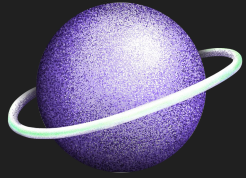


The background is a black space filled with numerous small white stars. Several planets are scattered throughout: a large blue planet with green continents in the top left; a smaller red planet with a white ring in the top left; a large yellow planet in the top center; a large orange planet in the middle right; a large blue planet in the bottom right; a small green planet with a white ring in the bottom right; a small red planet in the bottom left; and a small blue planet in the bottom left. A thin white line representing an orbit or path curves through the bottom left and bottom right.

Third Sprint Review

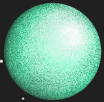
Jacob Sampley

Cellular Automata and Astronomy



Goals for this sprint

- Properly narrow my topic with the advice given in the last review
- Conduct further research/review literature of my narrowed topic
- Find some delightful graphics
- Present my findings thus far



Topic: Officially Narrowed

Q: How should I narrow my research topic on cellular automata? I could talk about astronomy, earthquakes, etc., but I can't figure it out.

A: You should narrow your research topic on cellular automata to the study of cellular automata in astronomy.

Q: Are you sure? How do cellular automata apply in the subject of astronomy?

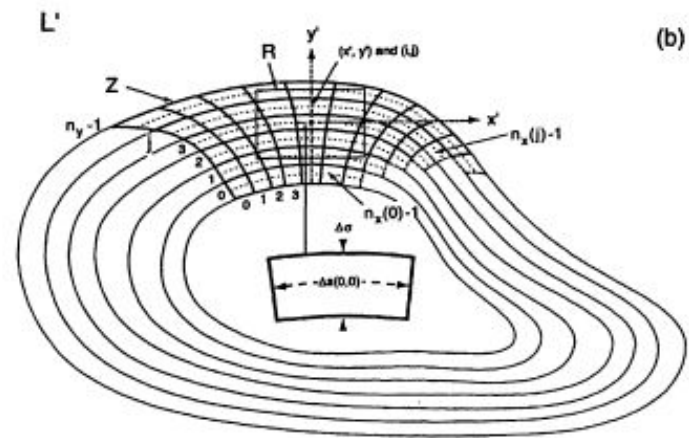
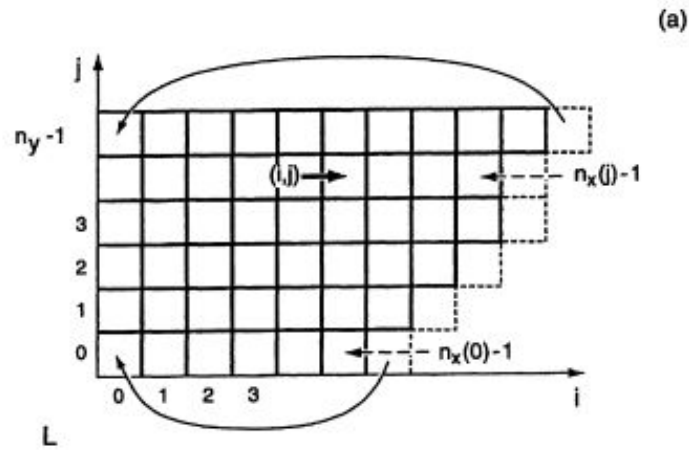
A: I am sure. Cellular automata are used to model the formation of stars and planets.

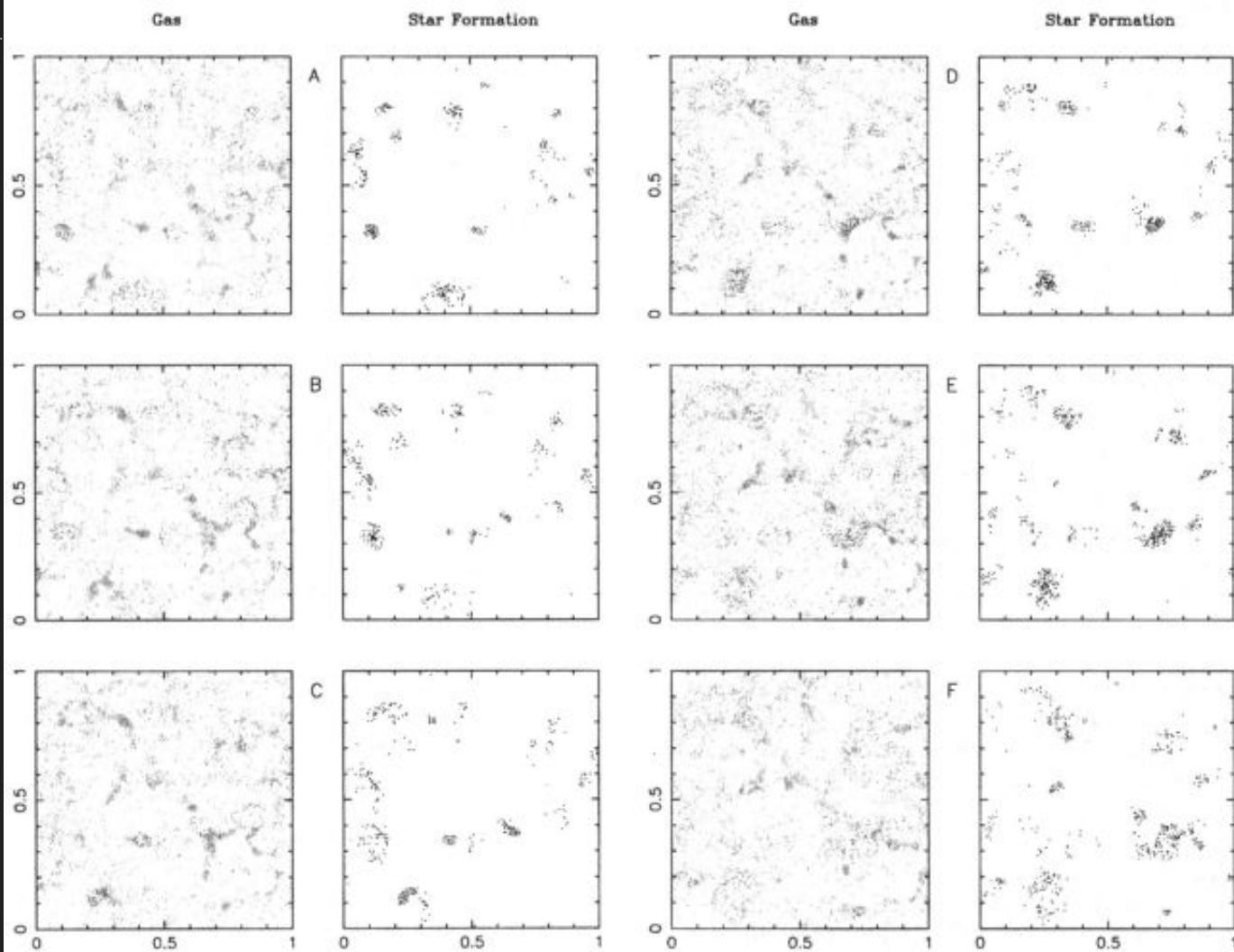
Full disclosure, I got much of my topic from an AI. However, until it can challenge me in court, I will claim the idea as my own.

Q: How are cellular automata used to model star and planet formation?

A: Cellular automata are used to model star and planet formation by simulating the gravitational interactions between particles.

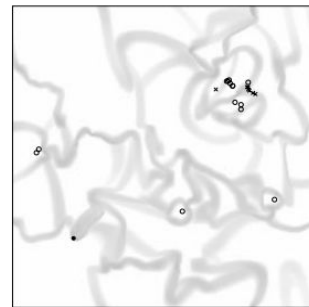
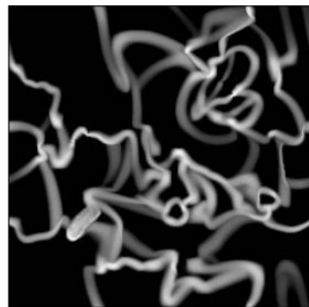
4. Dynamics of the CA simulation



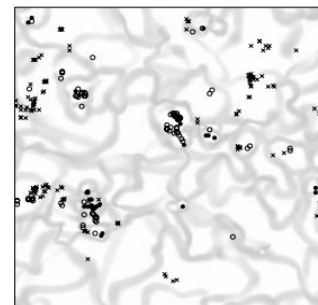
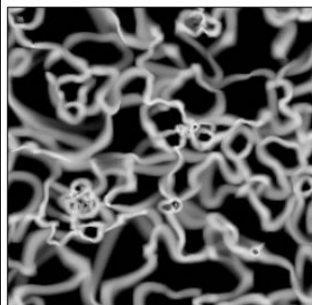


(Gardiner,
Turfus, Wang;
1998)

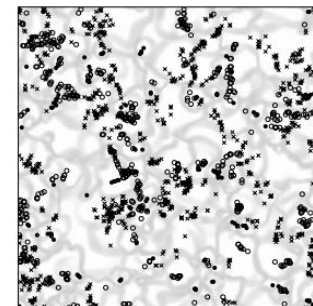
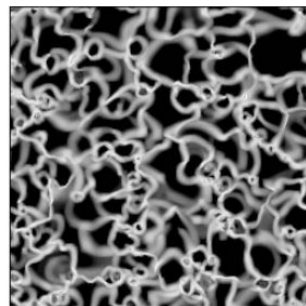
$$N_{\text{sf},21} = 3.0$$



$$N_{\text{sf},21} = 1.0$$



$$N_{\text{sf},21} = 0.5$$



(Chappell & Scalo; 2012)

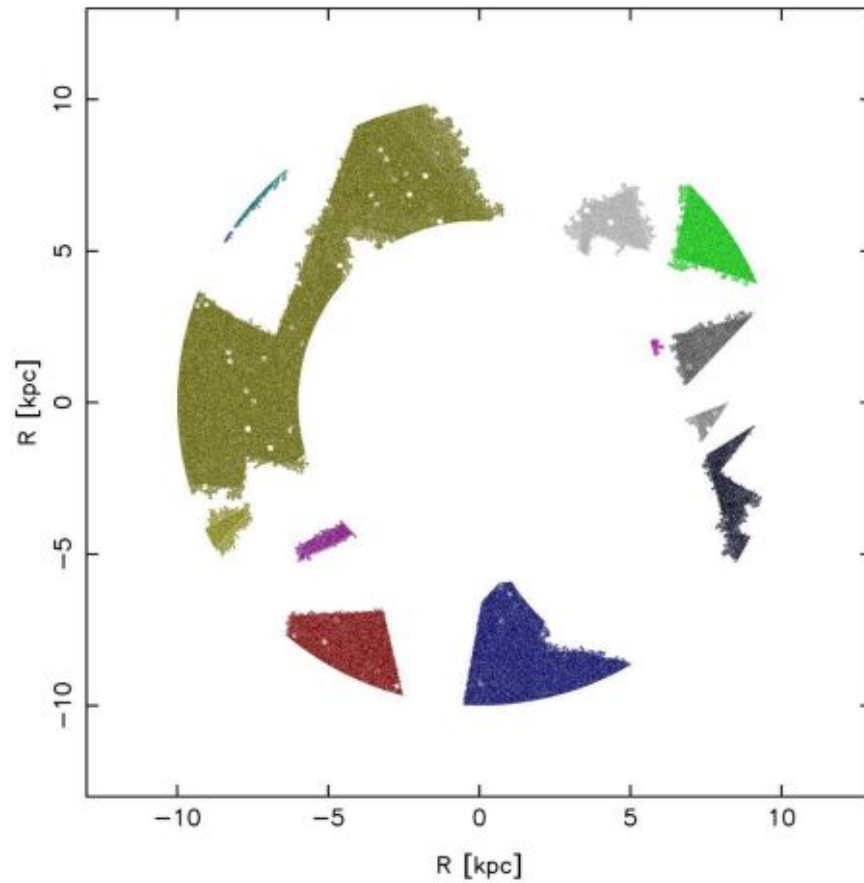
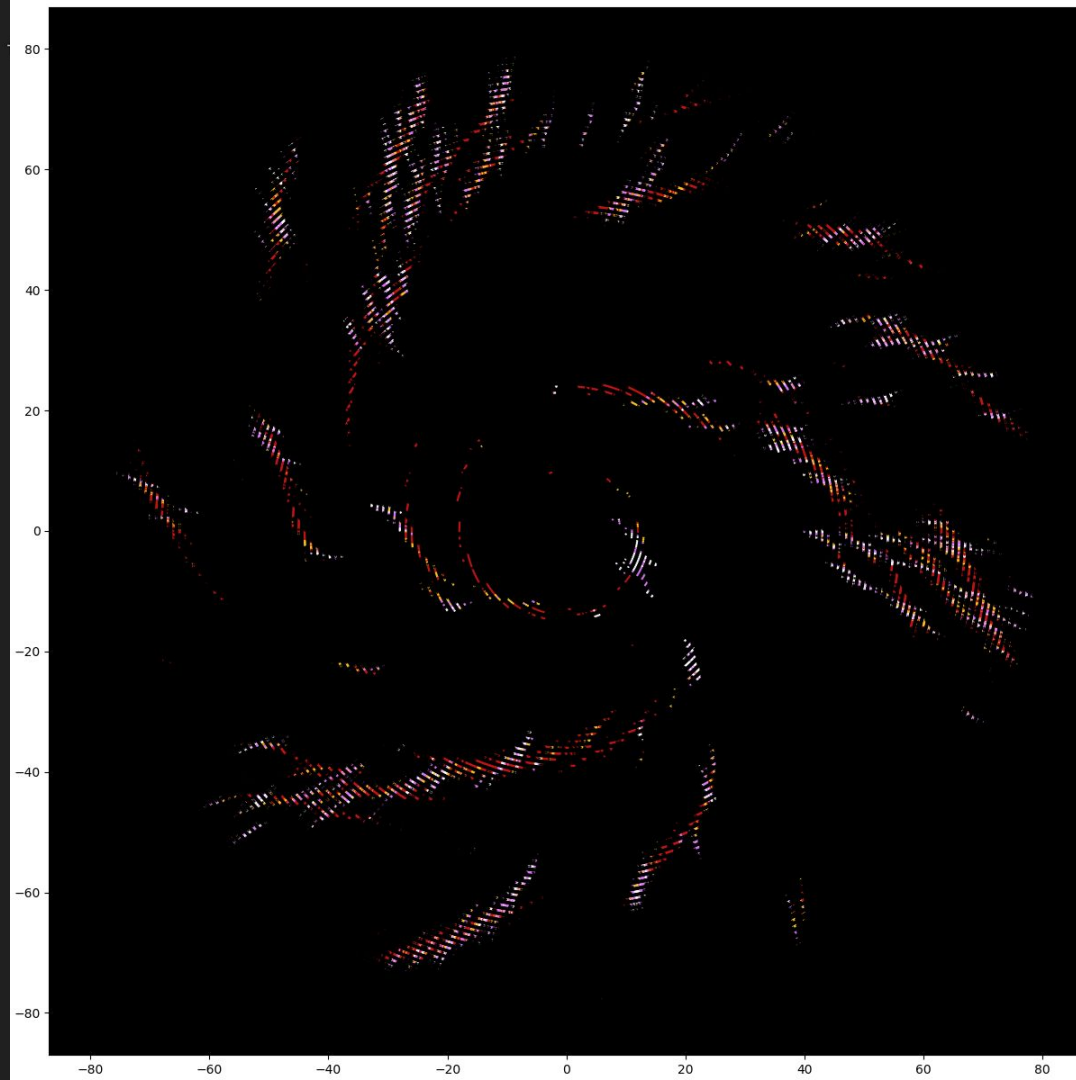


Figure 4. *An example of clusters formed in the coarse-grained PCA model of the Galactic Habitable Zone; scales are in kpc, and the snapshot corresponds to "late" epoch.*

(Vukotić & Ćirković;
2012)



(Block; 2020)



I will write my paper.

Goals for next sprint

As far as I can tell: There isn't one!



Works Cited

Block, Adam. "Galactic Cellular Automaton." *Adam Block - Fine Astrophotography*, 20 Jun. 2020.

Online: (adamblockphotos.com).

Chappell, D., Scalo, J. "Wind-driven gas networks and star formation in galaxies: reaction-advection hydrodynamic simulations." *Monthly Notices of the Royal Astronomical Society*, Volume 325, Issue 1, Jul. 2001, pp. 1–33, Online: (doi.org).

"Galactic Cellular Automaton." *Youtube*, uploaded by Adam Block, 21 Jun. 2020. Online: (youtube.com).

Gardiner, L. T., Turfus, C., Wang, M. "A Hybrid *N*-Body/Cellular Automaton Scheme for Modelling Propagating Star Formation in Galaxies." *Publications of the Astronomical Society of Japan*, Volume 50, Issue 4, 1 Aug. 1998, pp. 375–387. Online: (doi.org).

Perdang, J. & Lejeune, André. "Cellular Automaton experiments on local galactic structure. I. Model assumptions." *Astronomy and Astrophysics Supplement Series*, Volume 119, pp. 231-248, 2 Oct. 1996. Online: (doi.org).

Vukotić, B., Ćirković, M. "Astrobiological Complexity with Probabilistic Cellular Automata." *Origins of Life and Evolution of Biosphere*, Volume 42, pp. 347-371, 29 Aug. 2012. Online: (doi.org).