

Using Open Source Software To Build Networks And Create Impact In Environmental Science

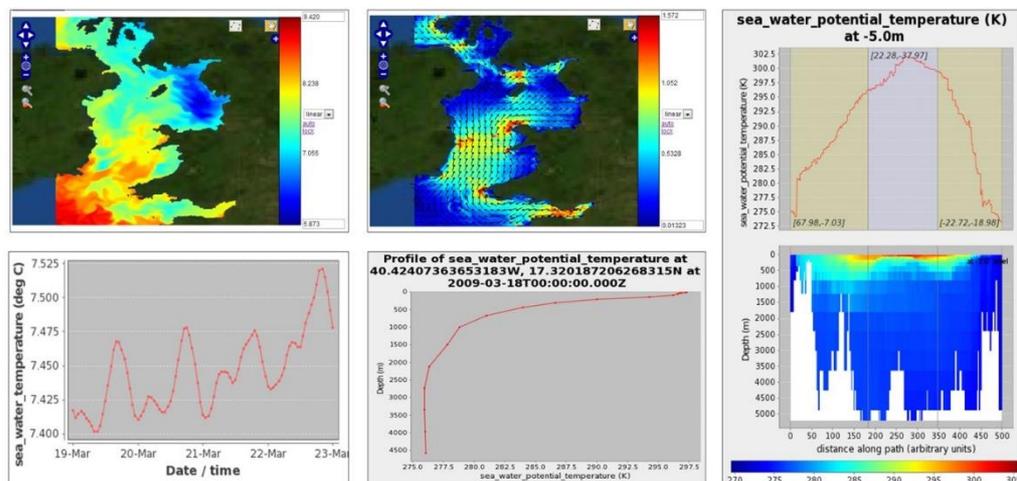


Dr Jon Blower

Dr Jon Blower, Chief Technology Officer at the Institute for Environmental Analytics (IEA), talks about using the power of open data and Open Source software development to create new environmental applications, and foster collaborations with academia, the public sector and industry.

I work at the interface of environmental science and advanced computing technology, developing environmental applications built on open data and Open Source software. One of the first projects I worked on after joining the University in 2003 was to develop a piece of software called ncWMS, which allows users to visualise and explore large-scale environmental datasets online.

Since being released in 2010 this software has been widely adopted by research institutes, government agencies and private industry in Europe, the US and Australia. Data providers, including the National Oceanographic and Atmospheric Administration and the Geological Survey in the US, and the European Commission's **Copernicus Marine Service**, have created interactive web-based 'quick-look' tools, which allow users to browse visually through their data holdings online. Companies in insurance, oil and gas, shipping and aviation industries have enhanced their data products and tailored them to the needs of end users.



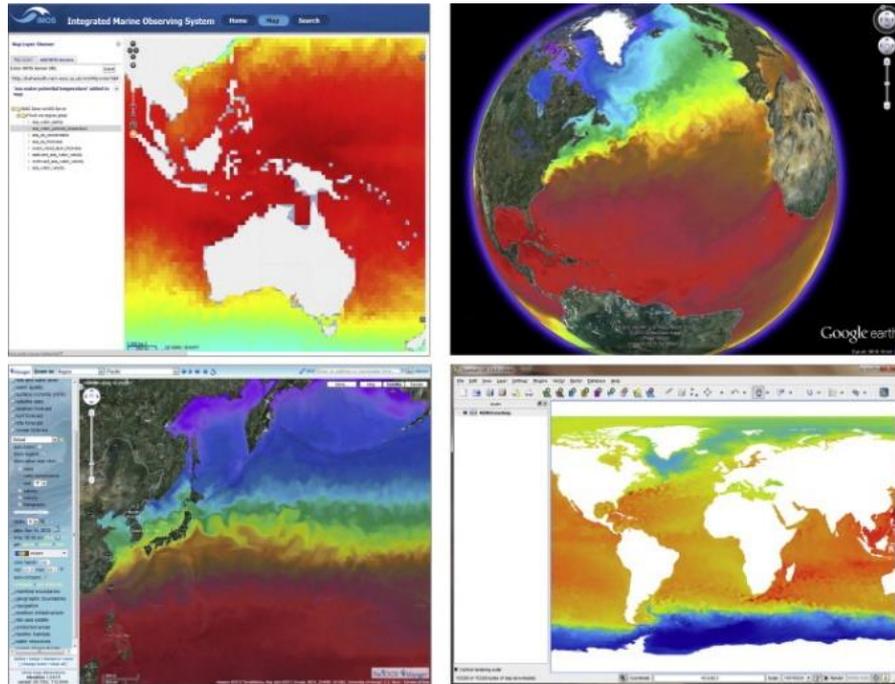
Examples of visualisations generated by ncWMS

The team decided at the outset to distribute the software source code for free under an Open Source licence. We used the **3-Clause BSD License**, which is short and easy to understand, and permits re-use, modification and redistribution of the source code, providing attribution is given. The code is made available via a repository on GitHub¹ which includes documentation on software installation and configuration, a link to a demo site, and a support mailing list.

We wanted to make it as easy as possible for users to adopt the software, whether for research or commercial purposes, to modify it to meet their own needs, and to contribute to ongoing improvement of the codebase. The software is more sustainable in the long term, because there is no financial or copyright barrier to prevent people from using it. Making the code Open Source helped us to build a community of users and contributors. When we presented our software at conferences we found that because it was Open

People are often worried about 'giving away' IP, but open licensing makes it easy to let other people benefit from your work without giving up control. It makes sense in the academic context, which is all about sharing knowledge.

Source and everything was completely transparent, people trusted the product, and were encouraged to use it and to work with us. From a marketing point of view, it was the best thing we could have done.



Examples of displaying data from ncWMS servers through a selection of third-party tools

The software continues to be maintained and supported by the IEA. This allows us to keep our user community involved. GitHub makes it very easy to manage bug fixing and enables other people to improve or extend the software by contributing code.

In 2012 we published an Open Access paper² describing the software in the journal *Environmental Modelling and Software*. We ask people to cite our paper if they use the software to produce published results. This allows us to generate citations and track the use of our software in the public record. It's important to realise that software created in academic research can be a valuable output in its own right, and can receive formal recognition in the scientific record.

People are often worried about 'giving away' IP, but open licensing makes it easy to let other people benefit from your work without giving up control. It makes sense in the academic context, which is all about sharing knowledge. The decision to 'go open' with ncWMS has enabled us to build collaborative relationships within both the research community and the commercial sector. This has helped us win significant grant income, and has led the Meteorology Department and the IEA to work with industrial clients in developing cutting-edge environmental data products and services.

 For more information, please contact:

Dr Jon Blower 
Institute for Environmental Analytics

University of Reading
 Whiteknights
 Reading, RG6 6BX

j.blower@the-iea.org

Tel (0118) 378 5213

 /theuniversityofreading

 @UniRdg_Research

www.reading.ac.uk

Open at a glance

- Open Source software adopted by research institutes, government agencies and industry worldwide
- Open Source provides transparency, creates trust, and removes barriers to re-use
- Open development allows users to provide feedback and contribute to source code
- Value created through collaborations and new grant income outweighs benefits of proprietary licensing

References and further information

1. Blower, J.D. et al. (2010). ncWMS: a Web Map Service for displaying environmental data over the web. Source code: <http://ncwms.sf.net/>
2. Blower, J. D. et al. (2013). A Web Map Service implementation for the visualization of multidimensional gridded environmental data. *Environmental Modelling and Software* 47: 218-224. <https://doi.org/10.1016/j.envsoft.2013.04.002>