



Solid Carbon: Safe and Durable Carbon Storage in Ocean Basalt - From Feasibility to Demonstration to Global Potential

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Oceanic crustal basalt rock has been identified to be the most abundant CO₂ sequestration reservoir on earth with a total capacity of up to 250,000 Gt of CO₂ and the added advantage of the CO₂ mineralizing into carbonate rock in the safest and most durable way. Experiments and pilot projects have established geologic carbon storage in basalt on land (e.g. Carbfix in Iceland) but have not been carried out offshore and are therefore required to demonstrate and prove this form of carbon storage offshore. We are presenting the ongoing Solid Carbon project, which is currently in the feasibility stage of demonstrating this concept in the Cascadia Basin offshore Vancouver Island where Ocean Networks Canada operates a cabled ocean observatory, which will be utilized to monitor and verify this form of geologic carbon storage. The demonstration site is at about 2700 m water depth, where the ocean crust is overlain by 200-600 m of sediment acting as a cap for the porous and permeable crustal basalt aquifer (300-500 m thick), underlain by a thick conductive basement. From previous seafloor drilling campaigns, the subsurface and hydrogeology in this area are well known, feeding both into sequestration modelling and also planning the required monitoring. In addition to planning the offshore demonstration experiment, the Solid Carbon project further includes research on social, regulatory and social acceptance as well as adding offshore energy and direct carbon capture to transform the concept into a negative emission technology. We will present the past, present and potential future of this form of geologic carbon storage.