Selected Highlights for 50 Years of Turbidite Studies since Introduction of the Bouma Sequence

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EXTENDED ABSTRACT

Our selected major landmarks for the past half-century of turbidite studies are based on more than 50 years of research in turbidite systems by each of us. Considering that our studies focused mainly on modern systems, we present here some major highlights for research on turbidite systems from our prospective. Time constraints limit the number of highlights we can cite and discuss and that we do not include experimental and modeling research. Prior to the past 50 years, Forel (1885, 1895) measured an underwater channel and described sediment-laden density currents that built the Rhone Channel and levee in Lake Geneva, Switzerland, in the late 1800s. Significant advances about earthquake triggering, turbidity-current flow and graded sand deposits were made in the 1950s by Arnold Bouma's major professor Ph. H. Kuenen (e.g., Kuenen and Migliorini, 1950). In the 1950s and early 1960's researchers such as Bruce C. Heezen, Maurice Ewing, and David Ericson confirmed the existence of turbidity currents in the modern ocean through core studies and documentation of submarine cable breaks (e.g., Heezen and Ewing, 1952; Ericson et al., 1952; Heezen et al., 1964).

In the 1960s, the Bouma (1962) sequence, which Arnold developed based on outcrops, provided immediate relevance for the characterization of turbidites in modern submarine environments (e.g., Astoria Fan a and b structures in proximal channels, c–e in levees, a–e in lobes, and d and e in basin plains), as well as for ancient outcrops, and industry boreholes (Figs. 1–3) (Nelson, 1968; Nelson and Nilsen, 1984; Nelson et al., 2009a). Bouma's (1962) model of turbidite systems based on the Ta–e sequence is still relevant today for base-of-slope sand-rich aprons that are not channelized (Fig. 4). Studies of modern turbidite systems in the late 1960s soon recognized the importance of channelized deposition in small-sized (5-100 km) and large-sized (100s km) unconfined submarine fans (Fig. 5) (e.g., Nelson, 1968; Nelson et.al., 1970; Normark, 1970). The Bouma (1962), Nelson (1968), and Normark (1970) models still provide the basic depositional patterns for unconfined turbidite systems.

… (Note: The full version of this extended abstract, including complete text, illustrations, and references, will be made available at a later date on both the 2014 GCAGS convention website [www.gcags2014.com] and AAPG Search and Discovery website [www.searchanddiscovery.com]).