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Pymagicc: A Python wrapper for the simple climate model MAGICC

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Software

- Review
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Summary

Pymagicc is a Python wrapper for the Fortran-based reduced-complexity climate carbon cycle model MAGICC (Meinshausen, Raper, and Wigley 2011). Aiming at broadening the user base of MAGICC[1], Pymagicc provides a wrapper around the MAGICC binary[2], which runs on Windows and has been published under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License[3]. Pymagicc runs on Windows, macOS and Linux and simplifies usage of the model by utilising DataFrames from the Pandas library (McKinney 2010) as a data structure for emissions scenarios. To read and write the text-based MAGICC configuration and output files in the Fortran Namelist format Pymagicc utilizes the f90nml (Ward 2017) library. All MAGICC model parameters and emissions scenarios can thus easily be modified through Pymagicc from Python.

MAGICC (Model for the Assessment of Greenhouse Gas Induced Climate Change) is widely used in the assessment of future emissions pathways in climate policy analyses, e.g. in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2014). Many Integrated Assessment Models (IAMs) utilize MAGICC to model the physical aspects of climate change. It has also been used to emulate complex atmosphere-ocean general circulation models (AOGCM) from the Coupled Model Intercomparison Projects[4].

Pymagicc also facilitates comparisons with other recently published simple climate models available from or written in Python, such as OSCAR[5] (Gasser et al. (2017)), Pyhector[6] (Willner, Hartin, and Gieseke (2017), Hartin et al. (2015)), and FAIR[7] (Millar et al. (2017).)

It can be installed using `pip` from the Python Package Index.[8] To enable Pymagicc to run under Linux and macOS the Wine[9] compatibility layer is used, usually being available from package managers.

Source code, documentation and issue tracker are available in Pymagicc's GitHub repository[10]. Usage examples are also contained in the repository as a Jupyter Notebook (Pérez

[1] http://magicc.org
[2] http://magicc.org/download6
[3] https://creativecommons.org/licenses/by-nc-sa/3.0/
[4] https://cmip.llnl.gov/
[5] https://github.com/tgasser/OSCAR
[6] https://github.com/openclimatedata/pyhector
[7] https://github.com/OMS-NetZero/FAIR-pro
[8] https://pypi.python.org/pypi/pymagicc
[9] https://www.winehq.org/
[10] https://github.com/openclimatedata/pymagicc

and Granger 2007; Kluyver et al. 2016). Thanks to the Binder project[11], the example notebook can also be run interactively and explored without the need to install Pymagicc locally.

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