Spatial and Temporal Variations in Geometry and Distribution Patterns of Sheet-like Turbidite Sandstone Beds Within a Forearc Submarine-Fan Succession of the Pliocene Kiyosumi Formation on Boso Peninsula, Central Japan

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Sheet-like turbidites are one of the important components of submarine-fan successions, because high-resolution definition of their geometry and distribution patterns is critical for better understanding of the estimation of volume and interconnectedness of reservoir sands and sandstones formed in a submarine-fan system. Here we studied spatial and temporal variations in geometry and distribution patterns of sheet-like turbidite sandstone beds within a submarine-fan succession of the Pliocene Kiyosumi Formation on Boso Peninsula, central Japan. The formation, as much as 850 m thick, represents a small sand-dominated submarine-fan system developed in a forearc basin, and is characterized by repeated occurrences of channel-and-overbank deposits and sheet-like turbidite packages, that are interpreted to have developed in response to upslope avulsion. On the basis of mapping of several volcanic ash beds, we conducted bed-to-bed correlation within a sheet-like turbidite package in a 20-45 m thick stratigraphic horizon in the middle part of the formation and obtained thickness-weighted center of the deposits.

Switching patterns of weighted center of a bed relative to the underlying bed exhibit increase-and-decrease patterns from the base to the top of the studied interval. These patterns are interpreted to document the repetitive sequential changes of (1) the development of topographic lows and (2) the infilling and flattening out of these lows. The latter processes may have resulted in sea-floor condition required for freely flowing of sediment-gravity-flows and developed the former topographic condition on the submarine-fan system.

Furthermore, these patterns permit subdivision of the studied interval into five bed-sets. The values of switching distances of the weighted center in a bed-set relative to the underlying bed-set are, in general, smaller than those of the switching distances of the component beds. The smaller values of switching distance of bed-sets are due to both (1) the development of the succession in an overall topographic low in response to sediment loading superimposed by forearc tectonics, and (2) overall balanced compensational stacking of component beds.