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MODELING ECOLOGICAL SUCCESSION ON A DELTA TOP. PRELIMINARY RESULTS ON WAX LAKE DELTA, LOUISIANA, USA

Enrica Viparelli¹, John Shaw², Azure Bevington³, Matthew Czapiga⁴, Chuan Li⁴ and Gary Parker^{4,5}

¹Department of Civil and Environmental Engineering, University of South Carolina at Columbia

²Department of Geology and Geophysics, University of Wyoming

³Department of Oceanography and Coastal Sciences, Louisiana State University

⁴Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign

⁵Department of Geology, University of Illinois at Urbana-Champaign

A numerical model of delta growth, in which it is assumed that the distributary channels have self-constructed their cross sections, is coupled with a vegetation model to predict the ecological succession on the delta top. In particular, the delta growth-model predicts the overall structure of the delta, while the vegetation model predicts the type of habitat that will develop on the newly deposited land. Inputs for the vegetation model are the overall structure of the delta, the statistics of elevation variation of the delta top, and the interannual variability of flow discharge and sea level. The vegetation model has already been coupled with the NCED (National Center for Earth-surface Dynamics) Land-Building model, a delta growth model that has been applied to estimate the land-building potential of a few “deep” diversions of the Mississippi River. The coupled model, called the Inundation model, has been tested on the Wax Lake Delta, a young freshwater delta in coastal Louisiana that has been monitored since its formation in the 1970s, and where detailed field work has been performed in the past 10 years. One of the main limitations of the Land-Building model is that the flow is assumed quasi-normal, and thus backwater effects are not accounted for. The delta growth model used in this study not only accounts for the backwater effects on the delta top, but it is also based on a novel channel formative closure that results in better predictions of the downdelta changes in channel geometry. In addition, updated statistics of elevation variation of the delta top are used to predict the ecological succession on the delta top. Preliminary results on the validation of the new Vegetated Delta model on the Wax Lake Delta are presented.