For use:
These simulations are provided free to use with proper reference.

Please reference the following papers for use:

science: Hill, A. S., Mac Low, M.-M., Gatto, A., & Ibáñez-Mejía, J. C., 2018, ApJ, 862, 1

repository: Hill, A. S., Mac Low, M.-M., Gatto, A., & Ibáñez-Mejía, J. C., 2018, Digital repository of the American Museum of Natural History, doi: 10.5531/sd.astro.2

Flash code: Fryxell et al. 2000; Dubey et al. 2008

And the CATS release paper (Burkhart et al. 2020).

If you have questions, or would like additional snapshots, please email: Dr. Mordecai-Mark Mac Low at mordecai@amnh.org or Dr. Alex S. Hill at alex.hill@ubc.ca.

The simulations presented here were computed with the Eulerian, adaptive mesh refinement, magnetohydrodynamics (MHD) code FLASH (Fryxell et al. 2000, Dubey et al. 2008) version 4.2. The equations solved were those of compressible ideal gas dynamics and MHD including terms to model the diffuse heating and cooling of interstellar gas, supernova heating, and a static background potential representing the stars and dark matter of a galactic disk.

The models were run on a rectangular base grid 1 × 1 × 40 kpc in size, centered on the midplane of the Galaxy and extending $|z| = 20$ kpc above and be- low the midplane. The maximum grid refinement varies with height, reaching values as small as $\Delta x = 0.98$ pc in the innermost 100 pc, and then increasing with height as shown in Table 2 of Hill et al. (2012). Periodic boundary conditions were used on the sides, and a zero-gradient outflow boundary condition at the top and bottom.

We include field variable (plt_cnt) and particle (part) output from the models listed in Table 1 of Hill et al. (2018), along with example python code to read the HDF5 files using yt (Turk et al. 2011). This parameter study focused on the effect of varying the diffuse heating rate, while also varying the initial magnetic field, numerical resolution, gas surface density, and supernova rate. The output files are HDF5 files including all field variables for each of these runs at a time of t = 200 Myr, when they have reached dynamical equilibrium, providing models for ISM turbulence in both the plane and the fountain flow of the galaxy.

The field variable plot files all contain the following fields:

`'dens'`: gas density in units of g cm^{-3}. The simulations were conducted assuming a mean gas phase mass per hydrogen atom μ=1.375; we divided by 1.375 times the mass of a proton to convert to cm^{-3}.
`'temp'`: temperature in K.
`'velx'`, `'vely'`, `'velz'`: x, y, and z components of bulk velocity in cm s^{-1}.

Magnetized (bx5) models also include:
`'magx', 'magy', 'magz'`: *x, y*, and *z* components of magnetic field strength B in G

The particle files include the positions of superbubbles that were active at 200 Myr.

The file names identify the simulation and midplane resolution; see Tables 1 and 2 of Hill et al (2018). The fields in the file name have the following meanings:

`sn:` total supernova rate (Myr^{-1} kpc^{-2})
`smd:` surface mass density (0.1 $M_{\odot}$ pc^{-2})
`bx:` initial *x*-component of the magnetic field (μG); zero unless specified
`nigm:` approximate log of IGM density (cm^{-3}); -7 unless specified
`pe:` photoelectric heating rate (10^{-27} erg s^{-1})
`pc:` midplane resolution (pc)