
Re-assessment of the Mississippi River “Delta Model” Curve

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ABSTRACT

The published delta model of “delta switching” is a symmetrical, bell-shaped curve defining the in-phase (synchronous) occurrence of the growth/decline of a delta and the riverine hydrology. The model defines peak delta extent corresponding to peak river discharge into the delta, and the complete loss of a delta at the inception of a new delta. This is a generalized model formulated on the basis of stratigraphic relationships for several Holocene deltaic lobes in southeast Louisiana. Because the model describes the naturally occurring constructive and destructive processes of deltaic plains, it is often referenced in coastal Louisiana restoration documentation.

Examination of the timing and development of the three youngest delta cycles in south Louisiana suggests inconsistencies with the “delta model”, including:

- 1) Expansion of deltaic wetlands for the last two abandoned deltas was faster than the rate of loss of the deltaic wetlands once abandoned, which requires an asymmetrical curve;
- 2) Portions of most of the delta plains created by the Holocene delta lobes persist to the present and temporally overlap in time, suggesting that they are not temporally isolated geologic events;
- 3) The time period of delta plain construction for the last two abandoned deltas is longer than suggested by the “delta model”;
- 4) The Mississippi River continued to discharge into the Lafourche delta several hundred years following inception of the Plaquemines/Balize delta;
- 5) The hydrologic cycle of river abandonment is not required to be in-phase with the growth/abandonment curve.

A schematic curve is proposed which is consistent with the relative relationship of overlapping delta complexes and differing rates of growth and contraction of the deltas.