Figures 1 – 5: NCAR Command Language (NCL) scripts (<https://www.ncl.ucar.edu/get_started.shtml>), the Chesapeake bay airshed shapefile and grid cell latitude and longitude data are located in Pub\_figures.tar.zip. NCLD code can be downloaded from the NCAR website (<https://www.ncl.ucar.edu/Download/>) at no cost and figures 1-5 can be regenerated using the scripts and data archived here.

Figure 1: Emissions data used for this figure are in the EMISS.data.tar.zip archive.

Figure 2: Historical and Future downscaled monthly mean meteorology data used for this figure are in the WRF.data.tar.zip archive.

Figure 3: Historical and Future downscaled monthly mean meteorology data used for this figure are in the WRF.data.tar.zip archive.

Figure 4: Monthly mean EPIC soil ammonium data used in this figure are in the EPIC.data.tar.zip archive

Figure 5: Seasonal deposition data used in this figure are in the CMAQ.data.tar.zip archive.

Figure 6: These normalized bar plots are generated from the same seasonal deposition data as used in Figure 5 and these data are in the CMAQ.data.tar.zip archive.

Figure 7: The historical data in this figure are from annual total nitrogen deposition totals located the CMAQ.data.tar.zip archive. Historical data are from 12km simulations and are too large to archive, over 11 GB compressed, on science hub. These files have been archived on EPA’s high-performance computer cluster at /asm/MOD3APP/ezv/extract/Chesapeake\_bay and will be available upon request.

Table 1. This table summarized the annual emission totals. These data are in the EMISS.data.tar.zip archive.

Table 2. Describes the simulations and contains no additional data.

Table 3. Is a summary of the total deposition and emission changes over the Chesapeake Bay watershed and the data in this table originate from the deposition totals in the CMAQ.data.tar.zip archive and the EMISS.data.tar.zip archive.

Archive metadata

The modeled data in these archives are in the NetCDF format (<https://www.unidata.ucar.edu/software/netcdf/>). NetCDF (Network Common Data Form) is a set of software libraries and machine-independent data formats that support the creation, access, and sharing of array-oriented scientific data. It is also a community standard for sharing scientific data. The Unidata Program Center supports and maintains netCDF programming interfaces for [C](https://www.unidata.ucar.edu/software/netcdf/docs/), [C++](https://www.unidata.ucar.edu/software/netcdf/docs/), [Java](https://www.unidata.ucar.edu/software/thredds/current/netcdf-java/), and [Fortran](https://www.unidata.ucar.edu/software/netcdf/docs-fortran/). Programming interfaces are also available for Python, IDL, MATLAB, R, Ruby, and Perl.

Data in netCDF format is:

* **Self-Describing.** A netCDF file includes information about the data it contains.
* **Portable.** A netCDF file can be accessed by computers with different ways of storing integers, characters, and floating-point numbers.
* **Scalable.** Small subsets of large datasets in various formats may be accessed efficiently through netCDF interfaces, even from remote servers.
* **Appendable.** Data may be appended to a properly structured netCDF file without copying the dataset or redefining its structure.
* **Sharable.** One writer and multiple readers may simultaneously access the same netCDF file.
* **Archivable.** Access to all earlier forms of netCDF data will be supported by current and future versions of the software.

Pub\_figures.tar.zip

Contains the NCL scripts for figures 1-5 and Chesapeake Bay Airshed shapefile. The directory structure of the archive is ./Pub\_figures/Fig#\_data. Where # is the figure number from 1-5.

EMISS.data.tar.zip

This archive contains two NetCDF files that contain the emission totals for 2011ec and 2040ei emission inventories. The name of the files contain the year of the inventory and the file header contains a description of each variable and the variable units.

EPIC.data.tar.zip contains the monthly mean EPIC data in NetCDF format for ammonium fertilizer application (files with ANH3 in the name) and soil ammonium concentration (files with NH3 in the name) for historical (Hist directory) and future (RCP-4.5 directory) simulations.

WRF.data.tar.zip contains mean monthly and seasonal data from the 36km downscaled WRF simulations in the NetCDF format for the historical (Hist directory) and future (RCP-4.5 directory) simulations.

CMAQ.data.tar.zip contains the mean monthly and seasonal data in NetCDF format from the 36km CMAQ simulations for the historical (Hist directory), future (RCP-4.5 directory) and future with historical emissions (RCP-4.5-hist-emiss directory).