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Practical data sharing with tangible rewards through publication in ESSD

David Carlson, Kirsten Elger, Jens Klump, Ge Peng, and Johannes Wagner
Earth System Science Data (ipy.djc@gmail.com)

Envisioned as one solution to data challenges of the International Polar Year (2007-2008), the Copernicus data journal Earth System Science Data (ESSD) has developed into a useful rewarding data-sharing option for an unprecedented array of researchers. ESSD has published peer-reviewed descriptions of more than 500 easily- and freely-accessible data products, from more than 4000 data providers archiving their products at more than 100 data centres. ESSD processes and products provide a useful step toward Findable, Accessible, Interoperable, Reusable (FAIR) expectations but also a caution about implementation.

For ESSD, findable and accessible derive from the journal's consistent mandate for open access coupled with useful title, author, abstract and full-text search functions on the publisher's website (which lead users quickly to data sources) and excellent (but varied) topical, geographic, textual and chronologic search functions of host data centres. Due to an intense focus on data reliability and reusability during peer review of data descriptions, ESSD-referenced data products achieve very high standards of accessibility and reusability. ESSD experience over an amazing variety of data products suggests that 'interoperability' depends on the intended use of the data and experience of users. Many ESSD-published products adopt a shared grid format compatible with climate models. Other ESSD products, for example in ocean biogeochemistry or land agricultural cultivation, adopt or even declare interoperable terminologies and new standards for expression of uncertainty. Very often an ESSD publication explicitly describes data collections intended to enhance interoperability within a specific user community, through a new database for example. For a journal that prides itself on diversity and quality of its products published in service to a very broad array of oceanographic, terrestrial, atmospheric, cryospheric and global research communities, the concept of interoperability remains elusive.

Implementing open access to data has proven difficult. FAIR principles give us guidelines on the technical implementation of open data. However, ESSD's experience (involving publisher, data providers, reviewers and data centres) in achieving very high impact factors (we consider these metrics as indicators of use and reuse of via ESSD published data products) can serve as a guide to the pursuit of the FAIR principles. For most researchers, data handling remains confusing and unrewarding. Data centres vary widely in capability, resources and approaches; even the 'best' (busiest) may change policies or practices according to internal needs independent of external standards or may - unexpectedly - go out of service. Software and computation resources grow

and change rapidly, with simultaneous advances in open and proprietary tools. National mandates often conflict with international standards. Although we contend that ESSD represents one sterling example of promoting findable, accessible, interoperable and reusable data of high quality, we caution that those objectives remain a nebulous goal for any institution - in our case a data journal - whose measure of success remains a useful service to a broad research community.