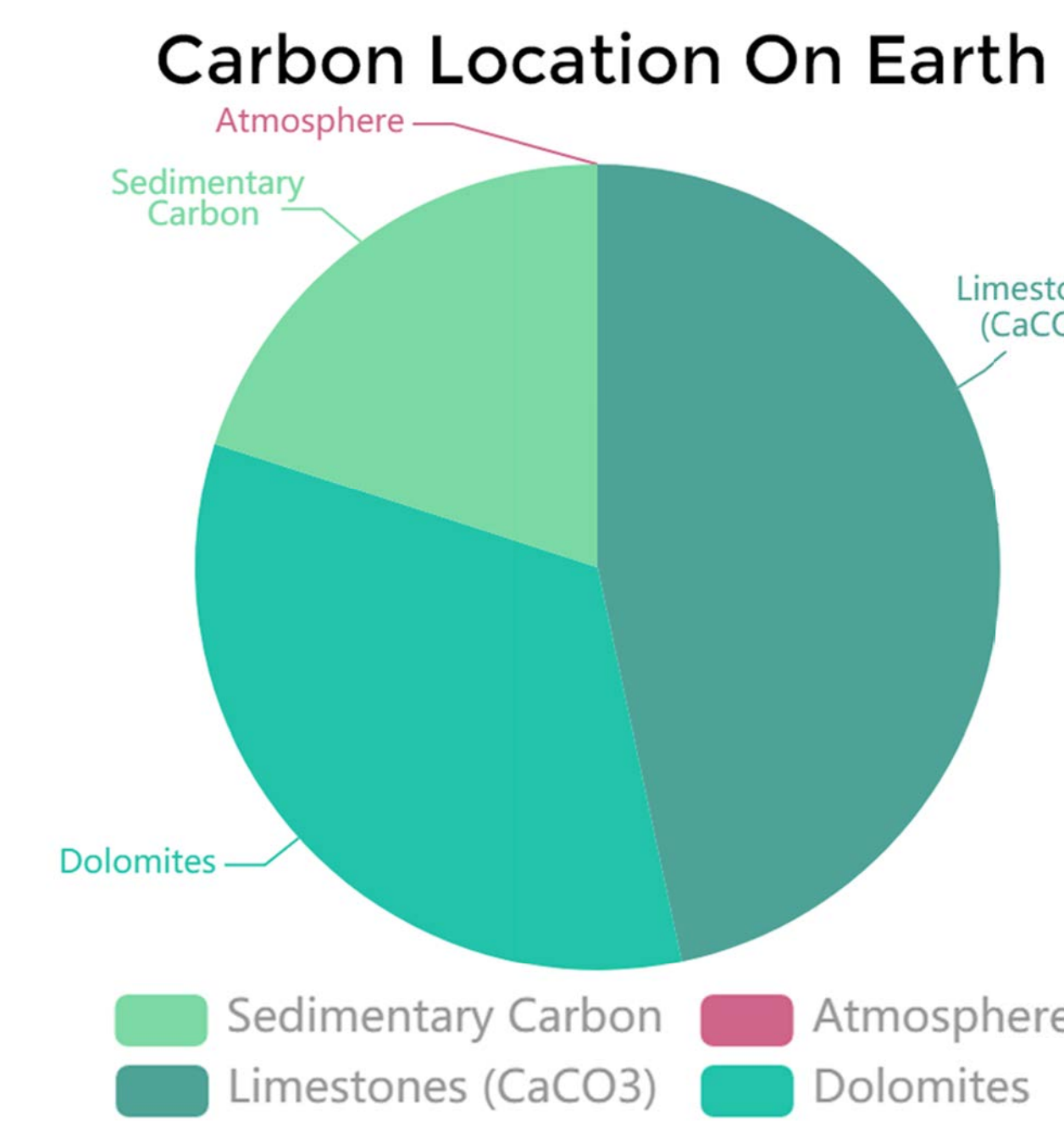


Enhanced Weathering: More Than a Coming Attraction, It's Earth's Main Event

Through weathering processes, Earth has stored 99.9% of its CO₂ in rock. By enhancing the speed of this weathering process, it is possible to remove more CO₂ each year than the total emissions of humanity.



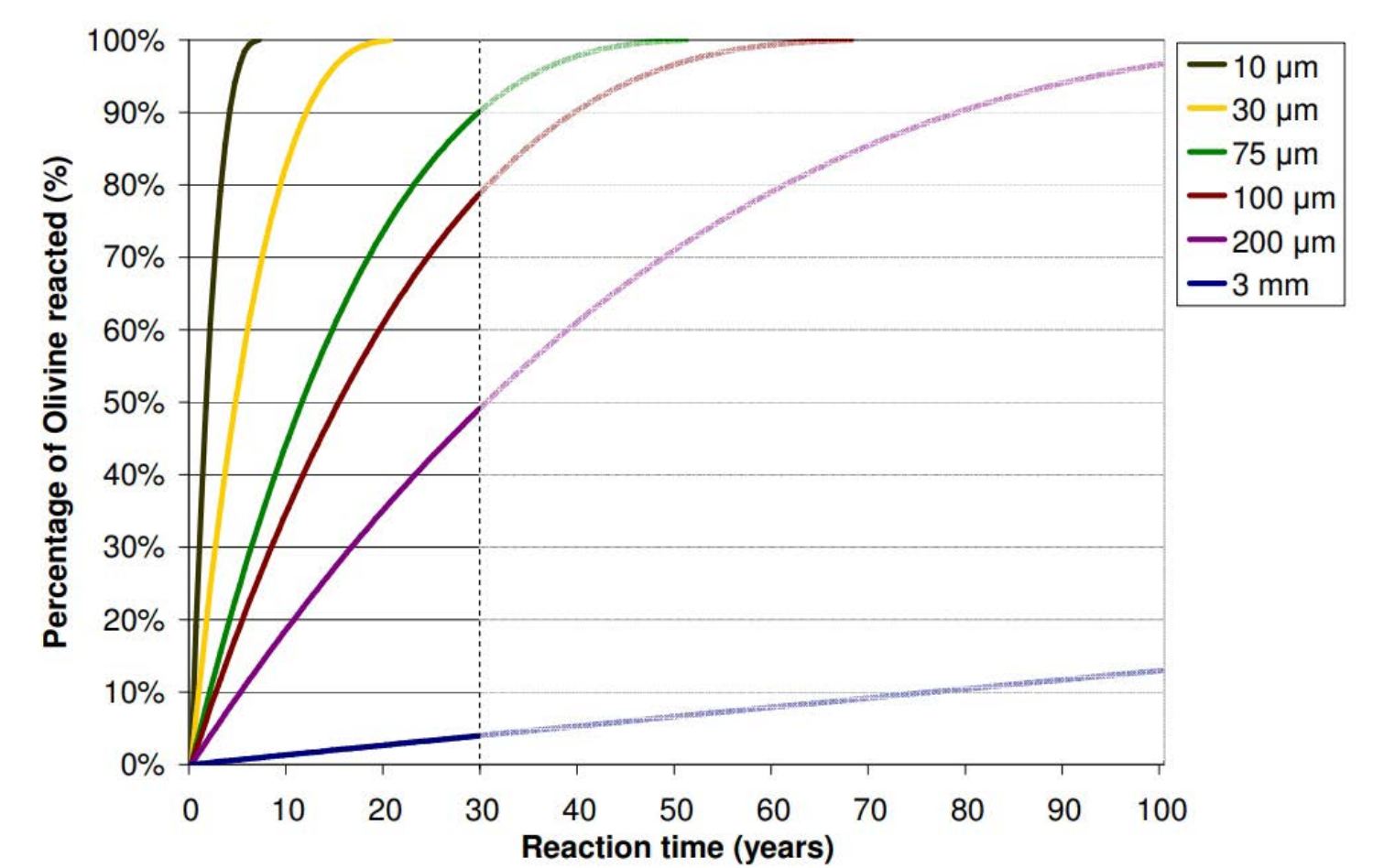
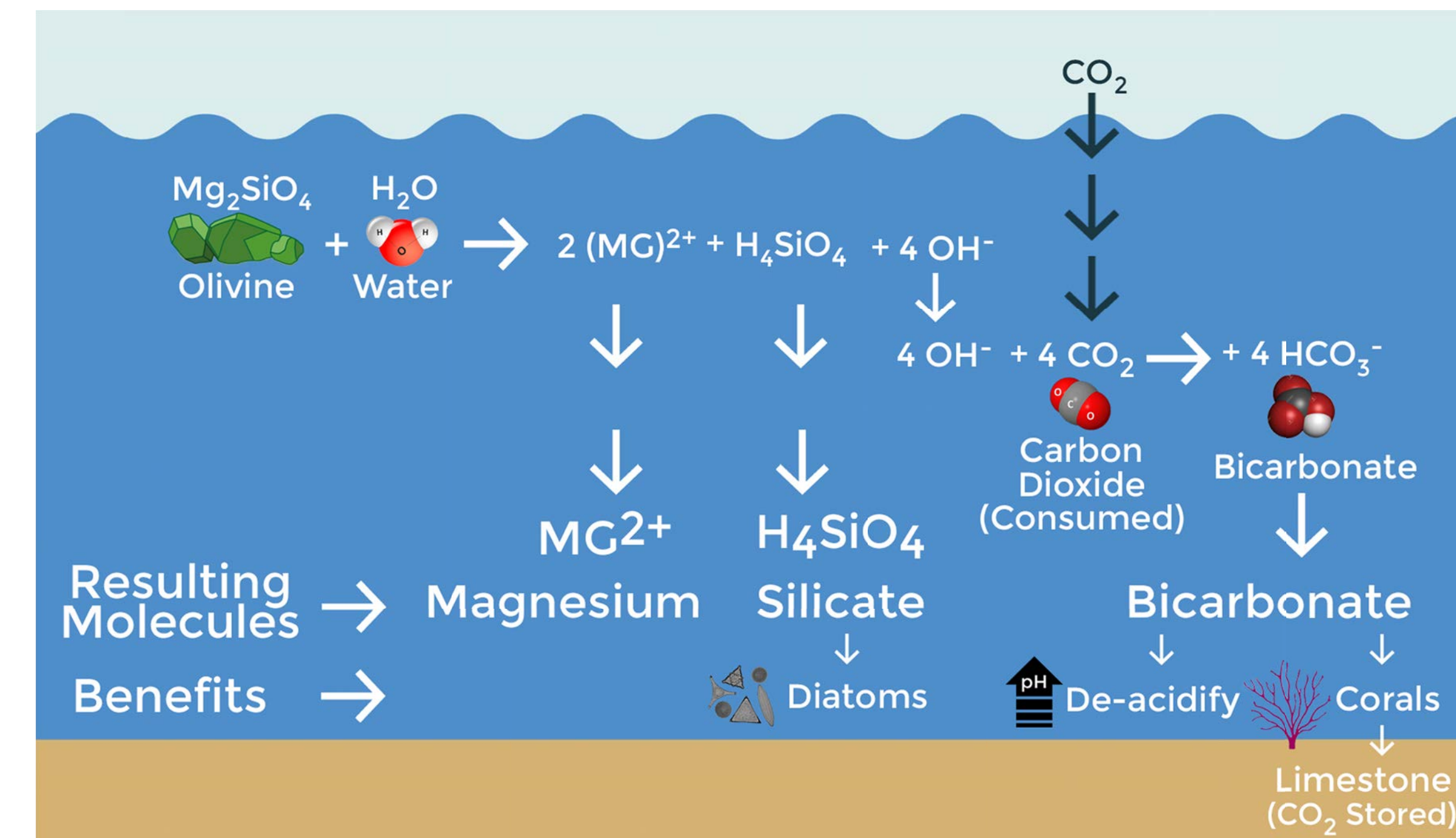
99.9% of Earth's CO₂ In Rock



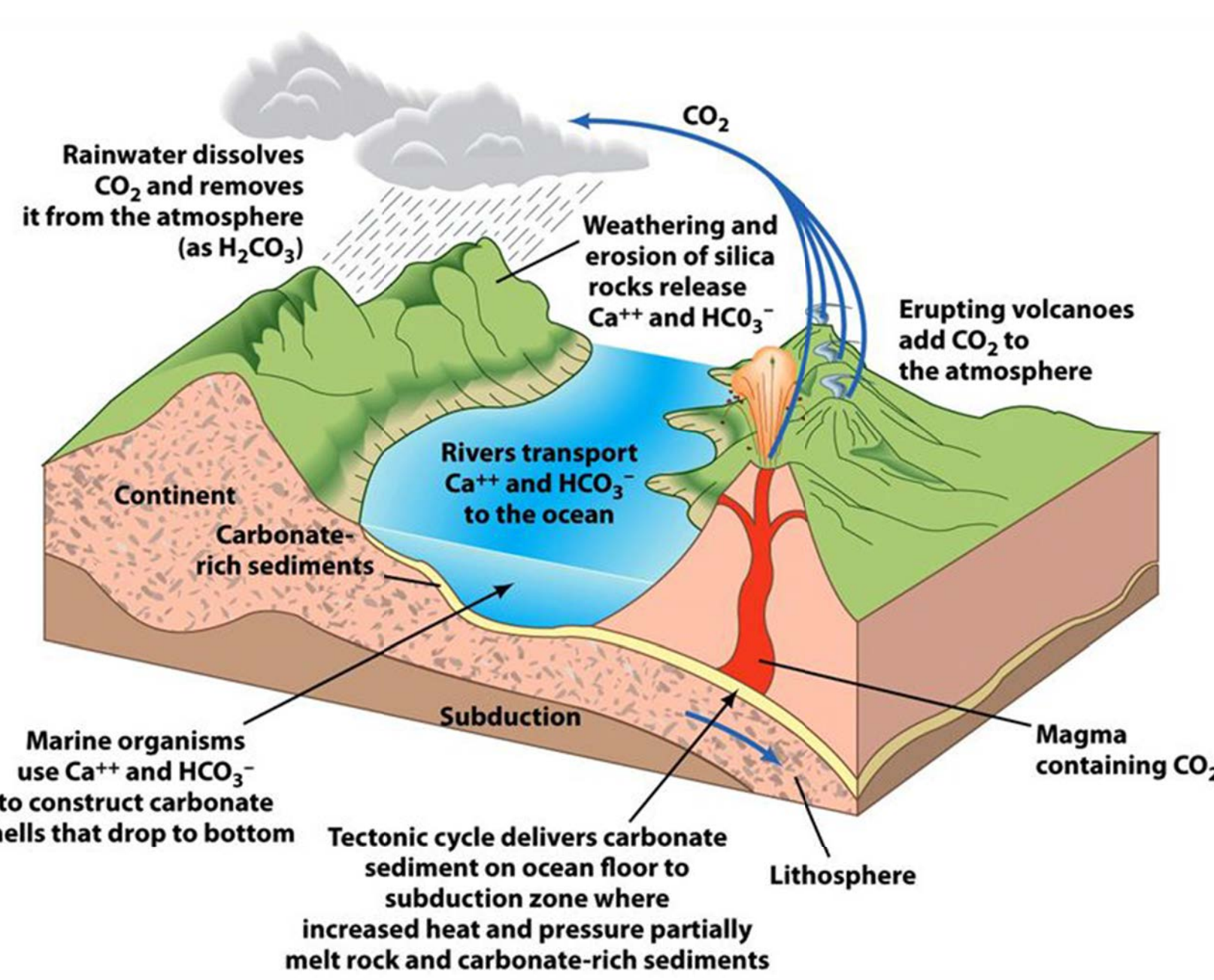
DUNSMORE: CO₂ REMOVAL AS CALCIUM CARBONATE MINERAL

Calcium Carbonate	35,000 *	46.64%	79.99%
Ca-Mg Carbonate	25,000	33.31%	
Sedimentary Carbon (Kerogen & Graphite)	15,000	19.99%	
Recoverable Fossil Fuels	4	0.0053%	19.99%
Oceanic HCO ₃ ⁻ - CO ₃ ²⁻	42	0.056%	0.06%
Dead Surficial Carbon (Humus and Peat)	3	0.0040%	
Atmospheric CO ₂	0.72	0.00095%	
All life	0.56	0.00074%	

Estimates of the relative distribution of carbon on Earth, in kg and % (after Berner and Lasaga, 1989).



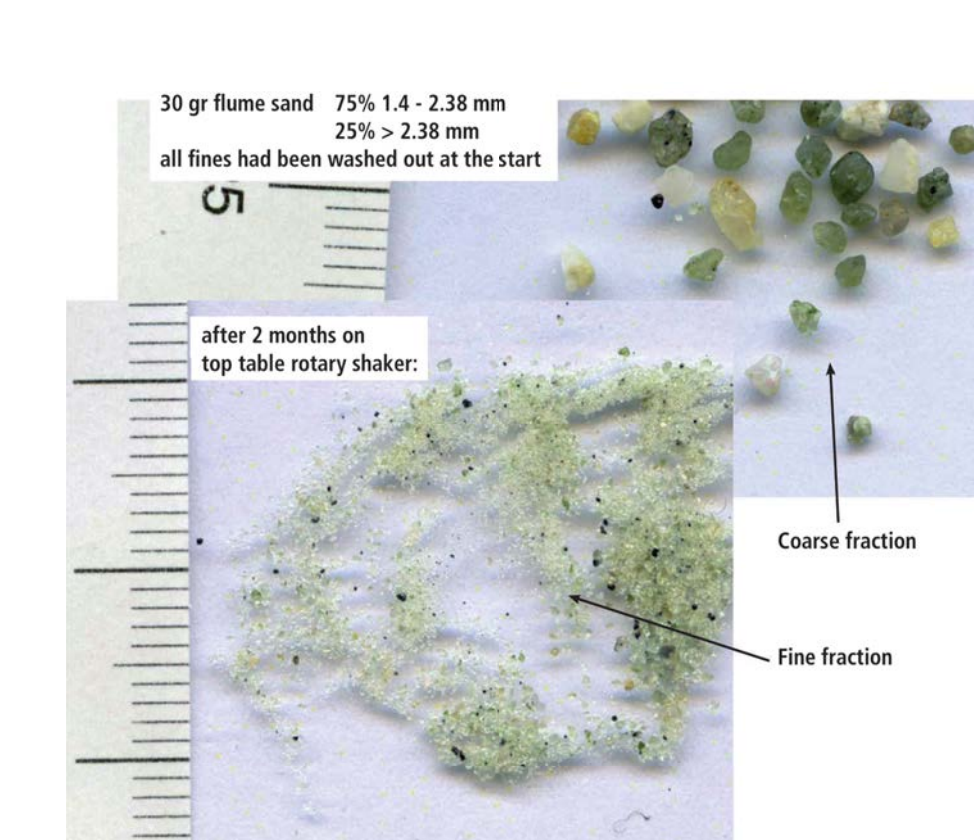
Earth's natural longterm carbonate-silicate cycle has balanced atmospheric carbon dioxide levels over geological time. Today, however, humans are emitting much more CO₂ than Earth's natural CO₂ removal cycle can handle annually.



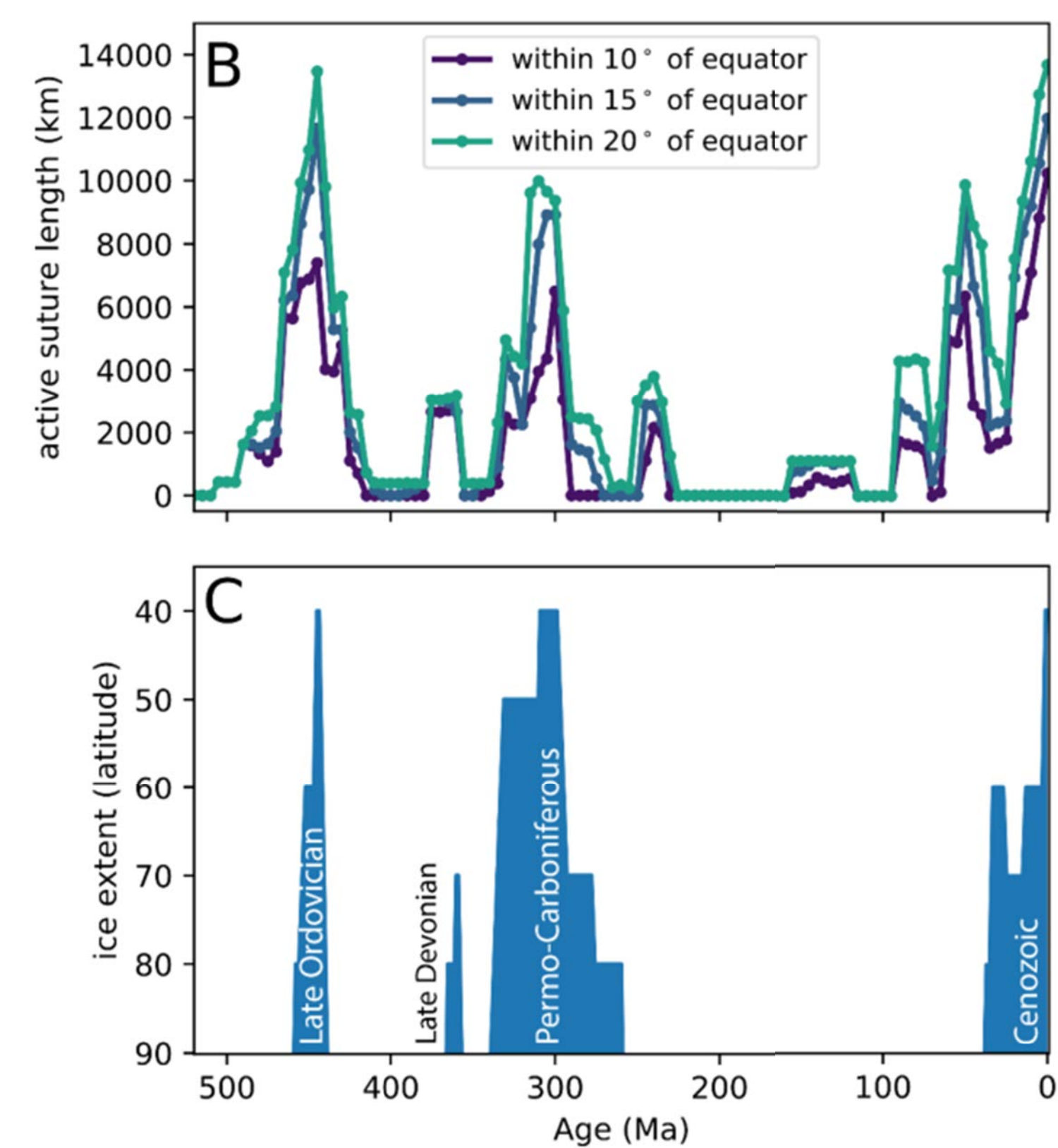
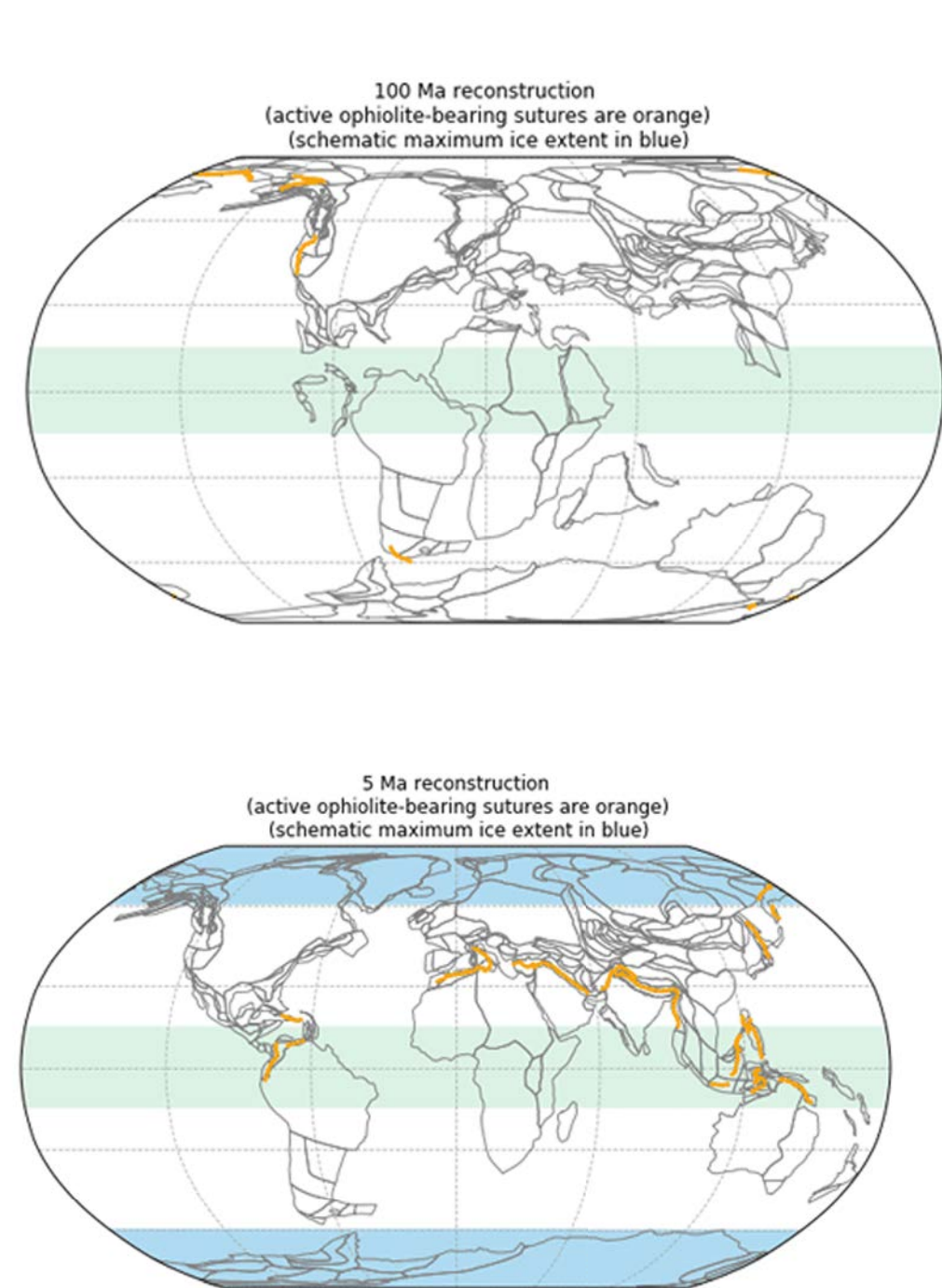
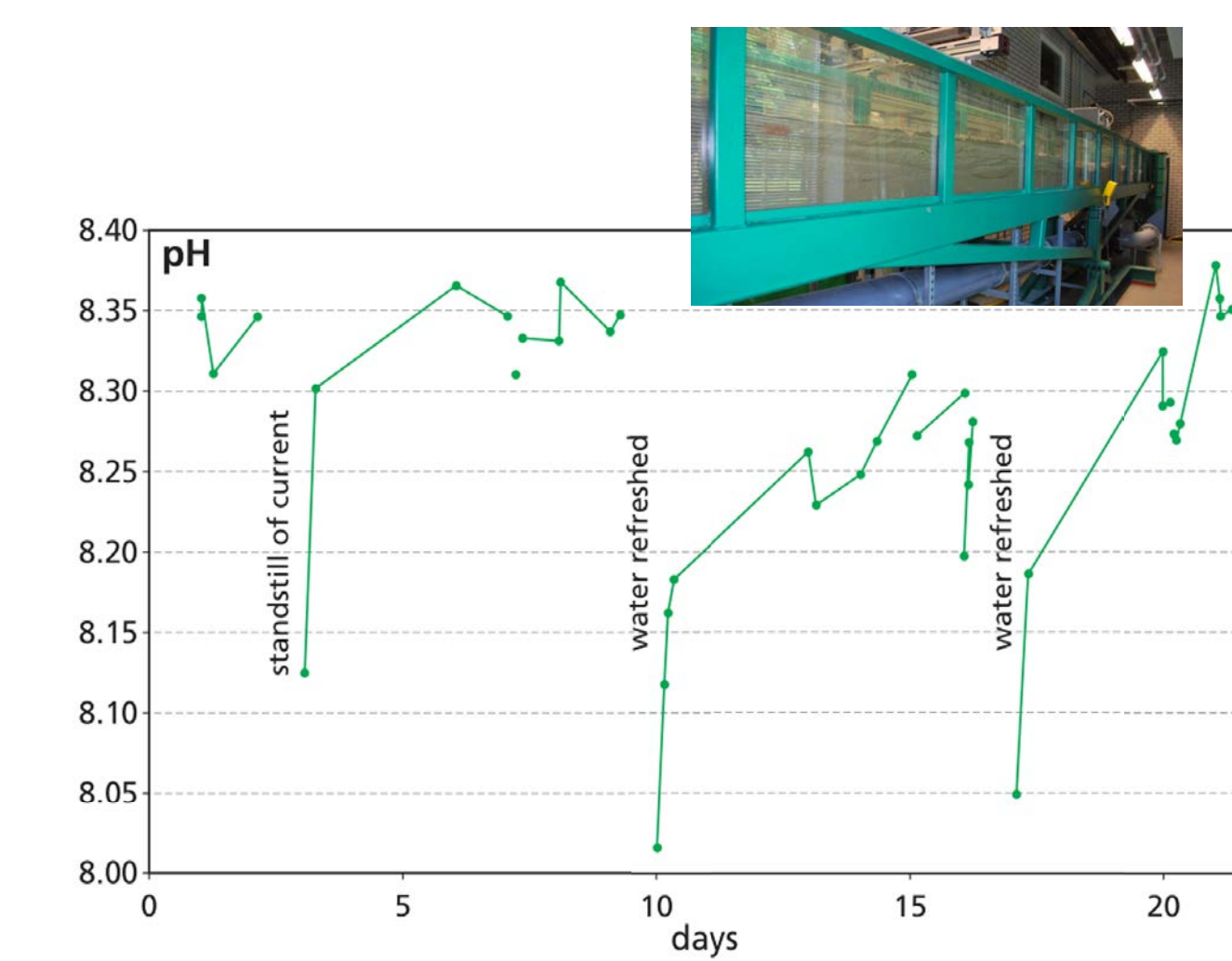
Olivine Before Desktop Weathering Experiment



Olivine After 10 Days of Weathering



after 2 months on top table entry value



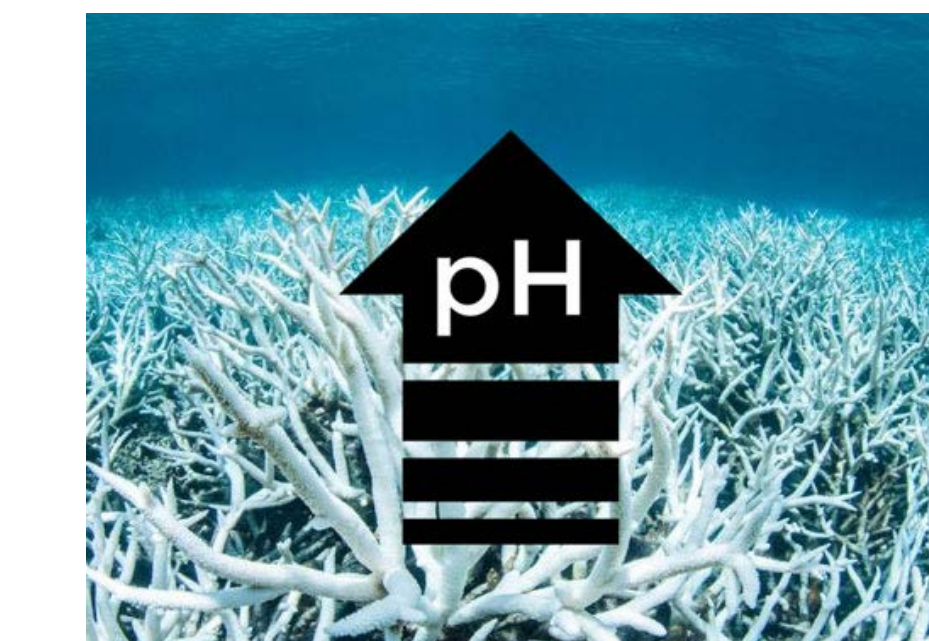
Can the carbonate-silicate cycle be sped up to remove enough CO₂ to effect global temperatures?

Yes. The last three ice ages were caused by the chance increase in exposure of volcanic rock in the wet tropics. Enhanced weathering mimics this process.



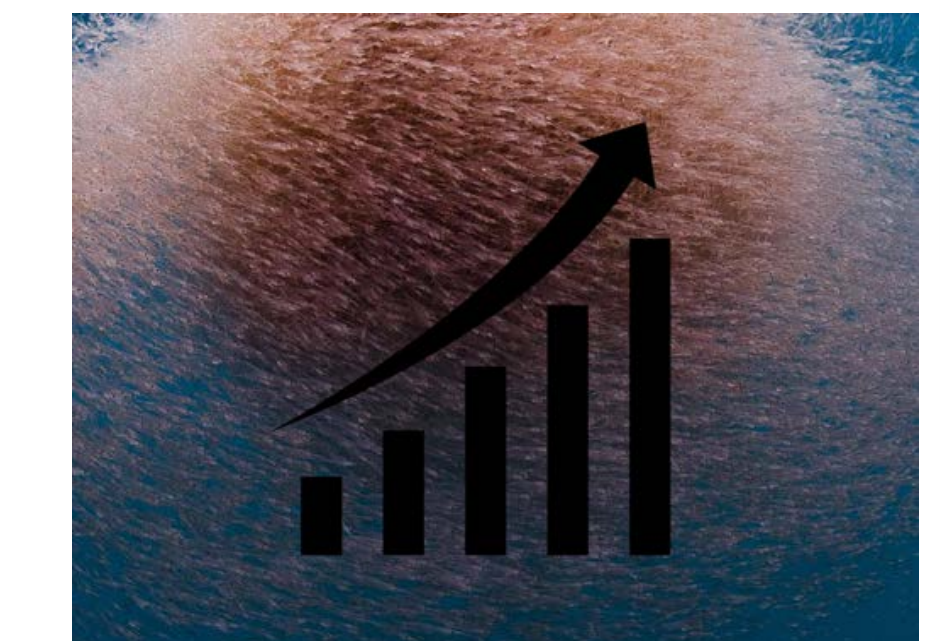
01. Remove & Store CO₂

The Earth stores the vast majority of its CO₂ in rock as calcium carbonate. Corals and other marine animals use calcium carbonate to build their shells. The shells eventually turn into sediments and form limestone, trapping the CO₂ for millions of years.



02. Deacidify

The resulting solution from the reaction of olivine, water, and CO₂ is alkaline and therefore works to immediately combat ocean acidification by raising the pH level of water in the surrounding area.



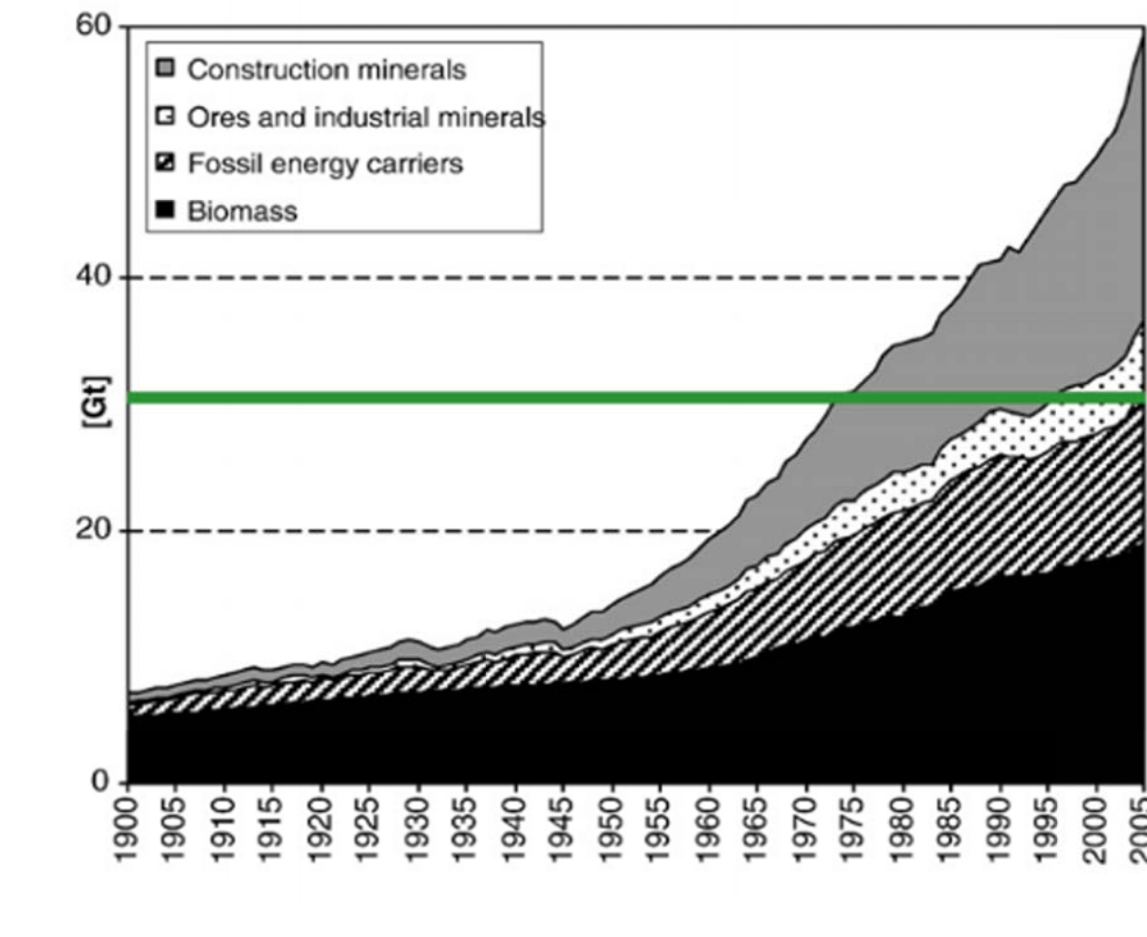
03. Fertilize

A product of the olivine weathering reaction is silicate, which is the limiting factor for diatoms. Diatoms are a type of plankton threatened by climate change and their abundance and competition against dinoflagellates can counteract algal blooms.



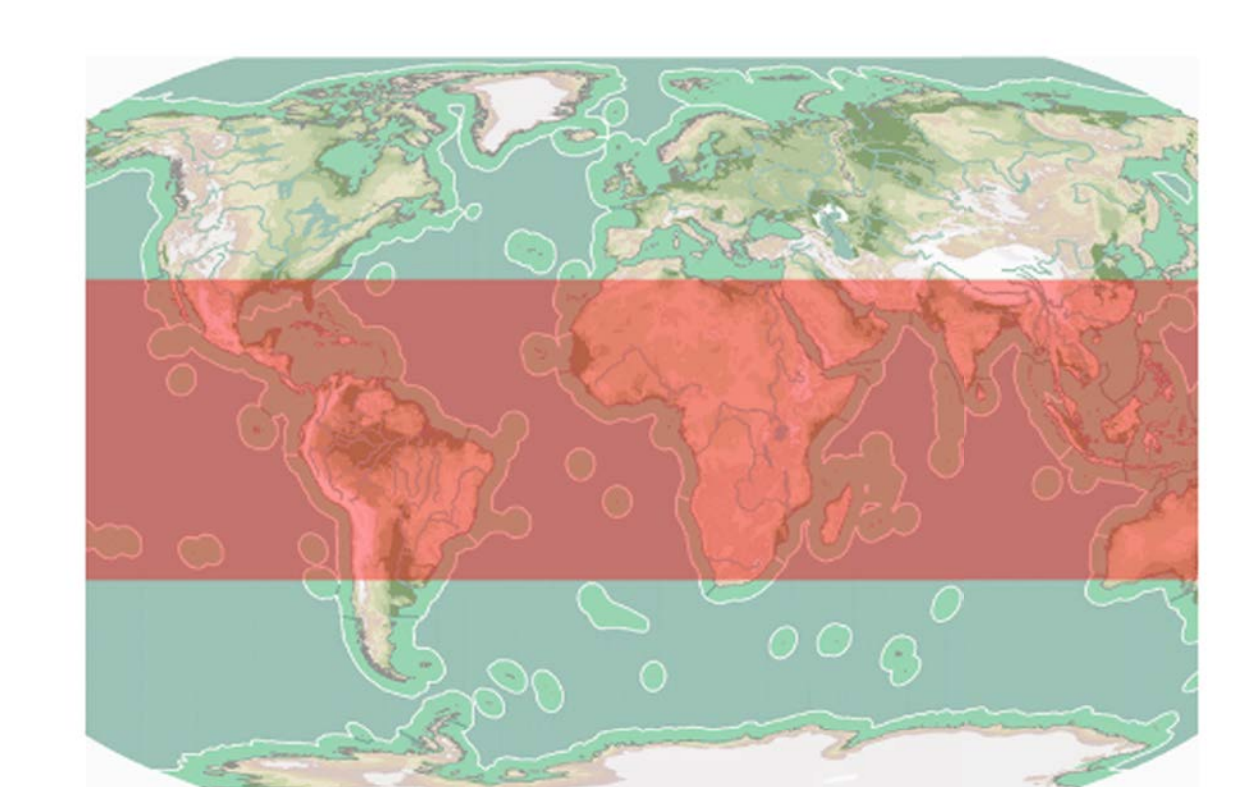
Weathering Math:

1 tonne of olivine weathered = 1.25 tonnes of CO₂ removed. The graphic above depicts the approx. cubic volume of 1.25 tons of CO₂ in the atmosphere and the 1 ton volume of olivine needed to remove it.



Olivine Tonnage:

A tonnage of olivine ~80% of the tonnage of CO₂ emissions is needed each year. At current rates (i.e. 40 Gt of olivine to remove 50 Gt CO₂), it is less than the volume of construction materials and less than that of fossil fuel equivalents mined yearly.



Shelf Seas Needed:

Only 2% of the world's shelf seas are needed, specifically those located around the equator, as the warmer the water the faster the reaction takes place. There are more than enough beaches with the optimal temperature and tidal forces.

Two Major Advantages of Enhanced Weathering As Compared To Nature

- (1) We can choose the fastest weathering rock: Olivine
- (2) We can choose a location that dramatically accelerates the weathering reaction: high-energy tropical shelf seas

COMBINE & ACCELERATE

