GEOL-201
Carbonate Environments
Carbonate deposits accumulate under the following conditions:

1) where the water $T$ is warm (typically above $20^\circ$ C),

2) where the water is relatively shallow (typically less than a few tens of metres, but definitely less than 4000 m), and

3) where there isn’t a significant amount of clastic material accumulating.
Carbonate environments

- Peritidal carbonate environments
- Sub-tidal shelf carbonate environments
- Reef environments
There are currently only two major depositional sites for carbonates in the world: the Bahama Banks and the Gulf of Arabia area.

In the past (e.g., during the Cretaceous) carbonate deposition has been much more extensive.
Peritidal environments
Figure 12.2  (A) The Three Creeks area along the west coast of Andros Island, Bahamas. Tidal channels cut an intertidal marsh composed largely of algae, with some ponds in the intertidal areas. (Stanley, 1989: 1226.) (B) Major features of the peritidal environment. (After Stanley, 1989: 1226.)
Figure 12.3 The major facies of the regressive tidal flat on the Persian Gulf Trucial Coast. Supratidal sabkha is composed of algal mats with a gypsum crust, which have grown over burrowed subtidal lagoonal sediments. Tidal deltas, composed mainly of ooids, form around inlets cut into small barrier islands composed of mollusk shells, ooids, and coral fragments. Coral reefs can grow seaward of the island, away from the tidal inlets. (Scholle, Bebout, and Moore, 1983: 480; by permission of the American Association of Petroleum Geologists, Tulsa, Okla.)
Figure 11.11 Some proposed models for dolomitization. (A) Coorong Lagoon type. (B) Sabkha evaporation. (C) Seepage reflux. (D) Burial compaction. (E) Mixing zone. (Tucker and Wright, 1990: 66; by permission of Blackwell Scientific Publishers. Oxford.)
Subtidal environments
Reef environments
**A**

<table>
<thead>
<tr>
<th>Growth Forms</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delicate, branching</td>
<td>Wave Energy: low</td>
</tr>
<tr>
<td>Thin, delicate, plate-like</td>
<td>Wave Energy: low</td>
</tr>
<tr>
<td>Globular, bulbous, columnar</td>
<td>Wave Energy: moderate</td>
</tr>
<tr>
<td>Robust, dendroid, branching</td>
<td>Wave Energy: moderate-high</td>
</tr>
<tr>
<td>Hemispherical, domal, irregular, massive</td>
<td>Wave Energy: moderate-high</td>
</tr>
<tr>
<td>Encrusting</td>
<td>Wave Energy: intense</td>
</tr>
<tr>
<td>Tabular</td>
<td>Wave Energy: moderate</td>
</tr>
</tbody>
</table>

**B**

Diagram showing different growth forms and their corresponding environments. The labels include:
- **Back Reef**
- **Reef Crest**
- **Reef Flat**
- **Reef Front**
- **Fore Reef**
- **Waves and swells**
- **Globular**
- **Encrusting**
- **Massive**
- **Branching**
- **Plate-like**