The Evolution of Star Habitable Zones

Jeffrey J. Wolynski
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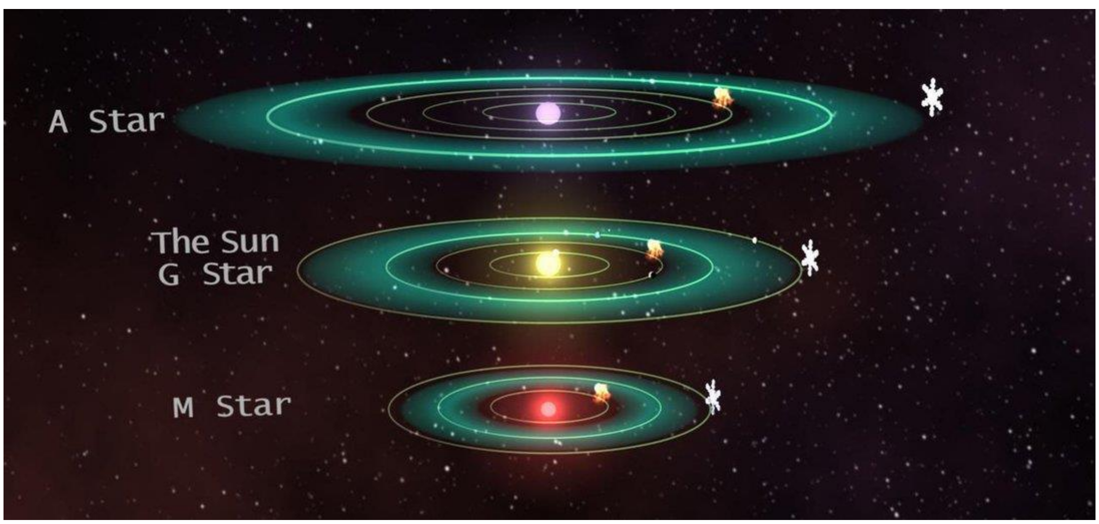
Rockledge, FL 32922

Abstract: It was discovered that planets are older, evolving stars. This means the Circumstellar Habitable Zone collapses and/or shrinks into the star itself, thus evolves as the star evolves. Explanation is provided.

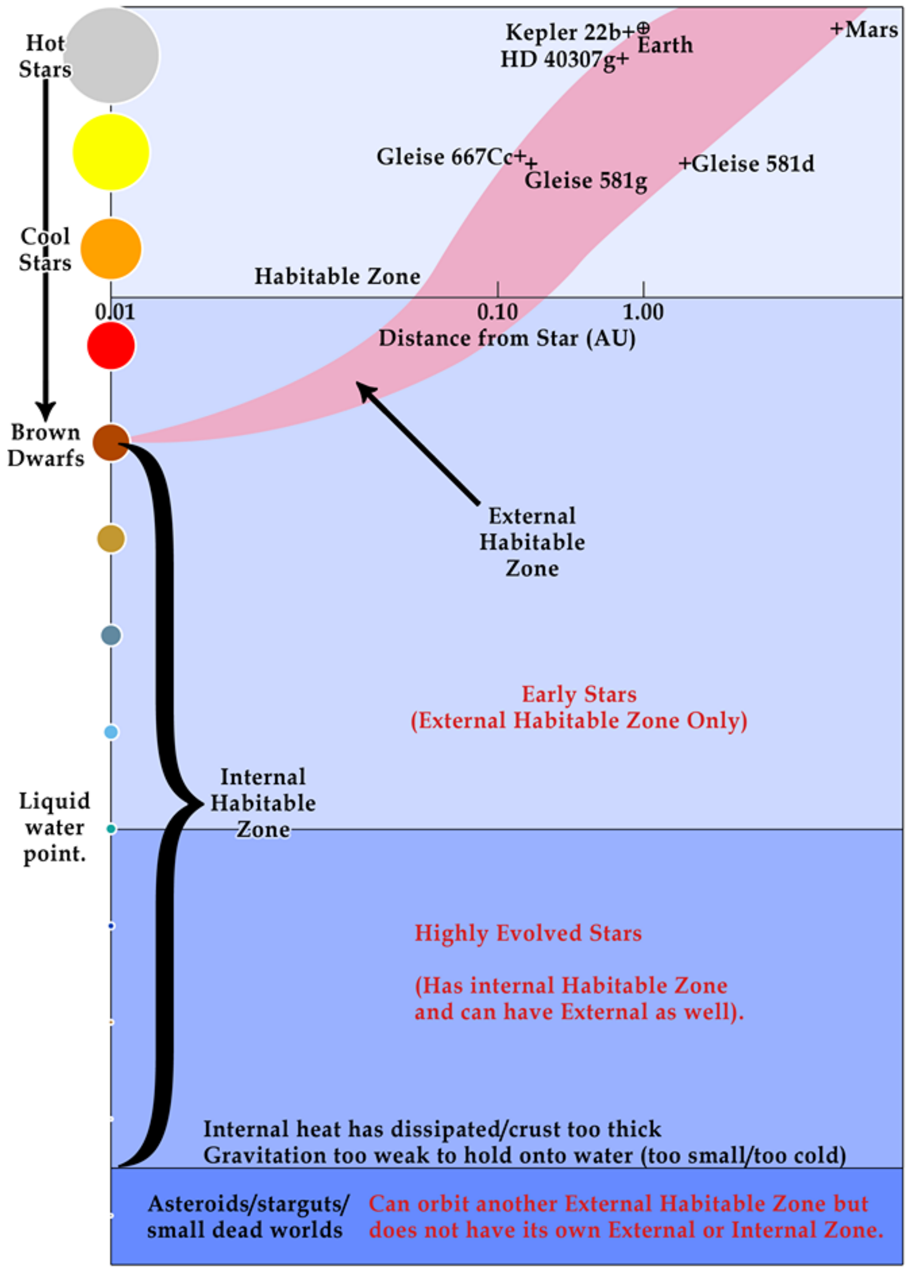
The habitable zone of a star is the area where liquid water exists or can exist. Since stars cool down and become water worlds as they evolve, combining their hydrogen with the leftover oxygen in large amounts, it is easy to see what happens. The star is too hot in the beginning to form water, or sustain it, but it can heat up other much colder stars allowing them to pool water on their surfaces from a distance. As the star cools and evolves, the distance it can do this diminishes considerably and its habitable zone shrinks.

Blue giants have the largest habitable zones, but they quickly contract because they are so young and are evolving rapidly to cooler, less massive states. What this means is that the time variable for the habitable zones of these objects is quite small. The activity of more evolved stars around blue giants should be short-lived, but interesting to say the least. White stars have smaller habitable zones but are still very large. Orange dwarfs have even smaller habitable zones, as well show a noticeable thinning of the zone as opposed to earlier stages. Red dwarfs have very small external habitable zones and the smallest external habitable zone belongs to only the smallest brown dwarfs, which still have a small amount of heat to radiate the surface of another more evolved star. Three external habitable zones are shown below. Notice how the zone both shrinks in diameter and thickness.

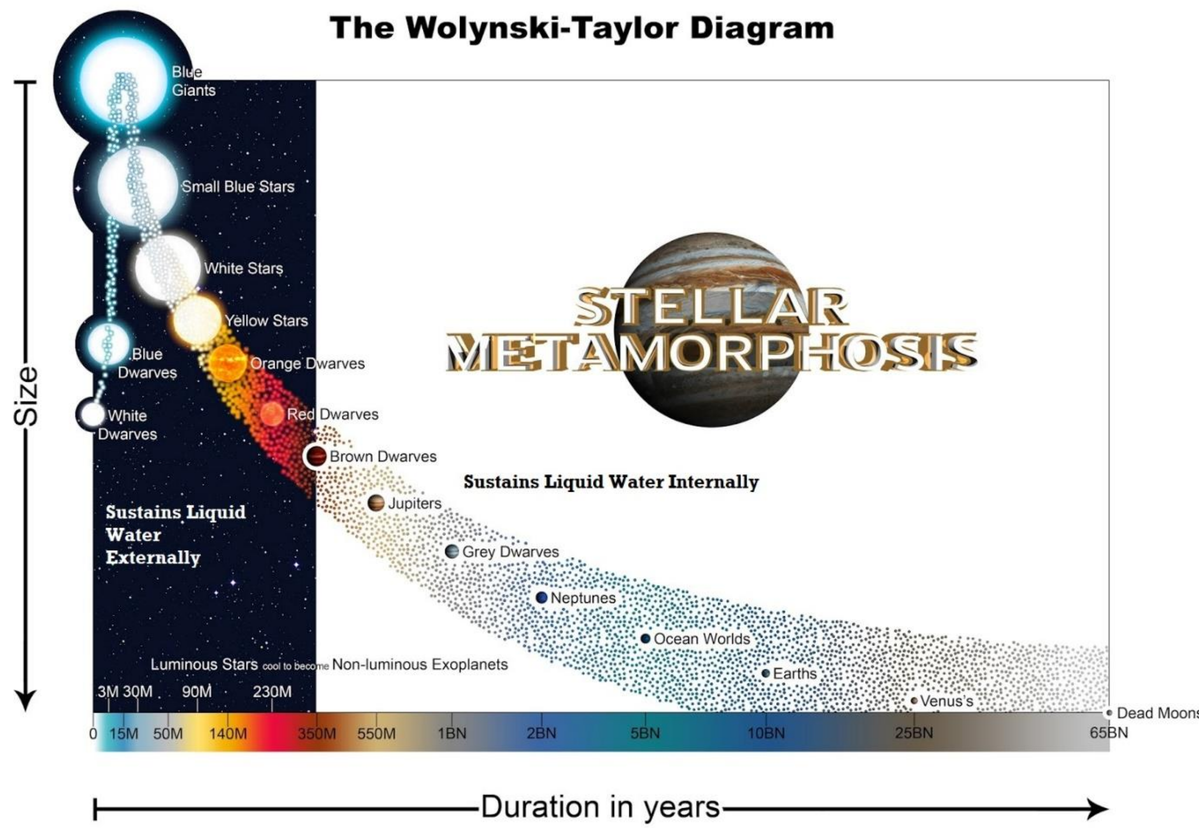


Source: NASA

After brown dwarf stages of stellar evolution, the internal temperatures are low enough to allow water to begin forming, meaning the habitable zone of the star internalizes. The heat from earlier stages of evolution (metamorphosis) keeps the water liquid. This means it does not need the heat from another star to keep its habitable zone. As the brown dwarf cools, the habitable zone moves more towards the center of the gas giant, and the top atmosphere cools significantly, to where water would just be ice crystals. This means the habitable zone becomes fully internalized, where the internal heat can keep water liquid, and the top atmosphere is too cold. Over time, the thick atmosphere diminishes and the star continues to lose mass, and internal heat energy, and the habitable zone moves further towards the center of the star.



Eventually the star reaches ocean world stages. The water available on the surface can be heated in large amounts both externally and internally, as the thick atmosphere no longer prevents surface heating from being in an external habitable zone of another star. This is the interesting part. The habitable zone can be both in the star itself, and the star can be orbiting inside the external habitable zone of a completely different star. It can have a double habitable zone. Over time though, the heat from the internal regions of the highly evolved star begins diminishing and its ability to keep ocean water liquid slows down, due to internal crust formation. It will begin relying on orbiting inside the external habitable zones of hotter stars, to maintain its water. Though the double habitable zone can exist for extreme periods of time as has the Earth, it all depends on how evolved the star is. Venus for example, placed in Earth's orbit would only have one habitable zone, because there is no mechanism to sustain internal heat. The crust has solidified very deeply, preventing internal heating. Since the concept of having a double habitable zone is very new, it is suggested to look into stars having them, as those are the most likely to host life, of course given other variables are met as well, such as having the right pressures, and the star has evolved long enough, above the Taylor Threshold.



Remember though, and this is very important, establishment dogma and the vast majority of University researchers and scientists reject the discovery that planets are simply older, evolving stars, so to them the habitable zones cannot evolve in the way outlined in this paper.

Unfortunately, they are wrong, and are on the wrong side of history.

Habitable zones and stars evolve together. As the star evolves, the habitable zone evolves. When the star dies, the internal habitable zone disappears, and can therefore only rely on external habitable zones to sustain liquid water/life.