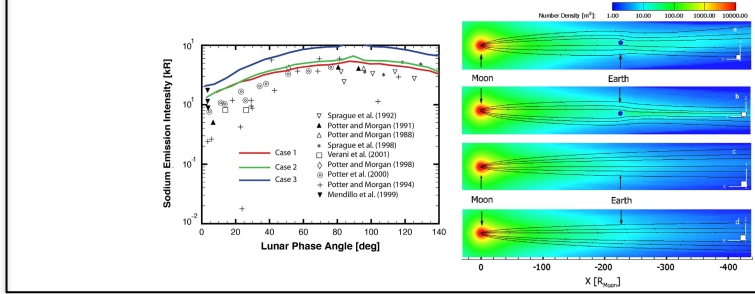

Simulation of SEPs in the heliosphere with SWMF/AMPS

Valeriy Tenishev

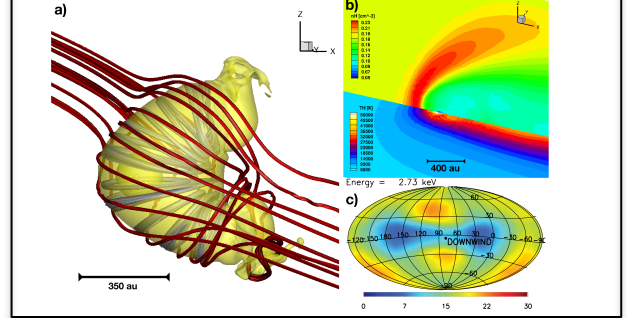


Adaptive Mesh Particle Simulator (AMPS)

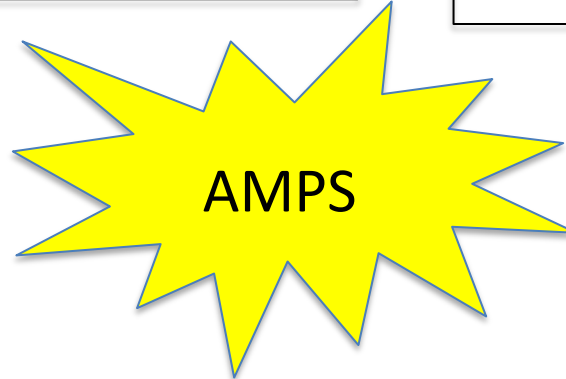
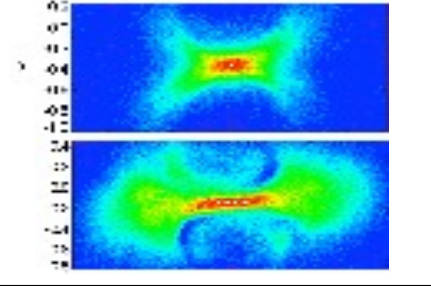
Exospheres of planetary satellites



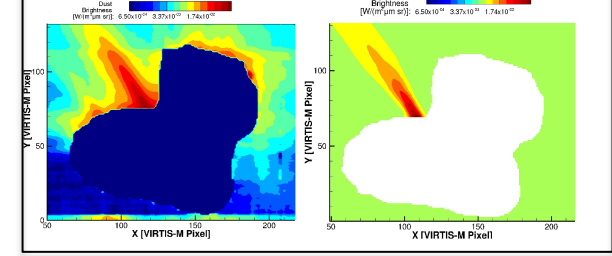
Hydrogen population in the outer heliosphere



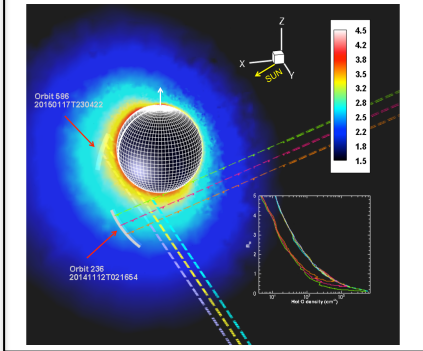
Kinetic plasma phenomena



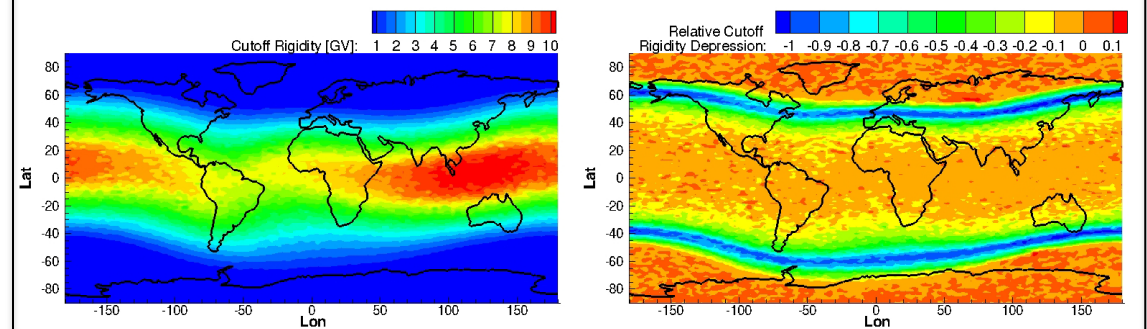
Charged dust



Planetary exospheres

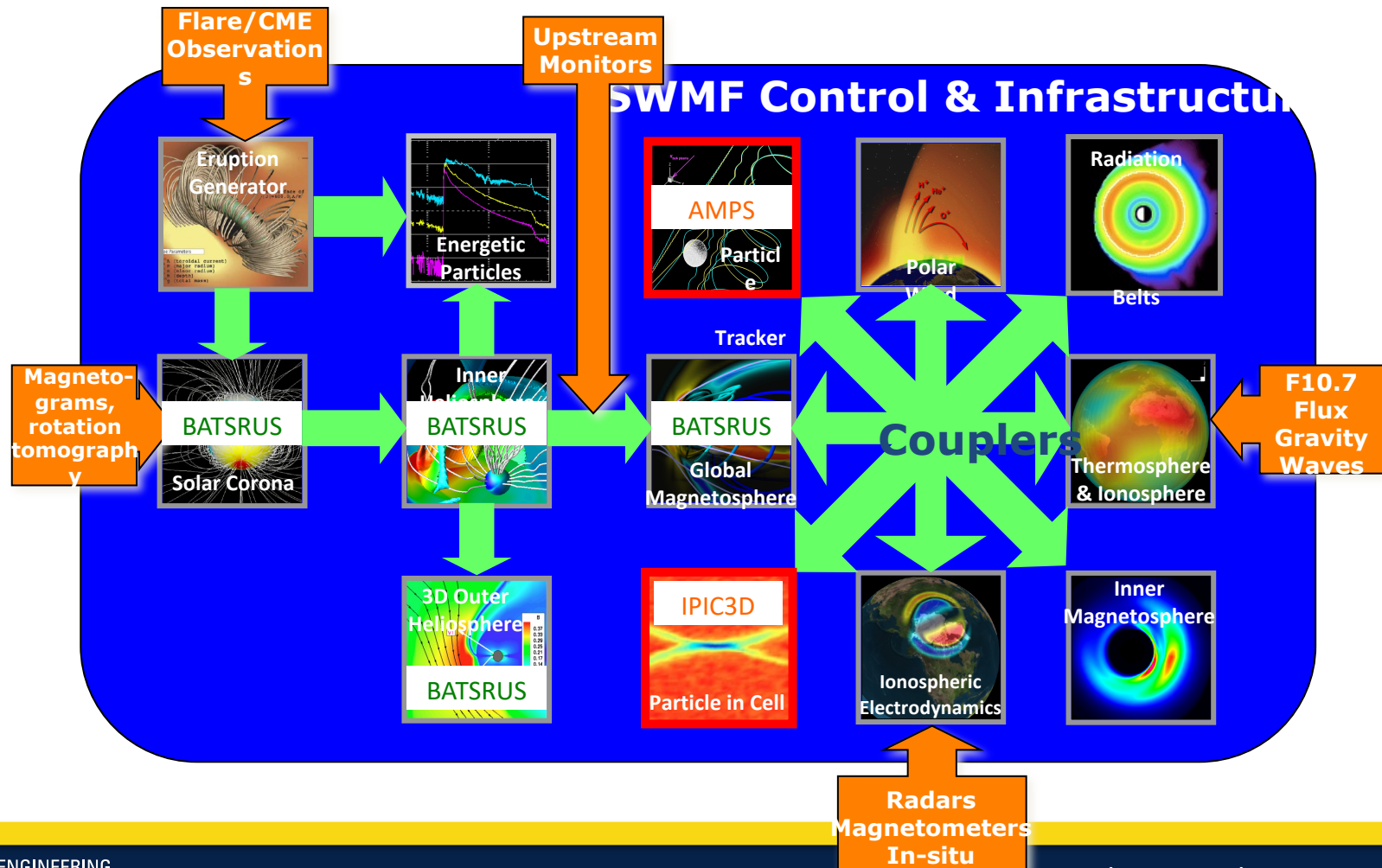


Energetic particle radiation



Adaptive Mesh Particle Simulator (AMPS)

Space Weather Modeling Framework



AMPS in CCMC



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Welcome to the new CCMC website!

Please note that some pages may have moved during the migration. If you experience any issues with the new website, please reach out to gsfc-ccmc-support@lists.hq.nasa.gov.

[Home](#) > [Model Catalog](#)

Last Updated: 06/06/2022

AMPS

Version: 2016

[→ Runs-on-Request](#)

AMPS: Trajectories (position, velocity) of individual particles inserted into completed global magnetosphere simulation.

Sections in this page

[Inputs](#)

[Outputs](#)

[Figures](#)

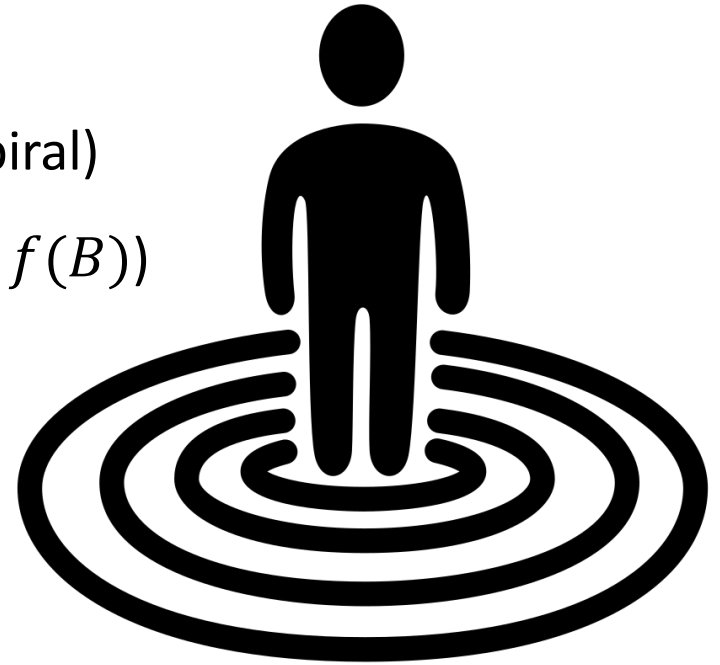
[Domains](#)



SEPs in AMPS

A user can select:

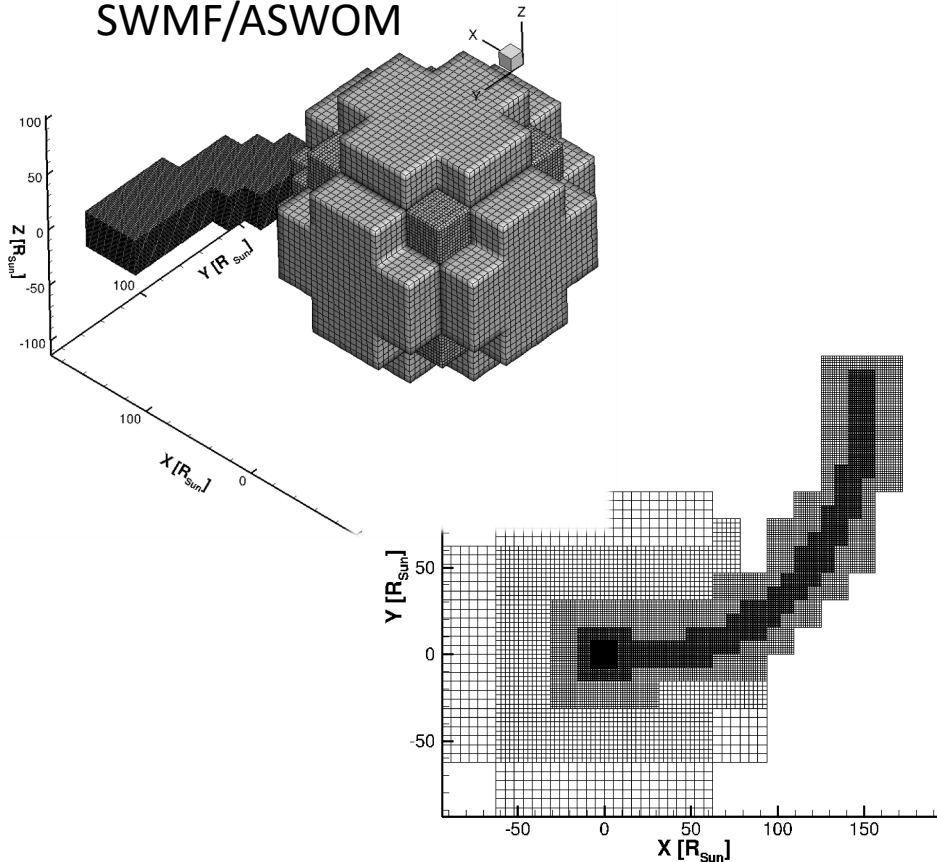
1. Parker or Focused Transports equation
2. 3D or magnetic field line (SWMF, Parker spiral)
3. Turbulence model (SWMF/AWSOM, $\delta B = f(B)$)
4. Diffusion coefficient
5. Seed population, injection efficiency
6. Background solar wind model



3D vs field line transport

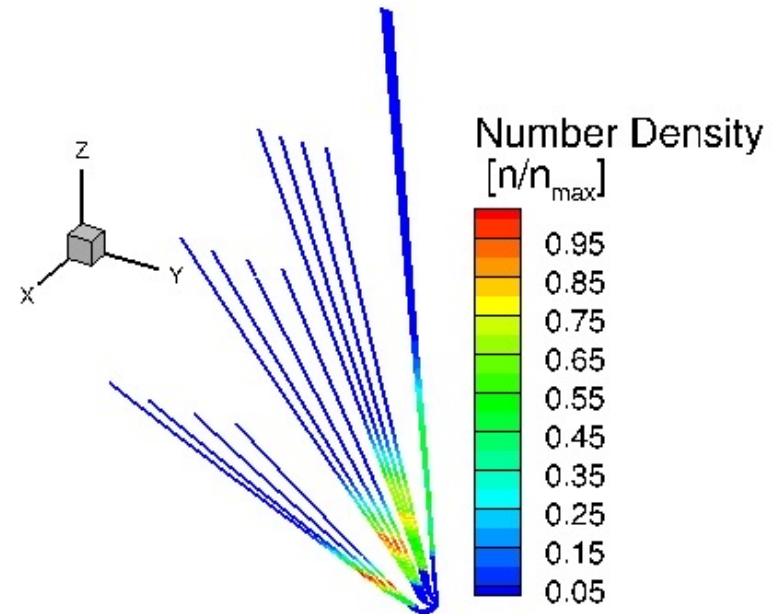
Transport in 3D:

1. Transport and acceleration of SEPs and GCRs
2. Time-dependent MHD parameters: SWMF/ASWOM

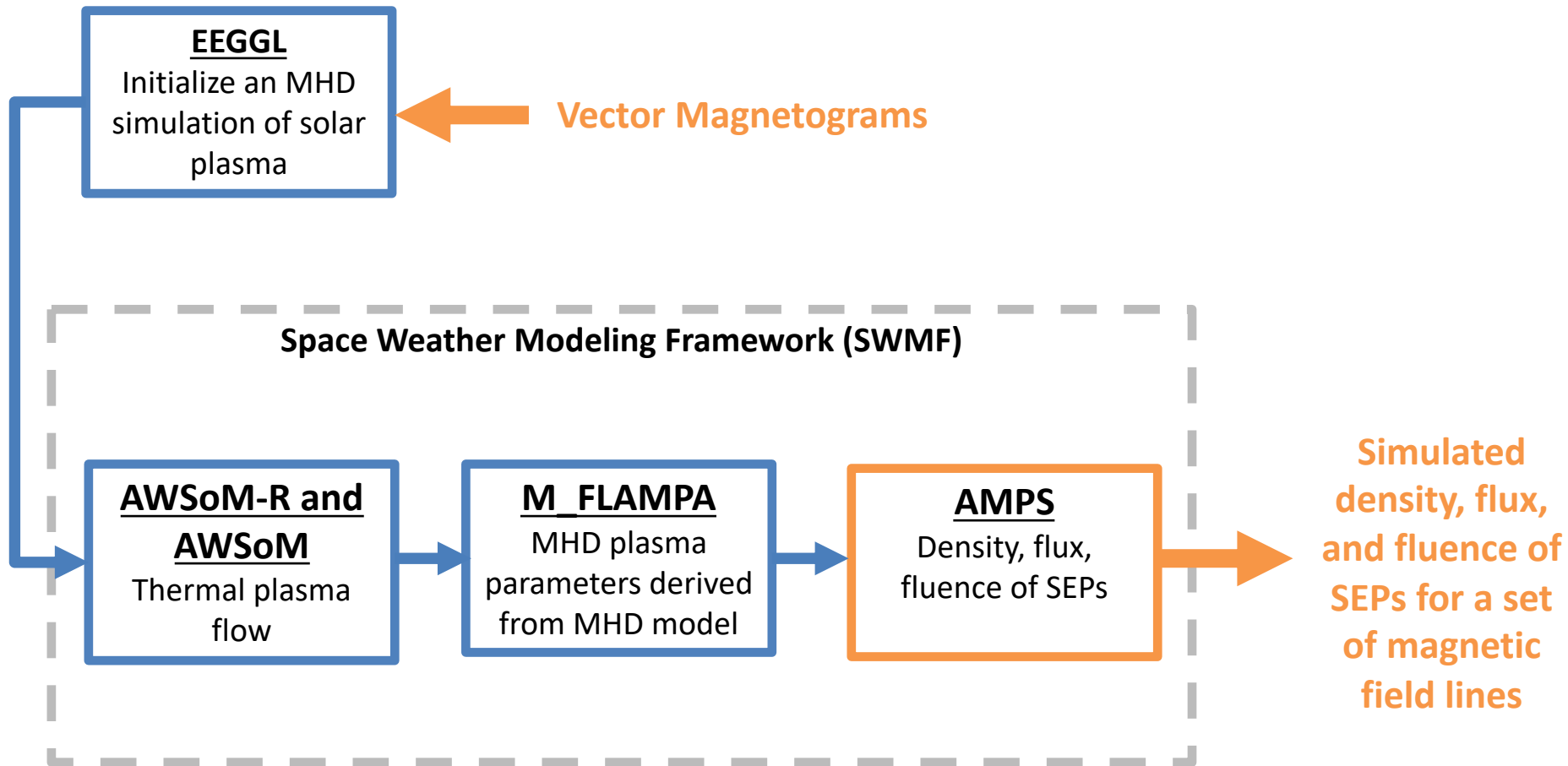


Transport along magnetic field lines:

1. Transport and acceleration of SEPs
2. Time-dependent topology and MHD parameters: SWMF/M-FLAMPA



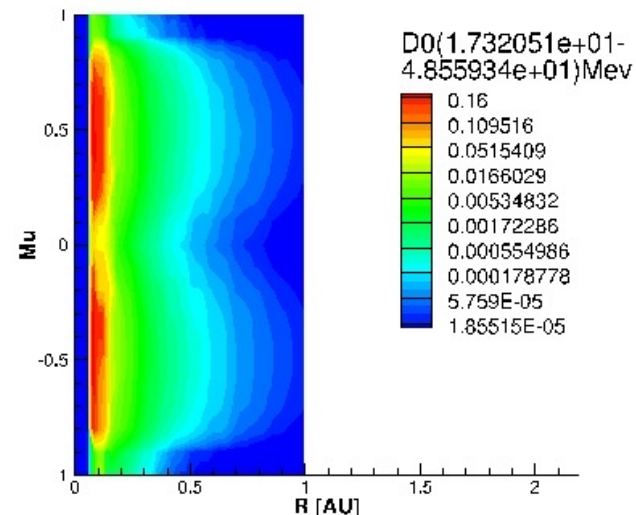
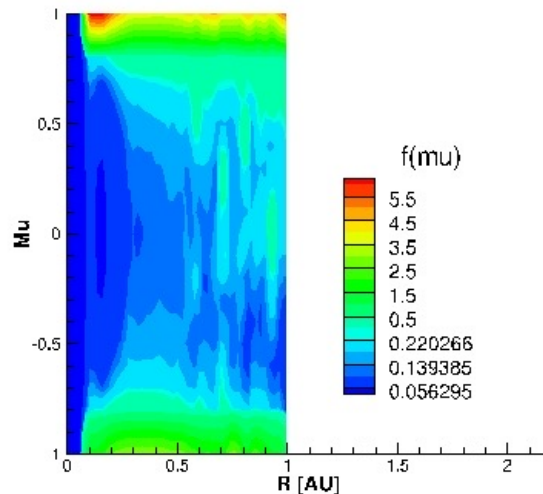
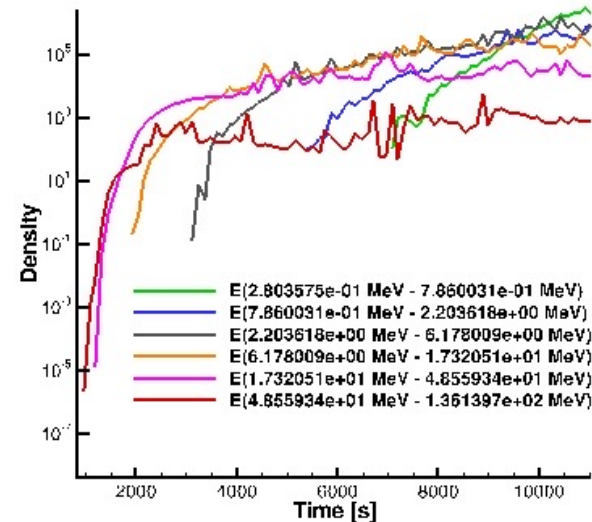
SEPs in AMPS: workflow



SEPs in AMPS: Current status

Example:

1. Seed population $f \sim p^{-5}$
2. Sun-to-Earth:
 - Coupled SWMF/SC, SWMF/IH, SWMF/M-FLAMPA, SWMF/AMPS



SEPs in AMPS: Current status

- **SEPs in AMPS:**
 1. Magnetic field lines: 1.05 R_{sun} -> 1 AU and further
 2. Run-time coupling SWMF/SC, SWMF/IH, SWMG/M-FLAMPA, and SWMF/AMPS
 3. SEPs in geospace

- **GCRs in AMPS:**
 1. We experiment with the domain size of 5 AU
 2. Drift and diffusion included

- **All in one package:**
 1. SWMF/AMPS: SEPs, GCRs in the heliosphere and geospace
 2. SWMF/SC, SWMF/IH, SWMF/GM, SWMF/M-FLAMPA

