

LOWSTAND DEEP-WATER CLASTIC FANS AND RELATED DEPOSITIONAL SYSTEMS: TERMINOLOGY, CHARACTERISTICS, PROCESSES, AND VARIABILITY

V. Kolla¹ and R. Martin¹

ABSTRACT

As presently used in sequence stratigraphic practice, lowstand clastic deep-water fans and related depositional systems consist of mainly "basin-floor fan," "slope-fan" and "shingled turbidites." Basin-floor fan refers to fan-shaped turbidites and related sedimentary gravity-flow deposits in the intraslope basins and basins of bathyal and deeper paleowater depths; the "basin-floor fan" is expected to have unchannelized and channelized sandy turbidites but should be devoid of channel-overbank deposits. "Slope fan" implies, in principle, fan-shaped, channel-overbank turbidites and related deposits that built the continental slopes, and slopes of the intraslope basins, outward and upward. The slope-fan system may also occur on the basin-floors of intraslope basins. The basin-floor fan is thought to be deposited during relative sea-level fall and maximum lowstand ("basin-floor fan time" or "basin-floor fan systems-tract time"), and the slope fan is thought to be deposited during subsequent sea-level still stand and slow rise ("slope fan time" or "slope fan systems-tract time"). "Shingled turbidites" are turbidites deposited at the toes of clinofolds of the prograding wedge following the time of slope fan deposition. Shingled turbidites may include massive sands like those in basin-floor fans, but are deposited closer to the sources of supply than basin-floor fans.

Outside the realm of strict sequence-stratigraphic terminology, "deep-sea fan" usually refers to fan- or cone-shaped morphology of organized systems of turbidites and related deposits in basinal settings. The concept of the slope-fan in sequence stratigraphy extends the "deep-sea fan" usage to continental slopes also. In actuality, fans of any usage, may or may not be "fan-shaped" sedimentary bodies depending upon the tectonic and physiographic setting of the basins, but must consist largely of organized systems of turbidites and related deposits.

In addition to basin-floor fan and slope-fan systems or "systems-tracts," mass-transport complexes, and slope-, or base-of-slope-, aprons (slides and slumps, debris flow and some turbidity current deposits) should be recognized as separate depositional systems. In the past, these depositional systems were included under "slope fan" or "slope-fan complex." However, the characteristics of aprons and mass-transport complexes, although highly variable and frequently gradational into turbidites, are sufficiently different from the slope-fan and therefore need separate identity.

We discuss and illustrate in our presentation the sedimentological, well log and seismic characteristics of fans, slope-aprons and related systems, and their variabilities with some examples from the Gulf of Mexico and elsewhere. Outside the mold of sequence-stratigraphic practice, sedimentologists and geologists use other terminologies for deep-sea fan systems. We attempt to point out the equivalencies of these terminologies to the ones used in sequence stratigraphy.

¹ Elf Exploration, Inc., 1000 Louisiana, Suite 3800, Houston, TX 77002