Under pressure: defining the limits of life on Ocean Worlds

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"Ocean worlds" are defined as planetary bodies with a current liquid ocean. This includes planet Earth, as well as icy moons of the outer solar system: Saturn's moon Titan and Jupiter's moons Ganymede and Europa. While microbial life is found on Earth in the deepest parts of the ocean and in the subseafloor, oceans on icy moons represent targets of future NASA and ESA missions to look for potential life. Pressure increases as a function of depth in ocean worlds, however, the range of pressures encountered in icy moons' oceans is much larger than in Earth's ocean. On Earth, pressure is known to affect the physiology and metabolism of microorganisms. **The goal of this project is to define the limits of microbial sulfate reduction under high hydrostatic pressure to evaluate how microorganisms influence biogeochemical cycles (e.g. S, C) at depth.** We used the sulfate-reducing bacterium *Desulfovibrio hydrothermalis* AM13 as a model organism to determine the influence of pressure on microbial sulfate reduction and survival in short-term cultures. Cell density influenced the survival of bacteria under pressure: the denser the starting culture, the more resistant to pressure. Our results indicate that pressure influences the lifestyle of bacteria and promotes a biofilm-like organization in dense bacterial cultures, that might preserving their viability under pressure.