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Thirsty Walls: A New Paradigm for Air Revitalization in Life Support

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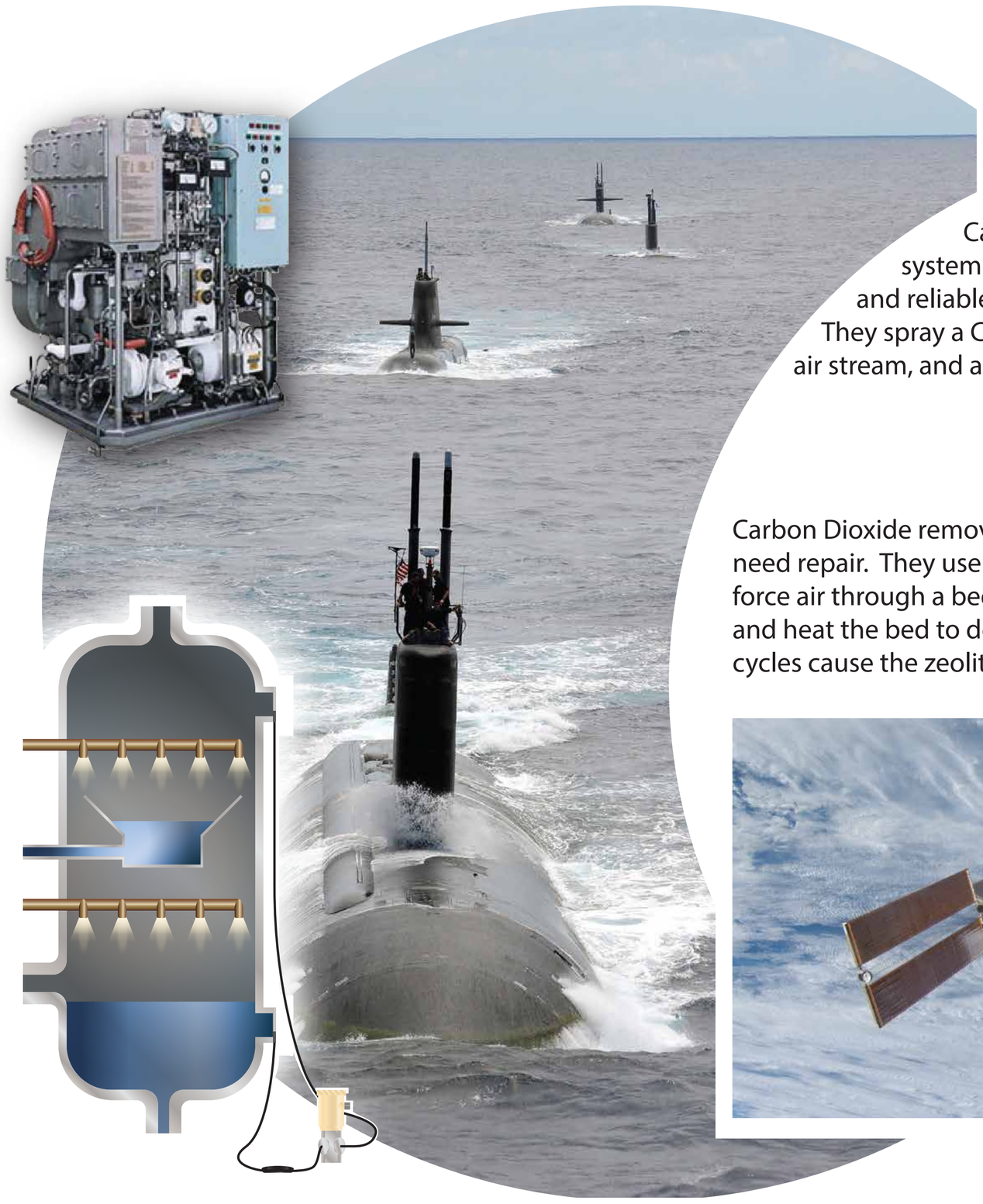
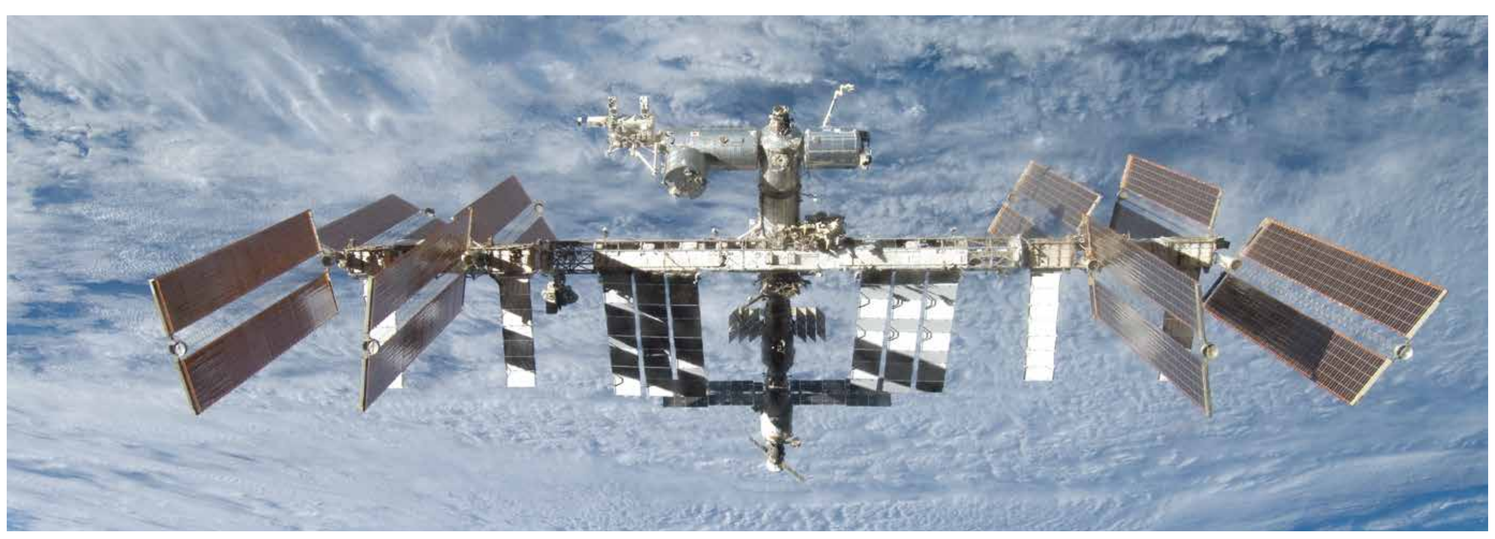


The Problem:

Carbon Dioxide removal systems on submarines are compact and reliable. They use solubility chemistry. They spray a CO_2 adsorbing chemical directly into the air stream, and allow the liquid to settle.

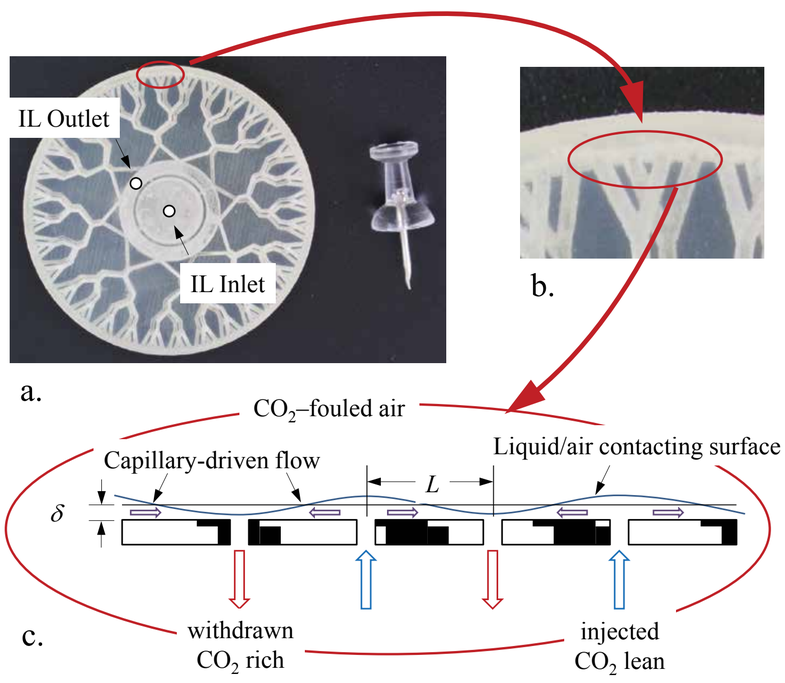
Carbon Dioxide removal systems on ISS are large and need repair. They use adsorption chemistry. They force air through a bed packed with granular zeolite, and heat the bed to desorb the CO_2. The thermal cycles cause the zeolite to dust.

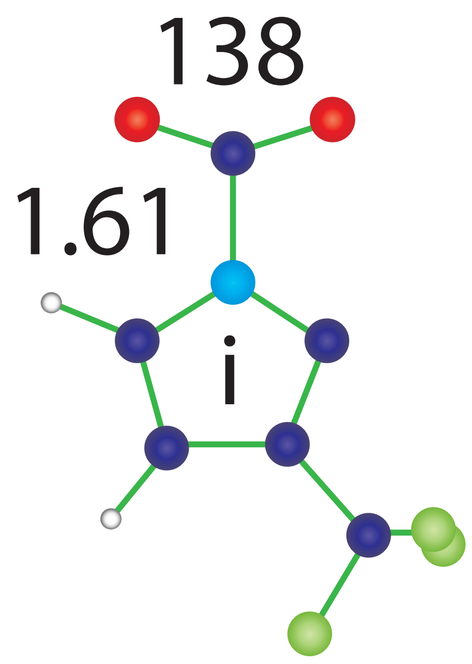


The New Thing(s):

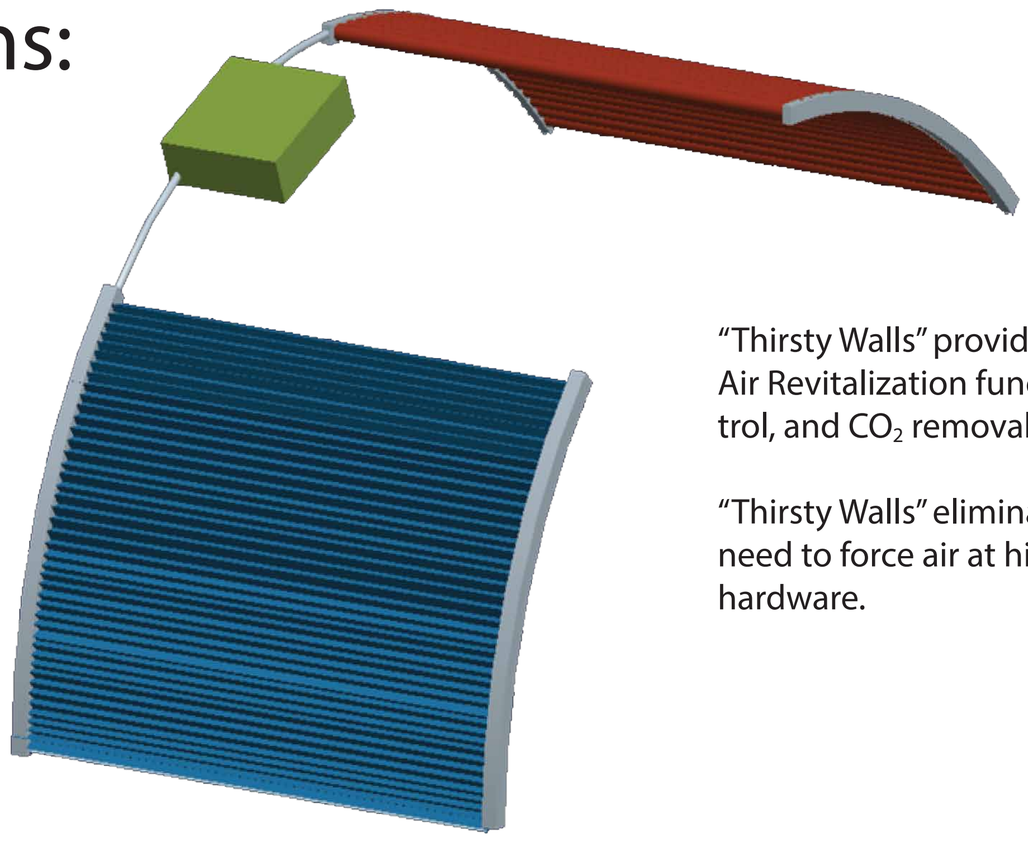
New advances in additive manufacturing, and a better understanding of fluid behavior in microgravity make it possible to expose a liquid directly to air in a microgravity environment. It is now practical to use submarine style solubility chemistry for atmosphere revitalization in space. It is now possible to develop space systems that achieve submarine levels of reliability

New developments in Ionic Liquid research make it possible to match the solubility performance characteristics of MEA used on submarines – with Ionic Liquids that do not release chemical vapors into the air.





Applications:



"Thirsty Walls" provide gentle, passive contact between ventilation air and Air Revitalization functions of temperature control, relative humidity control, and CO_2 removal.

"Thirsty Walls" eliminates the need of large blowers and compressors that need to force air at high velocities through restrictive Air Revitalization hardware.