**CosmoChron Guide**

For detailed information, refer to: **CosmoChron: A versatile age-depth modeling approach using cosmogenic nuclides and direct age constraints.**

**Important**

To utilize CosmoChron, you must download the SIPPI toolbox from https://github.com/cultpenguin/sippi and add it to your path by running the following commands in the MATLAB command window:

>> addpath sippi

then run >> sippi\_set\_path

**Scripts**

The main branch contains seven MATLAB scripts:

1. **Run\_CosmoChron.m**
   * This script runs CosmoChron. You can either type in or import your data. All settings are listed and described at the top of the script.
2. **Plot\_a\_CosmoChron\_age\_depth\_realization.m**
   * This script plots a single age-depth realization of the prior model, which helps guide the prior settings.
3. **Generate\_synthetic\_test.m**
   * This script generates a synthetic test case (a reference model) and saves it in your workspace as TrueToFit.mat.
4. **Run\_CosmoChron\_for\_synthetic\_test\_cases.m**
   * This script runs CosmoChron for the synthetic test case generated by Generate\_synthetic\_test.m.

Non-interactive scripts:

1. **CosmoChron\_forward.m**
   * This is the forward code for CosmoChron.
2. **sippi\_forward\_CosmoChron.m**
   * This script changes the format of the settings in scripts 1-4 to be suitable for SIPPI.
3. **SimpleBurialBalcoMCMC.m**
   * This script calculates simple burial ages using the Metropolis algorithm, as described in the caption for figure S8 in the supplementary material.

**Getting Production Rates**

To obtain production rates and attenuation lengths, go to the Get-production-rate folder/branch. Run AlBe\_production\_rate(elevation, latitude, longitude) in the command window or at the top of getproduction\_rate\_and\_plots.m.

Here, elevation is in meters, and latitude and longitude are in degrees. This will generate a file called b.m, which contains all the production rates and attenuation lengths. Move or copy b.m into your main folder to use these values in CosmoChron.

**Complex Pre-Burial History**

To apply a complex pre-burial history for CosmoChron, download the P-PINI tool from <https://github.com/cosmoJesper/PPINI>. Then run MC\_AlBe\_source\_final.m using your desired settings. This script generates a file called mc\_source.mat, which should be placed in your main folder. Set n2=1 to apply these complex pre-burial settings in CosmoChron.