

Research Data Infrastructures in ESS. EGU24-18056

https://doi.org/10.5194/egusphere-egu24-18056



Executable Book for the IPCC AR6 ATLAS products

Antonio S. Cofiño¹ and **David Dominguez Roman²**

¹Institute of Physics of Cantabria (IFCA, CSIC-UC), Santander, Cantabria, Spain ²Degree in Physics, Faculty of Sciences, University of Cantabria, Santander, Spain

https://antonio.cofino.es

1. Introduction

Internationally-coordinated climate model intercomparison projects (MIPs) explore the uncertainties inherent to climate change science. The Multi-MIP Climate Change ATLAS repository [1] is the backbone of the Sixth IPCC Assessment Report (AR6) Atlas Chapter, which provides a region-by-region assessment of climate change including also the innovative Interactive Atlas [2]. The Interactive Atlas complements the report by providing flexible spatial and temporal analyses of regional climate change, based on different MIPs.

2. The Multi-MIP Climate Change ATLAS

The IPCC AR6 promotes best practices in traceability and reproducibility of the results shown in the report, including the adoption of the Findable, Accessible, Interoperable, and Reusable (FAIR) principles for scientific data. In particular, reproducibility and re-usability are central in order to ensure the transparency of the final products. The ATLAS products are generated using free software community tools, based on the climate4R framework [3], for data post-processing (data access, regridding, aggregation, bias adjustment, etc.), evaluation and quality control (when applicable). All the ATLAS code is made publicly available as notebooks and scripts [1].

The Atlas products are generated using free software community tools, in particular R building on the climate4R framework for data post-processing (data access, regridding, aggregation, bias adjustment, etc.) and evaluation and quality control (when applicable). Provenance metadata is generated for the Interactive Atlas using the METACLIP RDF-based framework, extended to cover the products delivered by the IPCC-AR6 Interactive Atlas (metaclipcc).





4. The Executable Book Project

The Executable Book Project (EBP) [4] is an international collaboration between several universities and open source projects, to build tools that facilitate computational narratives (books, lectures, articles, etc. ...) using open source tools allowing users from scientific and academic communities to be able to: merge rich text content, output from live code, references, cross-references, equations, images, etc; execute content and cache results; combine into a document model, cached outputs and content files; build interactive (i.e. HTML) and publicationquality (PDF) outputs; and control everything from a simple interface.



Jupyter Book: A command-line interface for building beautiful, publication-quality books and documents from computational content. JB allows write content in Markdown and Jupyter Notebooks, execute content, and insert it into book producing interactive output and publishing document.



{MvST}NB

MyST: extends Markdown for technical, scientific communication and publications

Sphinx: A documentation engine written in Python.

MyST-NB: A Sphinx and Docutils extension for compiling Jupyter Notebooks into high quality documentation formats.

5. Binding ATLAS repository into a JupyterBook

In this contribution, a demonstration of a computational book has been created using the JupyterBook ecosystem, binding the code scripts and the notebooks from the Multi-Model Intercomparison Project (Multi-MIP) Climate Change Atlas repository to improve its reproducibility and reusability.



6. Publishing and Sharing

GitHub Pages is a feature of GitHub that allows the implementation of static content using HTML, CSS and JavaScript taken from a GitHub repository and can build and publish the result.

.github/workflows/book.yml

name: deploy-book # Only run this when the master branch changes on: workflow dispatch: push: branches: - ib-test # This job installs dependencies, build the book, and pu iobs: deploy-book: runs-on: ubuntu-latest defaults: run : shell: bash -1 {0} steps: - uses: actions/checkout@v2 # Install dependencies # Install Mambaforge - uses: conda-incubator/setup-miniconda@v2 with: environment-file: binder/conda/environment.yml miniforge-version: latest miniforge-variant: Mambaforge # Build the book - name: Build the book run · I jupyter-book build # Push the book's HTML to github-pages - name: GitHub Pages action uses: peaceiris/actions-gh-pages@v3.5.9 with: github_token: \${{ secrets.GITHUB_TOKEN }} publish_dir: ./_build/html https://SantanderMetGroup.github.io/ATLAS/

7. Acknowledgments

This work is partly supported by: project **CORDyS** (PI02020-116595RB-100) funded by MCIN/AEI/10.13039/501100011033; Ministry for the Ecological Transition and the Demographic Challenge (MITECO) and the European Commission NextGenerationEU (Regulation EU 2020/2094), through CSIC's Interdisciplinary Thematic Platform Clima (**PTI-Clima**); and, the **ENES-RI** and **IS-ENES3** project which is funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 824084



8. References

- [1] M. Iturbide et al., "Implementation of FAIR principles in the IPCC: the WGI AR6 Atlas repository" Sci. Data, 2022.
- doi:10.1038/s41597-022-01739-y https://github.com/SantanderMetGroup/ATLAS [2] Intergovernmental Panel on Climate Change (IPCC), Ed., "Atlas," in Climate Change 2021 – The Physical
- 2) Intergovernmental Panel on Climate Change (IPCC), Ed., Alas Science Basis: WG I Contribution to the 6th of the IPCC, 2023.
- doi:10.1017/9781009157896.021 http://interactive-atlas.ipcc.ch
- [3] M. Iturbide et al., "The R-based climate4R open framework for reproducible climate data access and postprocessing," Env.Mod.&Soft, 2019.
- doi:10.1016/j.envsoft.2018.09.009 https://github.com/SantanderMetGroup/climate4R
- [4] Executable Book Community, "Jupyter Book." 2020.
- doi:10.5281/zenodo.4539666. https://executablebooks.org
- [5] D. Domínguez Román, "Executable book for climate ATLAS", 2023 https://hdl.handle.net/10902/30120