

## Does adding brown algae (*Sargassum muticum*) affect the porosity in concrete?

Mata Seck, Monica Deibel, Brandon Myers, Eliza Heery, Cassandra Donatelli, Nara Almeida

Concrete is the most consumed building material: it is more widely used in construction than all other building materials combined. Concrete also accounts for 8% of total US carbon dioxide emissions. One potential way to reduce carbon emissions from concrete is to incorporate carbon-storing natural materials like *Sargassum muticum*, a brown algae, as an additive. We investigated the porosity of concrete mixed with varying percentages of ground, dried *Sargassum* (0%, 5%, 10%, 15% and 20% by weight), and with and without a superplasticizer (HPEG 2400H, a Polycarboxylate Ether Monomer chemical) added to cement mortar. We hypothesized that as the algae percentage went up, the porosity would increase. Also, the mixture of *Sargassum muticum* and superplasticizer with cement would have a lower porosity. We scanned samples using a SkyScan CT scanner at weekly intervals (0, 7, 14, 21, and 35 days). After scans, images were reconstructed using the software, NRecon, and porosity was quantified using 3D Slicer. Our results indicated that the porosity increased as the percentage of algae increased, with 5% -10% algae mixtures having the lowest porosity, irrespective of superplasticizer. After 35 days, pore percentage increased from 1.14% to 19.71% in mixtures without superplasticizer and from 10.16% to 61.46% in mixtures with superplasticizer, which suggests *Sargassum muticum* additive do increase the porosity of concrete. Further work is needed to understand the materials strength and durability.