



## Interfacing FORTAN Code with Python: an example for the Hydrus-1D model

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HYDRUS-1D is a popular software suite for one-dimensional modeling of flow and transport through the vadose zone [1]. Models can be handled through the Graphical User Interface (GUI), made freely available by the original authors (<https://www.pc-progress.com/>). As the program is file-based, the HYDRUS-1D GUI already ensures a certain degree of reproducibility, as these files contain all information about a model. The original FORTRAN code of the HYDRUS-1D model is also made available and is used in many publications to perform more complicated analysis of flow and transport through the unsaturated zone. For each of these publications new code was programmed to change the input files and perform a specific analysis. Being a popular hydrological model, it seems only logical to start reusing such code and structurally develop its capabilities. In the presentation, we introduce Phydrus, an open source Python package to create, optimize and visualize HYDRUS-1D models. Python scripts or Jupyter Notebooks are used for all steps of the modeling process, documenting the entire workflow and ensuring reproducibility of the analysis. Connecting HYDRUS-1D to Python makes it easier to perform repetitive tasks on models, and potentially opens up a whole new set of possibilities and applications. While introducing Phydrus, this presentation will also focus on the process of creating the Python Package and why we think it is worthwhile for the hydrologic community to interface existing (older) code with newer programming languages popular in the hydrological scientific community.

### References

[1] Šimůnek, J. and M. Th. van Genuchten (2008) Modeling nonequilibrium flow and transport with HYDRUS, Vadose Zone Journal.