

## CVM Topical Workshop (May 13-14, 2024): Tutorial on CVM Tools

### About This Tutorial:

This tutorial is focused on standardizing Community Velocity Models (CVMs) into unified formats to improve storage, exchange, extraction, and visualization capabilities. We will explore the use of GeoCSV (<http://geows.ds.iris.edu/files/geocsv/GeoCSV.pdf>) and netCDF-4 classic ([https://docs.unidata.ucar.edu/nug/current/netcdf\\_introduction.html](https://docs.unidata.ucar.edu/nug/current/netcdf_introduction.html)) formats. Both formats require that datasets be self-describing and contain sufficient metadata. We will demonstrate how to convert models into netCDF format, transform them into GeoCSV, and access them using Python packages such as Xarray.

### Repository and Software Requirements:

Access the tools for this workshop through the CVM GitHub repository at <https://github.com/cascadiaquakes/cvm-tools>. Ensure you are using the latest version of these tools, which are currently under development. All tools require Python 3.

### Package Installation and Preparation for the Tutorial:

1. Ensure Python 3 is installed on your system.
2. Create a directory specifically for this workshop.
3. Clone the repository: `git clone https://github.com/cascadiaquakes/cvm-tools`
4. Navigate to the tutorial directory and examine the `requirements.txt` file for necessary Python packages.
5. Create a virtual environment and activate it:
  - To create a virtual environment named `cvm-env`: `python3 -m venv cvm-env`
  - To activate the `cvm-env` environment: `source cvm-env/bin/activate`
6. Install the required packages: `pip install -r requirements.txt`

### Data Requirements:

Participants will need model data in CSV format along with corresponding metadata. You are welcome to bring your own model or use the provided Cascadia\_ANT+RF\_Delph2018 model available at [https://ds.iris.edu/ds/products/emc-cascadia\\_antrf\\_delph2018](https://ds.iris.edu/ds/products/emc-cascadia_antrf_delph2018). Data and metadata files for this model are located in the directory `sample-files/Cascadia-ANT+RF-Delph2018`:

- Metadata file: `Cascadia-ANT+RF_meta.txt`
- Data file in CSV format: `Cascadia-ANT+RF_data.txt` If bringing your own model, ensure your data is in CSV format and create a metadata file by copying and modifying the provided `Cascadia-ANT+RF_meta.txt` file.

**Using CVM Tools:**

During the tutorial, we will explore the following tools:

- `cvm_writer.py`: For converting data and metadata files to GeoCSV or netCDF formats.
- `netcdf_to_geocsv.py`: To convert netCDF files back to GeoCSV.
- `cvm_slicer.py`: To read, visualize, and extract data from netCDF files.

Please experiment with these tools prior to the workshop and come prepared with questions. Detailed instructions are available on the GitHub page:

<https://github.com/cascadiaquakes/cvm-tools/blob/main/README.md>

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