

Carbonate Factories

- Tropical Shallow Water

- Warm, sunlit waters
- $\sim 30^\circ$ N to 30° S latitude today

- Cool-Water

- Biotically controlled precipitates rule (Heterotrophs dominate)
- Wide depth window
- High latitudes

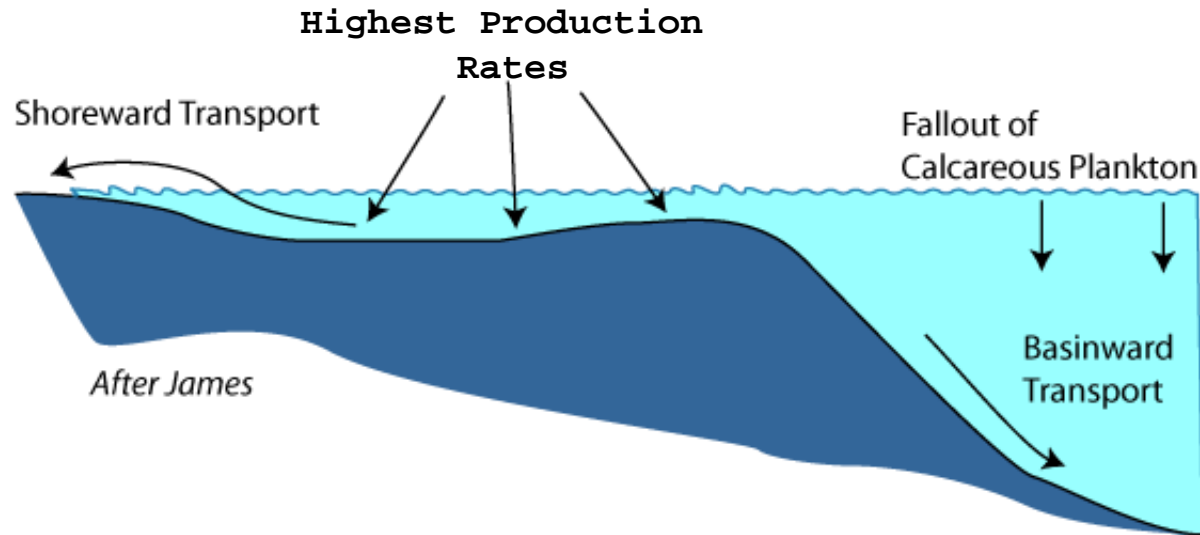
- Mud-mound

- In situ precipitation of fine grained carbonate
- Firm & hard upon formation
- Low light

Factory I: Tropical

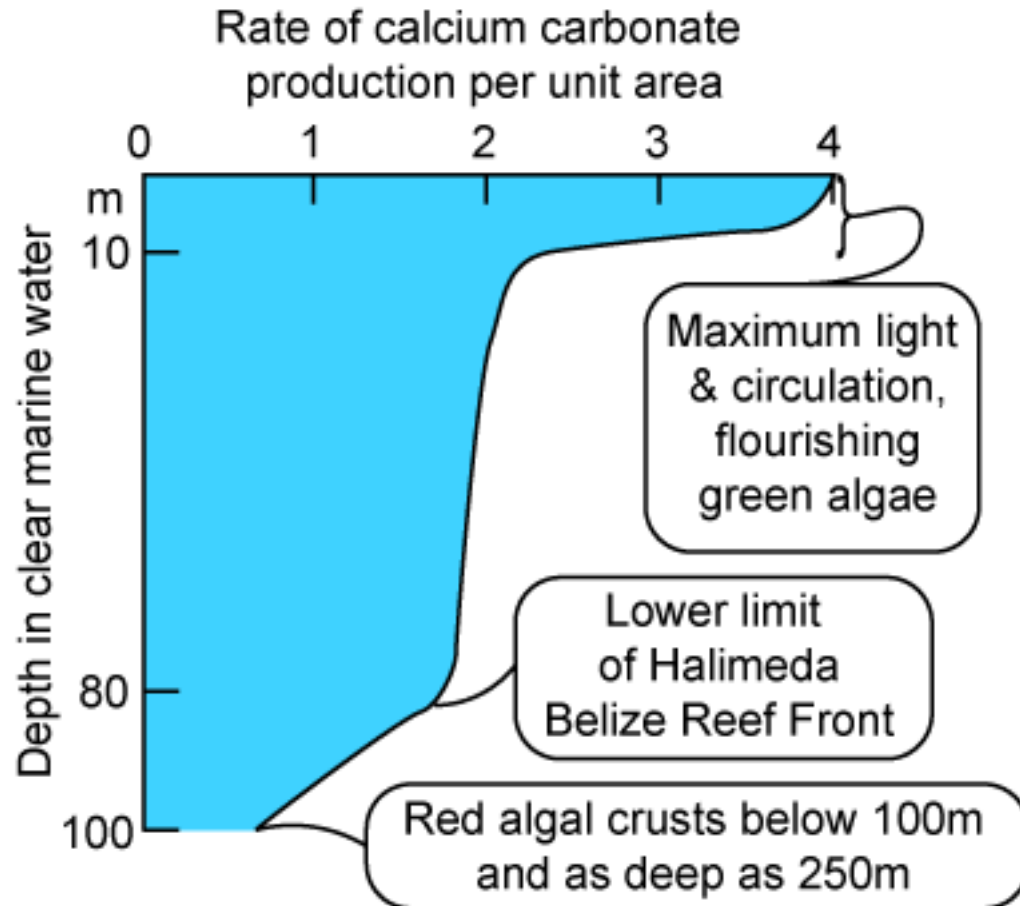
- Warm ($>18^{\circ}\text{C}$), shallow seawater ($< 100\text{m}$)
- Clear, well-lit, well-circulated seawater
 - Photosynthesis can mediate/control carbonate precipitation
 - Normal-to-elevated salinities for seawater
- Low nutrients
 - Low net organic productivity

Principal Zones of Carbonate Production and Accumulation



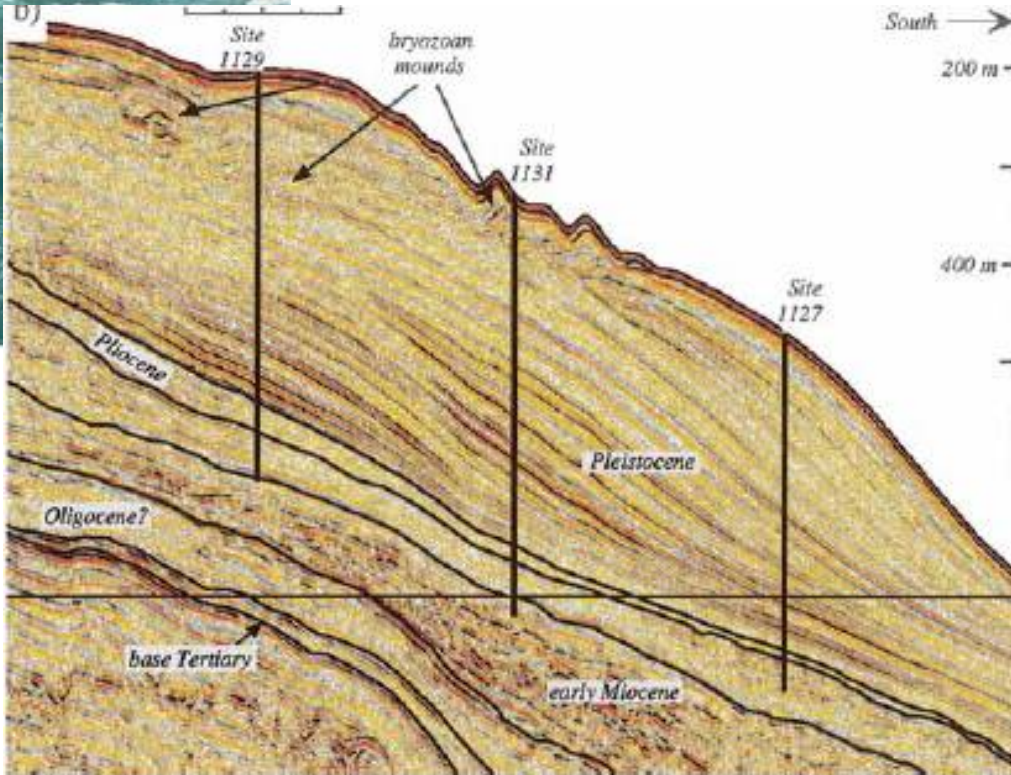
CaCO₃ Production

- Light is basis of photosynthesis
- Much carbonate is formed as byproduct of photosynthesis (e.g. calcareous algae)



Estimated rates of production after Ginsburg

Factory II: Cool Water: Great Australian Bight



Factory III: Mud Mounds

Porcupine Mounds, IODP Exp. 307

