**WHY DOES THIS RESEARCH MATTER ON EARTH TOO?**

Concrete is the most widely used man-made material in the world, second only to water. The large-scale production of cements contributes to ~5% anthropogenic CO₂ emission. Microgravity research can lead to more durable and hence more cost-effective material.

**RESEARCH OBJECTIVES**

The intent of this work is to utilize the microgravity environment aboard the International Space Station (ISS) to investigate the complex process of cement solidification.

Samples are going to be launched to ISS in 2018

**BACKGROUND ON CEMENT HYDRATION**

Microstructural development of hydrying cement results in elaborate combinations of amorphous and crystalline phases. The morphology, volume fraction, and distribution of these phases ultimately determine the hardened cement's material properties.

5 hours of hydration: Microstructural development of cement in 1g environment:

2 weeks of hydration:

**HYPOTHESIS**

Minimizing gravity-driven phenomena, such as thermosolutal convective flow and sedimentation, will ensure crystal growth strictly by diffusion and a considerably different microstructure than that observed in typical laboratory conditions on Earth.

The understanding of cement hydration in 0g is limited to 10 seconds in parabolic flight. Despite the short duration of the experiment, the amount of crystal, its size, and shape already present significant differences, as showing in the images below (Meyer and Plank, 2016).

**RESEARCH DELIVERABLES:**

- Determine the mechanical properties of hardened samples mixed in 0g;
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