

Climate change, ocean acidification and coral reefs

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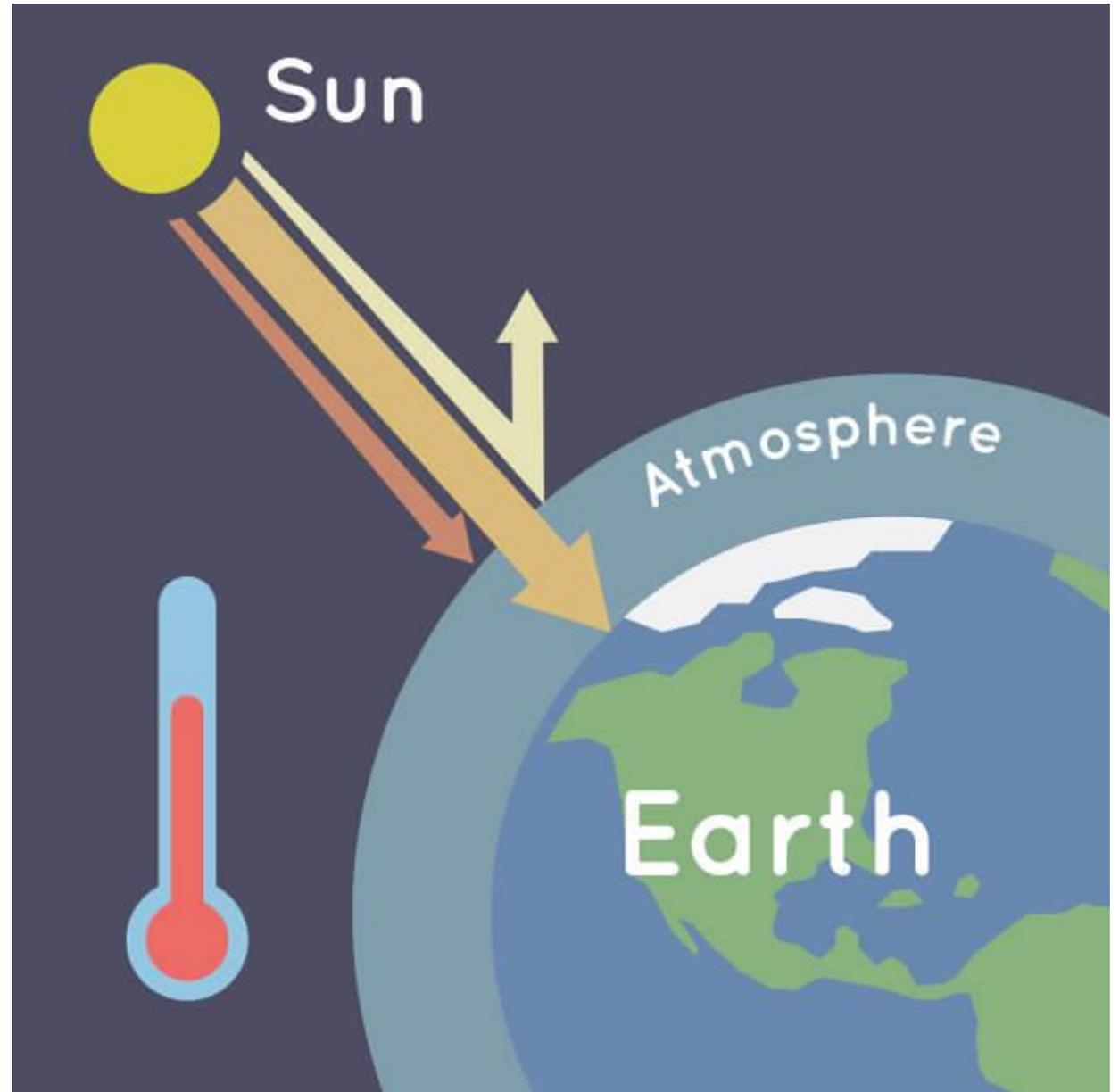
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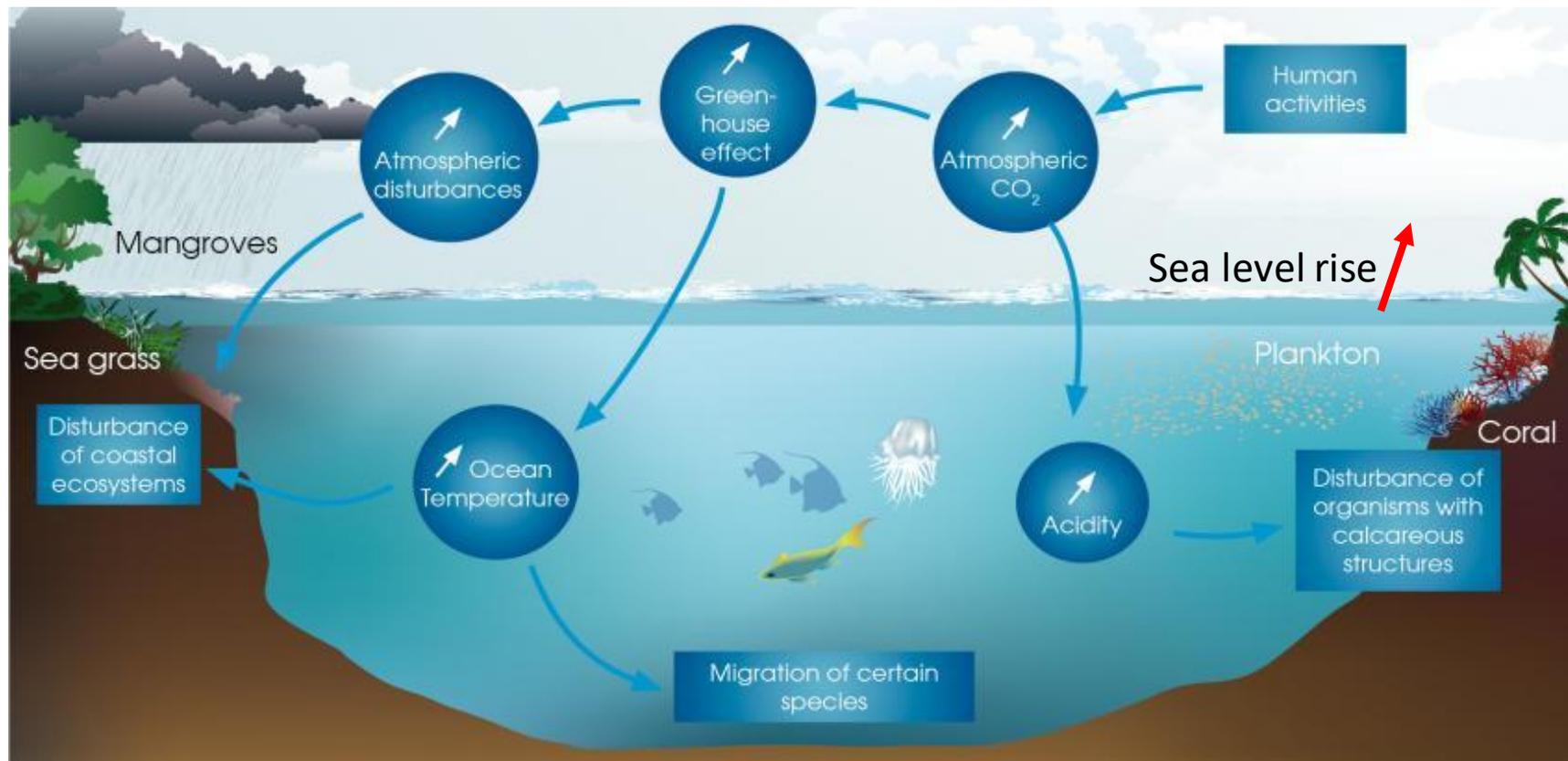


Power generation factories and gasoline and diesel burning vehicles are emitting the greenhouse gas CO₂ into the atmosphere at unprecedented rates.

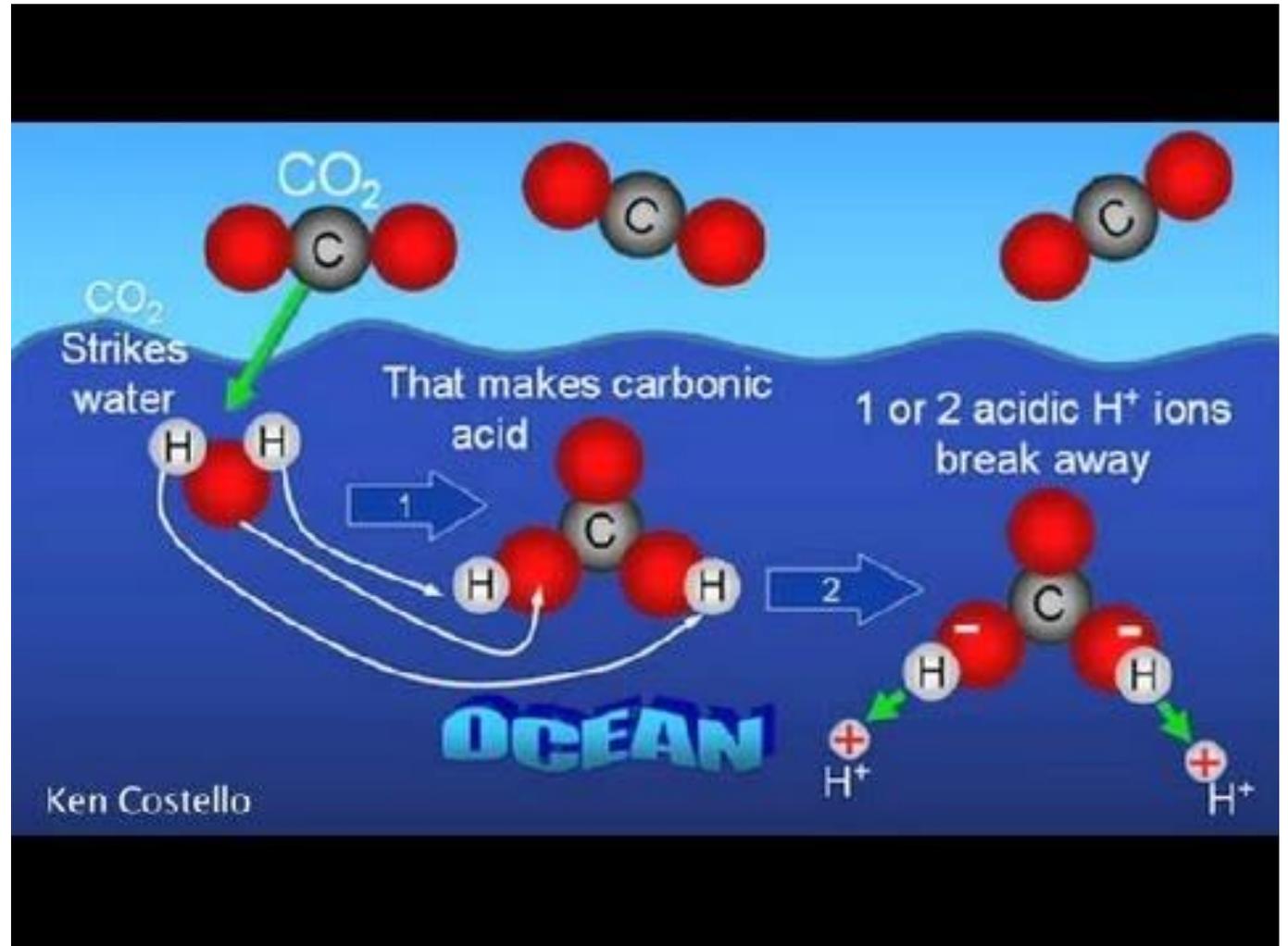
Increasing
CO₂ in our
atmosphere
is causing
the planet to
warm



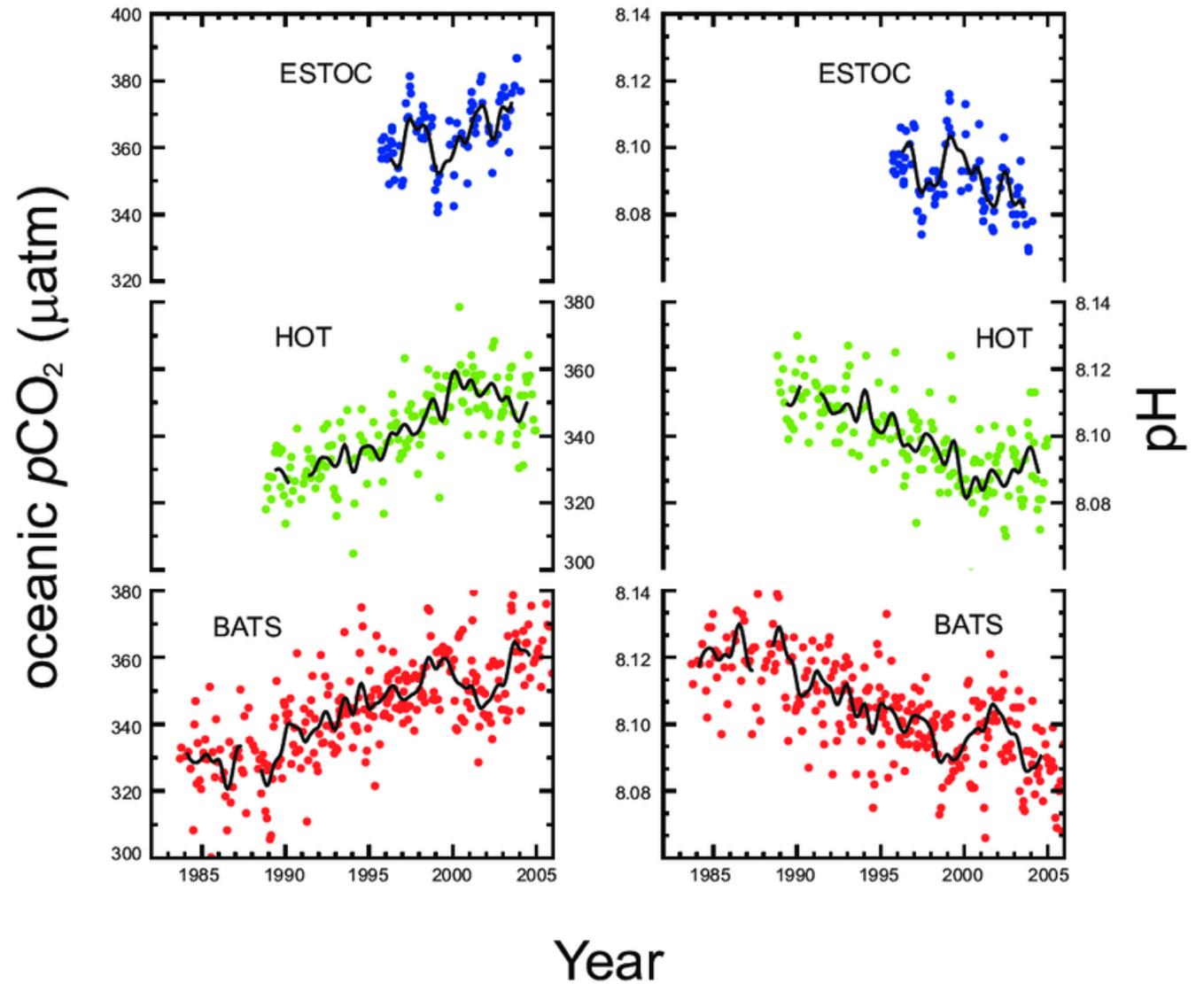
The oceans are warming and acidifying as they absorb heat and CO₂ from the atmosphere



How CO_2 dissolving into the ocean results in acidification



Ocean time series data at the Canary Is, Hawaii and Bermuda



How does acidification impact coral reefs?

- Drastically reduces reproductive success of corals
- Slows growth and weakens their skeletons
- Many small invertebrates that are food for fish on the reef disappear as the water becomes more acidic
- CO₂ effects fish brains in strange ways
 - they become less cautious, venturing further from the protection corals and are easily picked off by predators
 - some swim towards the scent of their predators instead of away

I got involved in this
research in a strange
way

Managers in the Biosphere wanted to know why the eight people living inside were getting sick

- They were feeling short of breath and had frequent head aches
- Research by Columbia University scientists revealed that the air they were breathing was very high in CO₂ and low in O₂
- The unusual composition of the air in the Biosphere was a result of an imbalance in the amount of plants and animals in the sealed structure.
- Animal respiration, including that by the people, was producing more CO₂ than the plants in the structure could remove by photosynthesis.
- The analogy to what is happening in our world is not perfect, but it does illustrate what can happen when the balance of nature is disturbed by human activities.

Flash forward several years

- I moved to Tucson and have been making observations and doing experiments in the corals in the B2 Ocean biome
- During the period when the facility had been occupied by people the CO₂ in the air had risen to high levels and the water in the B2 Ocean had become acidified just as is happening in the real oceans but faster and to a greater degree.
- The corals in the tank were in bad shape but quickly responded when I raised the pH to normal levels
- This was a bit of good news and indicated that coral reefs have the capacity to recover if we can get a handle on CO₂ emissions

If you want to learn more about ocean acidification

<https://oceanacidification.noaa.gov/OurChangingOcean.aspx>