Researchers are working hard on methods to mitigate, reduce or compensate for CO₂ emissions. One of these, geological carbon sequestration, involves injecting CO₂ into deep saline aquifers, or depleted oil and gas reservoirs so that it is not released into the atmosphere where it contributes to global warming. Now US researchers have found a potential new location for undersea CO₂ storage, which they believe could store US CO₂ emissions for over 100 years.

New research suggests that sediment covered aquifers on the Juan de Fuca plate are a promising location for CO₂ sequestration, and merit scientific research, technological assessment and economic evaluation. Areas of the Juan de Fuca plate, which is within a few hundred kilometres of Vancouver Island, Oregon and Washington on North America’s west coast, have geological properties suitable for CO₂ storage.

Researchers estimate that 208 gigatonnes (Gt) of carbon could be injected in the Juan de Fuca plate, rising to 250 Gt if all of the carbon became fixed by reacting with the basalt. The US emits 1.7 Gt of carbon per year at present, so at these rates CO₂ sequestration in the Juan de Fuca basalt could last for over 120 years. More realistic scenarios might involve emissions from only western US states, in which case the reserve would last considerably longer.

Deep sea basalt has potential for CO₂ sequestration due to interconnected pores and fractures in the rock that are filled with seawater, and the presence of magnesium-calcium silicate rocks. CO₂ injected into these aquifers should mix with the seawater and react chemically with the basalt, giving stable carbonate minerals as a result. Reaction of the CO₂ with the basalt would effectively trap the CO₂, preventing it from leaking and returning to the ocean or atmosphere. However, the rates at which these reactions will take place in the ocean crust and their effects on the basalt’s capacity for further CO₂ storage need further investigation. The Juan de Fuca plate’s relative proximity to major US cities both as research bases and a source of CO₂, coupled with previous deep sea studies in the area, make this a good location for a pilot investigation.

Geological storage of industrial CO₂ emissions could contribute significantly to reductions in greenhouse gas emissions over the next several decades. The technique’s success depends on the capacity of the reservoir, its stability, and the length of time the CO₂ is to be stored. The initial cost of CO₂ storage is likely to be high, and sites should be chosen to minimize the risks of leakage in the short and long term. The environmental impacts of both CO₂ storage and any potential leaks must also be considered. In the EU, these and other issues are covered by the proposal for a Directive on geological storage of CO₂.

In the EU, several companies, such as Vattenfall, Shell, RWE and Statoil have announced industry-led carbon capture and storage initiatives. A pilot underground CO₂ storage project is also underway in Germany.


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