfaces, virtual reality, data processing, remote data analysis frameworks (JupyterHub-like things), etc.
- Infrastructure (hardware, software, organization, protocols): Interoperability of Twins, data management and exchange, use of cloud, etc.

Components are mostly there (although there are technological challenges). What we lack is funding and organization.