resulting in the formation of wide wave-cut platforms in many places. Table 3.1 shows a simple classification of tidal range.

Table 3.1 Classification of tidal range

Macrotidal	More than 4 m
Mesotidal	2 to 4 m
Microtidal	Less than 2 m

Tidal surges

Tidal, or **storm surges** are occasions when meteorological conditions give rise to strong winds which can produce much higher water levels than those at high tide. One area affected by this phenomenon is the North Sea and east coast of Britain. Depressions (intense low pressure weather systems) over the North Sea produce low pressure conditions that have the effect of raising sea levels. The sea level can rise by about one centimetre for every one millibar drop in pressure. Strong winds drive waves ahead of the storm, pushing the sea water towards the coastline. This has the effect of *piling-up* water against the coast. The shape of the North Sea means that often water is increasingly concentrated into a space that is decreasing in size (funnelling). High tides, especially those of a spring tide, intensify the effect.

Famously the North Sea was affected by a tidal surge in 1953. However, the storms and associated surges of December 2013 and January 2014 brought some places along the east coast of England higher water levels than 60 years earlier. Figure 3.10 shows the size and power of the waves on Cromer pier and promenade during 5–6 December 2013.

Figure 3.10 Tidal surge at Cromer, Norfolk, December 2013

Skills focus

Visit the Met Office website (link below) to find out more about the winter storms of 2013 and study the synoptic chart for the 5–6 December.
www.metoffice.gov.uk/climate/uk/interesting/2013-decwind

Low energy and high energy coasts

Key terms

Coastal sediment budget – The balance between sediment being added to and removed from the coastal system, that system being defined within each individual sediment cell.

High energy coast – A coastline where strong, steady prevailing winds create high energy waves and the rate of erosion is greater than the rate of deposition.

Low energy coast – A coastline where wave energy is low and the rate of deposition often exceeds the rate of erosion of sediment.

Sediment cell – A distinct area of coastline separated from other areas by well-defined boundaries, such as headlands and stretches of deep water.

The processes outlined above combine to create **low energy coasts** and **high energy coasts** depending on local conditions. The following simple classification suggests the features of each.

Low energy coasts:

- Coastlines where wave energy is low.
- The rate of deposition often exceeds the rate of erosion of sediment.
- Typical landforms include beaches and spits.
- Examples include many estuaries, inlets and sheltered bays. The Baltic Sea is one of the best examples due to its sheltered waters and low tidal range.

High energy coasts:

- Coastlines where strong, steady prevailing winds create high energy waves.
- The rate of erosion is greater than the rate of deposition.
- Typical landforms include headlands, cliffs and wave-cut platforms.
- Examples of high energy coasts are the exposed Atlantic coasts of northern Europe and North America, including the north Cornish coast in south-west England.