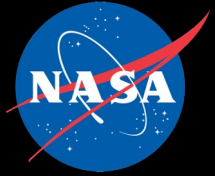


# A Stormy, Active Sun May Have Sparked Life on Earth



The origin of life on earth most likely required a spark. For decades, scientists have speculated that “warm little ponds” of chemicals on earth’s surface could have been energized by heat from lightning. Take an organic chemical-rich soup, add energy, and amino acids, the basis of all life on earth, will begin to form naturally.

While lightning is common on earth today, it may not have been in the atmosphere of the early earth. The sun at that time is thought to have been 30% dimmer than it is now. With less sunlight to warm the atmosphere, clouds may not have had the energy to form the convective friction necessary for lightning. Could another source of energy been responsible for sparking life?

Data from NASA’s Kepler mission, pointed to a new idea: energetic particles from our Sun. It turns out that solar energetic particles are a more efficient energy source, and the early Sun was much more active with large space weather events occurring more commonly than today. Results from this work suggest that our active young Sun could have catalyzed the precursors of life more easily and abundantly than lightning. An interesting possibility is that this may have allowed life to form earlier than currently thought.



A closeup of a solar eruption, including a solar flare, a coronal mass ejection, and a solar energetic particle event.

K. Kobayashi, et al., 2023: “Formation of Amino Acids and Carboxylic Acids in Weakly Reducing Planetary Atmospheres by Solar Energetic Particles from the Young Sun,” *Life*, 13, 1103.