Coastal Landforms and Landscapes

**ABSTRACT** Coastal geomorphology is the study of coastal landforms and their evolution over time. In this topic, we set the scene for discussing the variety of coastal landforms and landscapes and the major climatic and oceanic forces that shaped them during their geologic history. First, we briefly explore landforms along ice coasts, which have an extent of some tens of thousands of kilometres, either as floating shelf ice of Antarctica or calving glacier fronts of Greenland, Alaska or Chile. We then continue with coastal forms dominated by endogenic signatures like faulting, folding or jointing, or which are of volcanic origin and partly drowned by sea level rise in the warm period of today’s climate.

### 2.1 Classification of Coastal Landforms

Due to the complexity of coasts, numerous attempts to organize coastal features or processes have been put forward but hitherto no single system of classification has been comprehensive in scope or coverage (Finkl, 2004; Kelletat, 1999; Woodroffe, 2003). An example of a hierarchical classification system of natural coastlines with respect to their genesis and evolution of coastal features is given in table 2 (Read the table from left to right as it defines coastlines in very broad terms on the left hand site and in more detail at the right). In the widest sense, every coastline on Earth is either advancing or retreating (it may also be stable, but only for a very short period of time), or has advanced or retreated. The difference is evident: the terms *advanced* or *retreated* describe the history of evolution of the coastal forms; the terms *advancing* or *retreating*, the present day status. The next category of classification is defining *why* a coast is advancing or retreating. A coast may advance towards the sea because of emergence. For example tectonic forces within the Earth’s crust may uplift a coastline over geologic time. Alternatively constructive and/or depositional processes such as the growth of coral reefs or the deposition of sediments in delta regions may result in regression, or thirdly, it may result from sea level fall. A retreating coast is the result of relative sea level rise where tectonic movements cause a sinking of the crust or rise of sea level drowns the coastline. So too it may be affected by abrasion, which is the general term for coasts experiencing natural destruction and erosion by different forces. A more detailed differentiation classifies coastlines according to the processes which shaped them in the recent past and continue today: For example, constructive coastlines built up by organic processes (think again of coral reefs or visualize a coastline where extended mangrove flats or sea grass pastures capture sediments and extend the shoreline laterally over time), or new land along a shore built up by lava flows. The classification of coastlines
by Kelletat (1995) recognizes numerous categories of advanced and retreated coastlines based on a range of criteria, (see below). In the following topics, we present different landscapes inundated by the sea and discuss the resulting coastal landforms. We start with coastlines in a dynamic environment of magnificent natural scenery at the edge between the great continental ice caps and the sea – ice coasts.

2.2 Ice Cliffs, Calving Glaciers and Sea Ice

Only about 10 percent of Earth’s land surface is now covered by glaciers, almost all of this is blanketed by the huge ice sheets of Greenland.