Hunt and Tucker (1992), but follow Posamentier and Vail (1988) in the placement of the sequence boundary at the onset of base-level fall (e.g., Coe, 2003).

All classical sequence stratigraphic models assume the presence of an interior seaway within the basin under analysis, and as a result the systems tract nomenclature makes direct reference to the direction and type of shoreline shifts (Fig. 1.7). In overfilled basins, however, dominated by nonmarine sedimentation, or in basins where only the nonmarine portion is preserved, the definition of systems tracts is based on changes in fluvial accommodation, as inferred from the shifting balance between the various fluvial architectural elements. This chapter reviews the characteristics of all systems tracts, in both underfilled and overfilled basins. Five systems tracts are currently in use in underfilled basins, as defined by the interplay of base-level changes and sedimentation (Fig. 4.6). These are the highstand, falling-stage, lowstand and transgressive systems tracts, as well as a composite 'regressive systems tract' that amalgamates all deposits accumulated during shoreline regression. In addition to these five systems tracts, which assume the presence of a full range of marine to nonmarine depositional systems within the basin separated by a paleoshoreline, two more systems tracts have been defined for fully nonmarine settings. These are the low accommodation and the high accommodation systems tracts. The following sections provide a brief account of all types of systems tracts currently in use, from definition to identification criteria and economic potential. This presentation starts with the suite of three individual regressive systems tracts (i.e., highstand, falling-stage, and lowstand), followed by a discussion of the transgressive, the composite regressive, and the two fluvial systems tracts.

HIGHSTAND SYSTEMS TRACT

Definition and Stacking Patterns

The highstand systems tract, as defined in the context of depositional sequence models II and IV (Fig. 1.7), forms during the late stage of base-level rise, when the rates of rise drop below the sedimentation rates, generating a normal regression of the shoreline (Figs. 4.5 and 4.6). Consequently, depositional trends and stacking patterns are dominated by a combination of aggradation and progradation processes (Figs. 3.35 and 5.4–5.6).

The highstand systems tract is bounded by the maximum flooding surface at the base, and by a composite surface at the top that includes a portion of the subaerial unconformity, the basal surface of forced regression, and the oldest portion of the regressive surface of marine erosion (Figs. 4.6, 4.23, and 5.4–5.6). As accommodation is made available by the rising, albeit decelerating, base level, the highstand sedimentary wedge is generally expected to include the entire suite of depositional systems, from fluvial to coastal, shallow-marine, and deep-marine. Nevertheless, the bulk of the 'highstand prism' consists of fluvial, coastal, and shoreface deposits, located relatively close to the basin margin (Fig. 5.7). Highstand deltas are generally far from the shelf edge, as they form subsequent to the maximum transgression of the continental shelf, and develop diagnostic topset packages of aggrading and prograding delta plain and alluvial plain strata (Figs. 3.35 and 5.8). Along open shorelines, strandplains are likely to form as a result of beach progradation under highstand conditions of low-rate base-level rise. Shelf edge stability, coupled with the lack of sediment supply to the outer shelf – upper slope area, results in a paucity of gravity flows into the deep-water environment (Fig. 5.7). With a proximal location on the continental shelf, highstand prisms tend to be found stranded relatively close to the basin margins following the rapid forced regression of the shoreline, coupled with the lack of fluvial sedimentation during subsequent base-level fall (Figs. 5.7, 5.9, and 5.10). Also, highstand prisms tend to be subject to preferential fluvial incision during the subsequent stage of base-level fall (Fig. 5.9), as the forefront of the highstand wedge, which inherits the slope gradient of shoreface or delta front environments, is commonly steeper than the fluvial equilibrium profile. Such processes of differential fluvial erosion have been documented by Saucier (1974), Leopold and Bull (1979), Rahmani (1988), Blum (1991), Posamentier *et al*. (1992b), Allen and Posamentier (1994), Ainsworth and Walker (1994), also consistent with the flume experiments of Wood *et al*. (1993) and Koss *et al*. (1994), and are discussed in more detail in the following section that deals with the falling-stage systems tract.

The relative increase in coastal elevation during highstand normal regression, which is the result of aggradation along the shoreline systems, is accompanied by differential fluvial sedimentation, with higher rates in the vicinity of the shoreline. This pattern of sedimentation, which involves progradation and vertical stacking of distributary mouth bars at the shoreline coeval with backfilling of the newly created fluvial accommodation, leads to a decrease in the gradient of the topographic slope and a corresponding lowering with time in fluvial energy (Shanley *et al*., 1992). This trend, superimposed on continued denudation of the sediment source areas, tends to generate an upward-fining fluvial profile that continues the overall upwards-decrease in grain size recorded by the underlying lowstand and

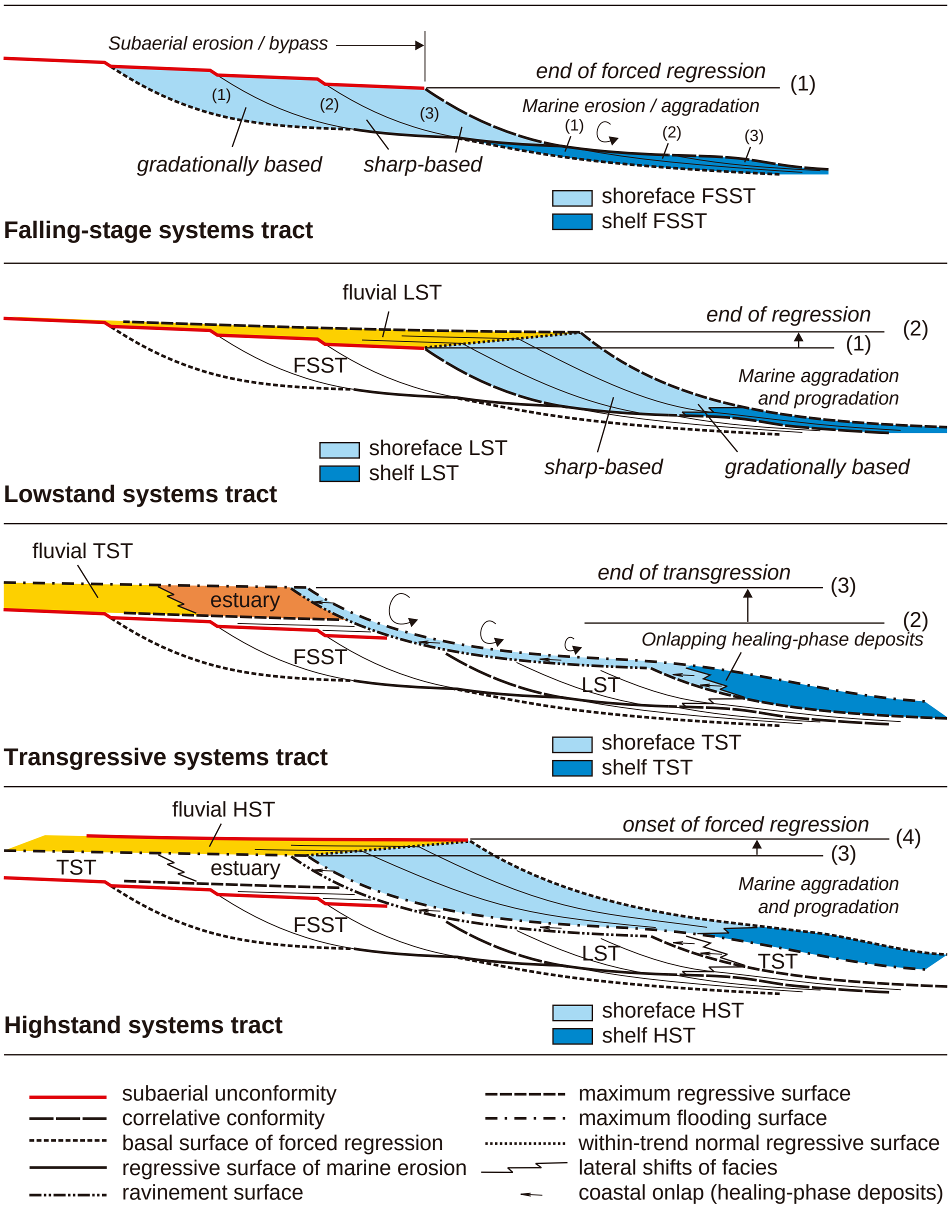

FIGURE 5.6 Detailed architecture of systems tracts and stratigraphic surfaces in the transition zone between fluvial and shallow-marine environments, in a shelf-type setting (modified from Catuneanu, 2002). The falling-stage shallow-marine deposits have a low preservation potential where the shoreline falls below the shelf edge (Fig. 5.4). Note that the earliest falling-stage shoreface deposits are gradationally based, whereas the earliest lowstand shoreface deposits are sharp-based. These are exceptions to the rule, as the falling-stage shoreface strata are generally recognized as sharp-based, in contrast to the lowstand shoreface facies which are generally regarded as gradationally based.

transgressive systems tracts (Fig. 4.6). However, the late highstand may be characterised by laterally interconnected, amalgamated channel and meander belt systems with poorly preserved floodplain deposits, due to the lack of floodplain accommodation once the rate of base-level rise decreases, approaching stillstand (Legaretta *et al.*, 1993; Shanley and McCabe, 1993; Aitken and Flint, 1994). The fluvial portion of the highstand systems tract may therefore be split into a lower part, characterized by isolated channel fills engulfed in finer-grained overbank sediments, and an upper part characterized by a higher degree of channel amalgamation. The early phase of the highstand stage is defined by relatively high rates of base-level rise, albeit lower than the sedimentation rates, which results in a stacking pattern with a strong *aggradational component*. Consequently, the ratio between floodplain and channel fill architectural elements also tends to be high. In contrast, the late phase of the highstand stage is defined by much lower rates of base-level rise, which result in a stacking pattern with a stronger *progradational component*, and hence it is prone to an increase in channel clustering and implicitly in the ratio between channel fill and floodplain architectural elements. Progradation therefore accelerates with time during the highstand stage, in parallel with the decrease in the rates of base-level rise and the corresponding decrease in the rates of creation of fluvial and marine accommodation.

The trends recorded by the fluvial portion of the highstand systems tract may be described in two different terms, one referring to energy and related

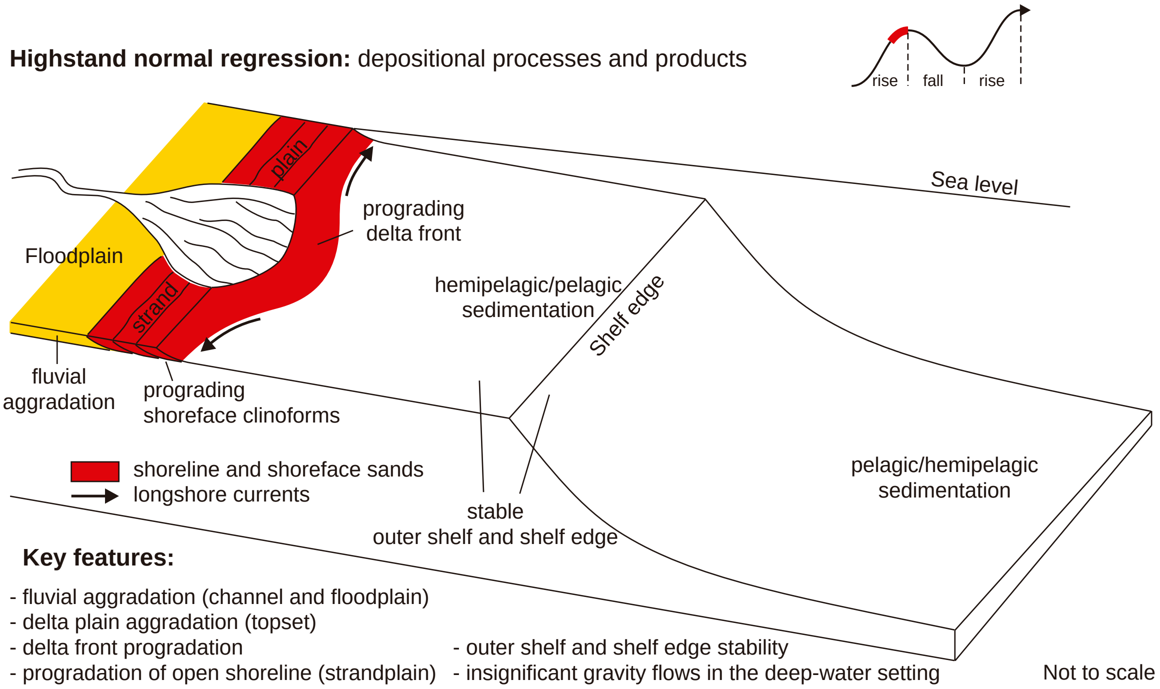

FIGURE 5.7 Depositional processes and products of the highstand (late rise normal regression) systems tract (modified from Catuneanu, 2003). The deposits of this stage overlie and downlap the maximum flooding surface. The bulk of the 'highstand prism' includes fluvial, coastal, and shoreface deposits. The shelf and deep-marine environments receive mainly fine-grained hemipelagic and pelagic sediments.

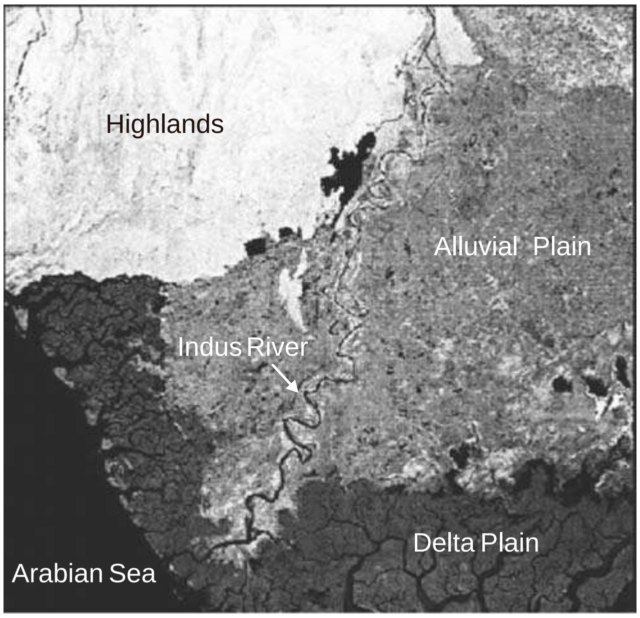

FIGURE 5.8 Satellite image of the Indus Delta (Pakistan), showing the aggrading and prograding alluvial and delta plains of a modern highstand prism (image courtesy of H.W. Posamentier). Subaerial accommodation is created by the relative increase in coastal elevation at the shoreline during the highstand normal regression, as defined by the trajectory of the anchoring point of the fluvial graded profile (Fig. 3.35). The delta plain corresponds to the intertidal environment, and it is marked by tidal creeks. Fluvial aggradation is most active along the Indus River, which explains the seaward encroachment of the alluvial plain in the vicinity of the river. For scale, the Indus River is approximately 2.5 km wide.

competence (maximum grain size that can be transported by rivers), and the other referring to the balance between channel sandstones and overbank fines (Fig. 5.11). While the maximum grain size transported by highstand fluvial systems decreases with time, as a result of lowering slope gradients and fluvial energy, the sand/mud ratio increases in response to decelerating base-level rise and the corresponding increase in the degree of channel clustering. The vertical profile of the fluvial highstand deposits may therefore be described as fining-upward, if one plots the maximum grain size observed within channel fills, even though the net amount of sand tends to increase up section. The fining-upward trend is even more evident in most preserved stratigraphic sections, as the amalgamated channels at the top of the highstand systems tract are usually subject to erosion during the subsequent fall in base level. In the interfluve areas of incised-valley systems, which are less affected by erosion during forced regression, the top of the nonmarine highstand systems tract may be preserved, and instead be subject to pedogenic processes (Wright and Marriott, 1993).

An example of low energy, 'sluggish' highstand fluvial systems is presented in the left half of the seismic image in Fig. 5.12. This image captures a system of overlapping, moderate to high sinuosity Pleistocene rivers in the Malay Basin, offshore Malaysia, which were subsequently flooded during the Holocene sea-level

FIGURE 5.9 Oblique aerial photograph of a Pleistocene highstand coastal prism stranded behind and above the forced regressive shoreline of the Great Salt Lake, Utah (photograph courtesy of H.W. Posamentier). The arrow points to localized fluvial incision, which is limited to the highstand prism. The depth of incision decreases downstream, as the landscape gradient becomes in balance with the fluvial graded profile beyond the toe of the highstand prism.

rise and transgression. The superimposed aspect of these highstand rivers is an artefact of the diachronous nature of the seismic time slice (196 ms two-way travel time below the sea level), which thus captures rivers of slightly different ages on the same amplitude extraction map. Note the isolated nature of the channel fills, which are engulfed, and surrounded by extensive floodplain deposits. As discussed above, highstand fluvial systems may have a limited preservation potential due to subsequent subaerial erosion during base-level fall. This aspect is exemplified in the lower-right area of the seismic image in Fig. 5.12, where the highstand rivers have been removed by processes of valley incision and replaced on the time slice by younger, lowstand fluvial deposits that form the fill of an incised valley (Miall, 2002).

The shallow-marine portion of the highstand systems tract displays a coarsening-upward profile related to the basinward shift of facies (Fig. 5.11), and includes low-rate prograding and aggrading normal

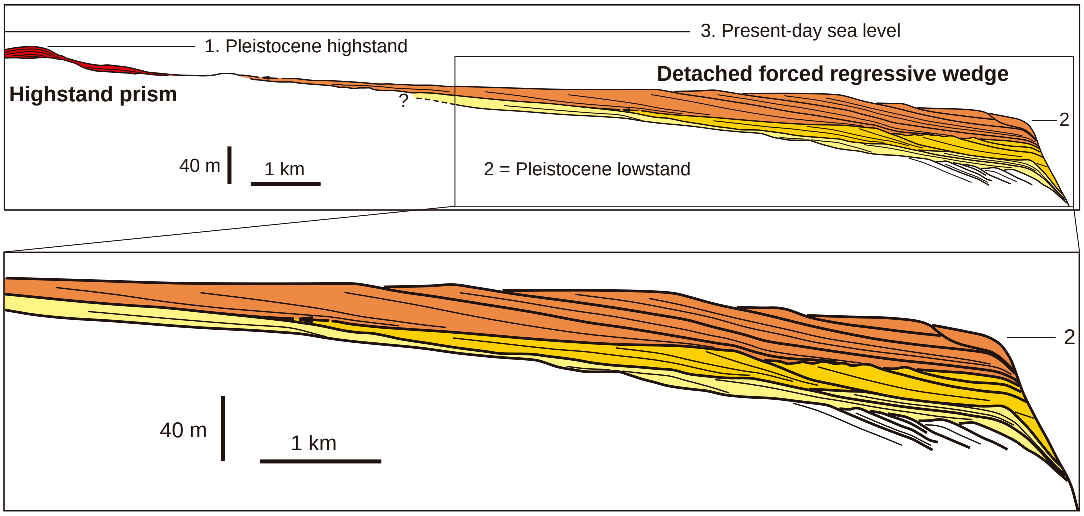

FIGURE 5.10 Cross-section through the uppermost, Pleistocene deposits of the Rhone shelf (offshore southeast France), based on the interpretation of a 2D seismic line (modified from Posamentier *et al*., 1992b). The profile shows a typical detachment between a highstand coastal prism and the younger shallow-marine forced regressive deposits that accumulated during subsequent base-level fall. The highstand prism has been abandoned on the continental shelf behind the rapidly shifting forced regressive shoreline. The detached forced regressive wedge consists of a succession of offlapping, wave-dominated deltaic and shoreface prograding lobes, and preserves the record of at least three high-frequency episodes of base-level fall. Note that each set of forced regressive lobes pinches out in the landward direction (arrows), being separated from the highstand prism by a zone of sediment bypass.

Systems tract / Environment	HST		FSST		LST		TST	
	maximum grain size	sand-mud ratio	maximum grain size	sand-mud ratio	maximum grain size	sand-mud ratio	maximum grain size	sand-mud ratio
Fluvial	Upward decrease(1)	Upward increase(2)	N/A(3)		Upward decrease(4)		Upward decrease(4)	
Shallow water	Upward increase(5)		Upward increase(5)		Upward increase(5)		Upward decrease(6)	
Deep water	N/A(7)		Upward increase(8)		Upward decrease(9)		Upward decrease(10)	

FIGURE 5.11 Grading trends along vertical profiles through the fluvial, shallow- and deep-water portions of the various systems tracts. The trends of change in maximum grain size and sand/mud ratio correlate in general, with the exception of the highstand fluvial systems (shaded area). Notes: (1)—younger channel fills tend to be finer-grained than the older ones due to the decrease with time in slope gradients and associated fluvial competence; (2)—due to increasing degree of channel amalgamation with time; (3)—fluvial degradation and steepening of the slope gradient; formation of sequence boundary; (4)—due to decreasing slope gradients and associated fluvial competence; (5)—due to the progradation of delta front/shoreface facies over finer prodelta/shelf sediments; (6)—due to the retrogradation of facies; (7)—dominant pelagic sedimentation; (8)—transition from mudflow deposits to high-density turbidites; (9)—transition from high-density to low-density turbidites; (10)—transition from high-density turbidites to mudflow deposits.

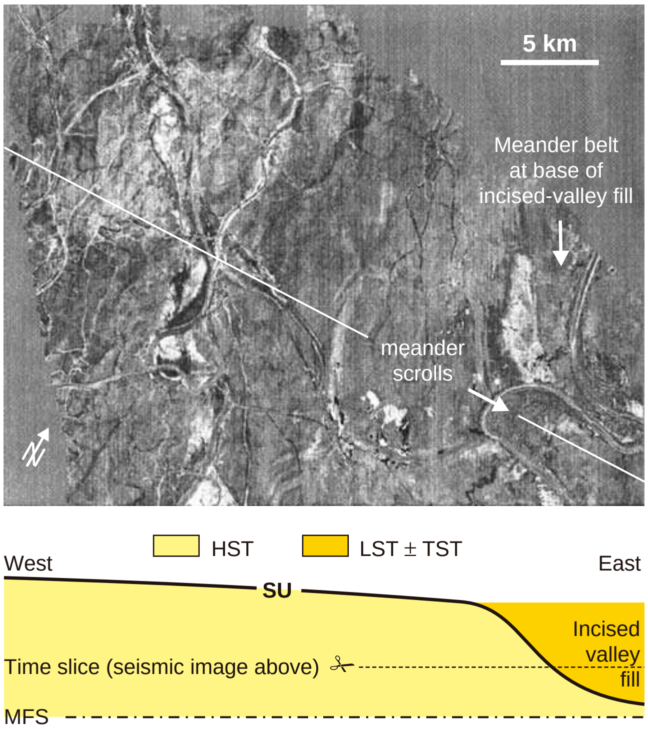

FIGURE 5.12 Amplitude extraction map along a time slice (196 ms two-way travel time below the sea level) in the Malay Basin, offshore Malaysia (modified from Miall, 2002; seismic image courtesy of A.D. Miall). The image shows juxtaposed highstand (left half of map) and lowstand (lower-right side of map) fluvial systems of Pleistocene age, which are physically separated by a subaerial unconformity that formed during an intervening stage of base-level fall—see cross-section for an interpretation. Abbreviations: HST—highstand systems tract; LST—lowstand systems tract; TST—transgressive systems tract; SU—subaerial unconformity; MFS—maximum flooding surface.

regressive strata. Within the overall regressive shallow-marine succession of a sequence, which includes highstand, falling-stage and lowstand deposits, the highstand systems tract occupies the lower part of the coarsening-upward profile (Figs. 4.6 and 5.5). This highstand prism typically includes deltas with topset geometries, in clastics-dominated settings, or carbonate platforms, where the submerged shelf hosts favourable conditions for a 'carbonate factory.'

The internal architecture of a highstand shallow-marine succession depends in part on the pattern of shoreline shift, which can be continuous during the entire duration of the highstand stage or may comprise a succession of higher-frequency transgressive-regressive pulses caused by fluctuations in the rates of sedimentation and/or base-level rise. In the case of a continuous regression, the shallow-marine portion of the highstand systems tract consists of a single upward-coarsening facies succession ('parasequence') that downlaps the maximum flooding surface. In the case of the more complex pattern of highstand regression, the shallow-marine portion of the highstand systems tract includes a succession of stacked prograding lobes ('parasequences'), in which each lobe extends farther seaward relative to the previous one. This shallow-marine architecture is often referred to as a forestepping, or seaward-stepping pattern of basin fill. The degree of vertical overlap of the progressively younger prograding lobes is more pronounced during the early phase of highstand, when the rates of base-level rise are high, and the normal regression has a strong aggradational component. In contrast, the late phase of highstand is characterized by an increased rate of shoreline regression, which is a consequence of the fact that base-level rise decelerates as it approaches stillstand. As a result, the thickness of the topset package, which reflects the degree of vertical overlap between successive prograding lobes, decreases with time, as the balance between aggradation and progradation shifts in favour of the latter. Another consequence of a decelerating base-level rise is the fact that progressively less accommodation is created on the shelf, so the prograding lobes ('parasequences') that fill the available accommodation become thinner with time and in a basinward direction (Fig. 5.13). Nevertheless, as accommodation is limited during late highstand, the youngest coastal to shoreface sandstones of the highstand systems tract tend to have a wider geographic distribution across the shelf, as autocyclic shifting in the *locus* of lobe deposition is forced upon deltas, and as a result these shallow-marine reservoirs have a better connectivity relative to their early highstand counterparts (Posamentier and Allen, 1999; Fig. 5.13). At the same time, the gradual lowering in fluvial energy during the highstand stage indicates that the late highstand deltas are expected to consist of finer-grained sediments relative to the early highstand deltas (Fig. 5.13). In spite of this general trend of grain size decrease from the older to the younger lobes of the highstand deltas, which occupy more proximal *vs.* more distal portions of the shelf, respectively, the vertical profile in any given location still shows an overall coarsening-upward trend due to the progradation of delta front facies over finer prodelta sediments (Fig. 5.11).

The preservation potential of the upper part of the fluvial to shallow-marine highstand prism is hampered by the subaerial and marine erosional processes that are associated with the subsequent fall in base level. It is typical therefore for the highstand systems tract to be truncated at the top by the subaerial unconformity, and to a lesser extent by the regressive surface of marine erosion (e.g., Fig. 4.23).

Economic Potential

Petroleum Plays

The best potential reservoirs of the highstand stage tend to be associated with the shoreline to shoreface depositional systems, which concentrate the largest amounts of sand, with the highest sand/mud ratio (Fig. 5.14). These reservoirs are usually meters to tens of meters thick (Fig. 3.38), and may display very good lateral continuity along the strike of the basin. Both strandplains (open shorelines) and deltas (river-mouth settings) prograde and downlap the maximum flooding surface, which marks the lower boundary of the highstand normal regressive package (Fig. 4.40). At the top, the highstand reservoirs may be truncated by the subaerial unconformity. Fluvial systems have a moderate hydrocarbon potential, with the reservoirs mainly represented by channel fills and crevasse splays interbedded with finer-grained floodplain facies (Fig. 5.14). The sand/mud ratio and the reservoir connectivity within the fluvial systems tend to improve upwards, as the decreasing rates of base-level rise during the highstand normal regression lead to an increase in the degree of channel amalgamation (Fig. 5.11). The distribution in plan view of fluvial reservoirs depends of course on their nature (channel fills *vs.* crevasse splays), which needs to be assessed based on sedimentological and geomorphological grounds. No significant reservoirs are expected to develop during this stage in the shelf and deeper-marine settings (Fig. 5.7).

Systems tracts / Trends	HST deltas		FSST deltas		LST deltas	
	Early HST	Late HST	Early FSST	Late FSST	Early LST	Late LST
Thickness	Thicker →	Thinner	Thicker →	Thinner	Thinner →	Thicker
Distribution	Localized →	Wider	Localized →	Wider	Wider →	Localized
Grain size	Coarser →	Finer	Finer →	Coarser	Coarser →	Finer

FIGURE 5.13 Trends of change in thickness, distribution (geometry in plan view) and sediment grain size of deltas that prograde a shelf-type setting during highstand, base-level fall and lowstand stages. Note that changes in thickness and distribution are linked to each other, as required by the conservation of deltaic lobe volumes associated with similar sediment supply. Thus, given a constant sediment supply, thinner and wider lobes have the same volume as thicker but more localized lobes. The trends of change in sediment grain size are independent of the lobe geometry, and reflect corresponding changes in fluvial energy and competence. Fluvial gradients and energy are lowered during stages of base-level rise, and increase during the falling stage. Also note that even though younger lobes (with a more distal position on the shelf) are finer-grained than the older lobes (with a more proximal position on the shelf) in the lowstand and highstand deltas, vertical profiles in any given location still show coarsening-upward grading trends due to the progradation of delta front facies over finer-grained prodelta sediments (Fig. 5.11).

Systems tract	Significance	Fluvial	Coastal	Shallow-water	Deep-water
Highstand Systems Tract	Sediment budget	Good: *aggrading systems*	Good: *deltas and strandplains (coastal prisms)*	Good: *gradationally based shoreface and shelf facies*	Poor
	Reservoir	Fair: *channel fills, crevasse splays*	Good: *shoreline sands*	Good: *shoreface sands*	Poor
	Source and Seal	Poor source, fair seal: *overbank facies*	Poor	Fair: *shelf fines*	Good: *pelagic facies*
Transgressive Systems Tract	Sediment budget	Good: *rapidly aggrading systems, incised and unincised*	Good: *estuaries, deltas, backstepping beaches*	Fair: *onlapping shoreface and shelf facies*	Fair: *low-density turbidity flows and debris flows*
	Reservoir	Fair: *channel fills, crevasse splays*	Good: *estuarine, deltaic, and beach sands*	Fair: *shelf-sand deposits, basal healing-phase wedges*	Fair: *turbidites (basin floor)*
	Source and Seal	Poor source, fair seal: *overbank fines*	Poor source, fair seal: *central estuary facies*	Good: *shelf fines (shelf facies may be missing distally)*	Good: *pelagic facies*
Lowstand Systems Tract	Sediment budget	Good: *amalgamated channel fills, incised and unincised*	Good: *shelf/shelf-edge deltas, strandplains*	Good: *gradationally based shoreface and shelf facies*	Fair: *low-density turbidity flows*
	Reservoir	Good: *channel fills*	Good: *shoreline sands*	Good: *shoreface sands*	Good: *turbidites (basin floor)*
	Source and Seal	Poor	Poor	Fair: *shelf fines*	Fair: *"overbank" pelagics*
Falling-stage Systems Tract	Sediment budget	Poor	Fair: *offlapping deltas, downstepping beaches*	Fair: *sharp-based shoreface, and shelf facies*	Good: *debris flows and high-density turbidity flows*
	Reservoir	Poor	Fair: *detached shoreline sands*	Fair: *shoreface sands*	Good: *turbidites (slope and basin floor)*
	Source and Seal	Poor	Poor	Fair: *shelf fines*	Fair: *"overbank" pelagics*

FIGURE 5.14 Sediment budget and the petroleum play significance of systems tracts. Sediment budget refers to the relative volumes of sediment present in the various portions (fluvial, coastal, shallow-water, and deep-water) of each systems tract. Ranking qualifiers used in this table range from poor to fair and good.

The downside of the increased degree of fluvial to shallow-marine sand amalgamation and connectivity toward the top of the highstand systems tract is the corresponding poorer representation of source and seal rocks (Fig. 5.14). As a result, the interconnected late-highstand sand deposits tend to lack adequate seals. The sealing potential of these reservoir facies is further diminished by the presence of the overlying subaerial unconformity and, where incised valleys are located, by the presence of sand-prone valley-fill deposits above the subaerial unconformity (Posamentier and Allen, 1999). It can be concluded that the petroleum play significance of the highstand systems tract consists in the accumulation of reservoir facies mainly within proximal regions (fluvial to coastal and shoreface environments) and of source and seal facies mainly within the distal areas of the basin (shallow- to deep-water environments).

The primary risk for the exploration of highstand reservoirs is represented by the potential lack of charge due to the insufficient development of seal facies, especially towards the top of the proximal portion of the systems tract. Where present, however, highstand fluvial floodplain shales may provide a seal for the early-highstand isolated channel fills, whereas the overlying lowstand fluvial floodplain shales and/or fluvial or marine transgressive shales may seal the late-highstand amalgamated reservoirs. The exploration potential of each individual reservoir therefore needs to be assessed on a case-by-case basis.

Coal Resources

Coal exploration is restricted to the nonmarine portion of the basin, where the thickest and most regionally extensive coal seams are generally related to episodes of highest water table relative to the landscape profile. Providing that all favorable conditions required for peat accumulation are met, which involve the interplay of subsidence, vegetation growth and sediment supply, these most significant coal seams tend to be associated with maximum flooding surfaces (Hamilton and Tadros, 1994), hence marking the base of the highstand systems tract (Fig. 5.15).

Following a stage characterized by a high accommodation to sediment supply ratio during the transgression of the shoreline, the time of end of shoreline transgression is arguably the most favorable for peat accumulation and subsequent coal development. During highstand normal regression, the balance between accommodation and sedimentation gradually changes in the favor of the latter. This, coupled with the decelerating rates of base-level rise, diminishes the chance for significant peat accumulations. The lower portion of the highstand systems tract, defined by a predominantly

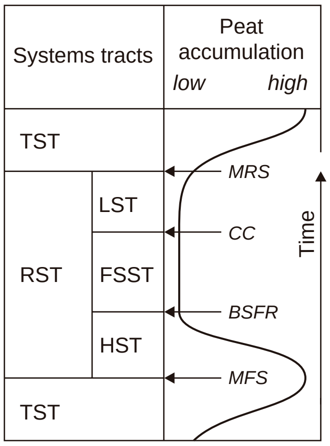

FIGURE 5.15 Generalized trend of peat accumulation during the various stages of a base-level cycle, in response to changes in accommodation. See text for discussion. No temporal scale is implied for the relative duration of systems tracts. Abbreviations: TST—transgressive systems tract; RST—regressive systems tract; HST—highstand systems tract; FSST—falling-stage systems tract; LST—lowstand systems tract; MFS—maximum flooding surface; BSFR—basal surface of forced regression; CC—correlative conformity (*sensu* Hunt and Tucker, 1992); MRS—maximum regressive surface.

aggradational sedimentation pattern, may still include well-developed coal seams interbedded with overbank fluvial facies, above the tidally-influenced transgressive fluvial channel fills. The upper portion of the highstand systems tract commonly lacks coal deposits due to insufficient accommodation and the relatively high sediment input that results in the amalgamation of meander belts. These trends in the likelihood of peat accumulation during highstand normal regressions, as well as all other stages of the base-level cycle, are illustrated in Fig. 5.15.

Placer Deposits

Mineral placers may also be studied within the framework of sequence stratigraphy, as they tend to be associated with specific sequence stratigraphic surfaces. The gold 'reefs' of the Late Archean Witwatersrand Basin, for example, offer a good opportunity to observe the stratigraphic position and significance of placer deposits (Catuneanu and Biddulph, 2001). Regardless of the mechanism of emplacement, detrital or hydrothermal, the gold in the Witwatersrand Basin is always present in the coarser lag deposits that are associated with unconformities. These conglomerates ('reefs') are not alike throughout the basin fill, but may display various textural attributes and relationships to the adjacent facies that argue for different origins. Understanding the origin of each individual placer is the key to the strategy of exploration of that particular deposit, because both the distribution and the changes in grades along dip are a function of its genesis. Three genetic types of placer deposits may be defined in the context of sequence stratigraphy, and correspond to unconformities that form during the forced regressive and transgressive shifts of the shoreline. These stratigraphic surfaces include the subaerial unconformity, the regressive surface of marine erosion, and the transgressive ravinement surface; all three types of unconformities have the potential of concentrating economic lag deposits (placers) as a result of erosion and sediment reworking.

It can be noted that none of the three types of placers forms *during* the highstand normal regression of the shoreline, but at least portions of the subaerial unconformity and of the regressive surface of marine erosion may be part of the composite boundary at the top of the highstand systems tract (Fig. 4.23). These two placer types are discussed in the following section that deals with the falling-stage systems tract. The placers associated with transgressive scouring in near-shore environments are also described in this chapter, in the section that deals with the transgressive systems tract.

FALLING-STAGE SYSTEMS TRACT

Definition and Stacking Patterns

The falling-stage systems tract corresponds to the 'lowstand fan' of Posamentier *et al.* (1988), and it was separated as a distinct systems tract in the early 1990s, as a result of independent work by Ainsworth (1991, 1992, 1994), Hunt (1992), Hunt and Tucker (1992) and Nummedal (1992). The actual systems tract terminology varied from 'falling-stage' (Ainsworth, 1991, 1992, 1994) to 'forced regressive wedge' (Hunt, 1992; Hunt and Tucker, 1992) and 'falling sea-level' (Nummedal, 1992), with the simplest nomenclature of Ainsworth (1991, 1992, 1994) becoming generally more accepted and subsequently adopted by more recent work (e.g., Plint and Nummedal, 2000).

The falling-stage systems tract includes all strata that accumulate in a sedimentary basin during the forced regression of the shoreline. According to standard sequence stratigraphic models, the forced regressive deposits consist primarily of shallow- and deep-water facies, which accumulate at the same time with the formation of the subaerial unconformity in the nonmarine portion of the basin (Fig. 5.11). The falling-stage systems tract is bounded at the top by a composite surface that includes the subaerial unconformity, its correlative conformity (*sensu* Hunt and Tucker, 1992), and the youngest portion of the regressive surface of