“Rising seas increase the risk of coastal flooding, storm surge inundation, coastal erosion and shoreline retreat, and wetland loss. Most of the damage along the California, Oregon, and Washington coasts, however, is caused by storms—particularly the confluence of large waves, storm surges, and high astronomical tides during a strong El Niño. The water levels reached during these large, short-term events have exceeded mean sea levels projected for 2100, so understanding their additive effects is crucial for coastal planning.” (NRC 2012)

**Components of Sea Level Rise**

- Ice melting
- Gravitational attraction of ice
- Ocean-atmosphere Interaction
- Terrestrial water storage
- Groundwater withdrawal
- Uplift and subsidence
- Density Changes
- Ocean circulation
- Glacial isostatic adjustment
- Gravitational attraction of ice

**More Than “Just” Sea Level Rise**

Flooding and Beach and Cliff Losses from Combinations of Sea Level Rise, Climate Variability, Tides, Waves and Run-up

**Sea Level Rise Projections for Southern California**

<table>
<thead>
<tr>
<th>YEAR (Relative to 2000)</th>
<th>PROJECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030</td>
<td>1.8 - 11.8 inches</td>
</tr>
<tr>
<td>2050</td>
<td>5.0 - 23.9 inches</td>
</tr>
<tr>
<td>2100</td>
<td>17.4 - 65.6 inches</td>
</tr>
</tbody>
</table>

* Sea level rise, storm, and tide illustration (above) is adapted from Dr. Bill O’Reilly (UCSD, Scripps Institution of Oceanography).