Subsurface 3D Model of the South Texas Sand Sheet and its Connection to Regional Hydrologic Systems

Eli Gonzalez, Chu-Lin Cheng, Juan Gonzalez, and Sarah M. F. Hardage

University of Texas–Rio Grande Valley, 1201 W. University Dr., Edinburg, Texas 78539

ABSTRACT

Conjunctive water resources management play critical roles for available water supplies in regions where freshwater sources are scarce. The South Texas Sand Sheet (STSS) covers six South Texas counties and occupies an area of approximately 7.8 x 10^2 km^2. The STSS consists predominantly of loose eolian sand deposits (medium to fine grain) and relict sand dunes. Previous studies indicate the thickness of the STSS varies between a few centimeters to 12 m. The eastern portion of the STSS is adjacent to Laguna Madre, one of the important lagoon ecosystem on the Texas shoreline. The interactions of fresh/brackish water in STSS with coastal marine ecosystems in Lower Laguna Madre (LLM) require further studies.

The preliminary conceptual model implies that STSS is a significant hydrologic component and storage for water resource management in the region and nearby LLM. Water (fresh/brackish) held in STSS should be taken into account when managing regional water sources (e.g., groundwater recharge and storage, flood control, and discharge to coastal areas).

Analysis has been conducted using digital elevation model (DEM) data with geographic information system (GIS) spatial analysis tools including Flow Direction, Flow Accumulation, and Stream Order to produce Basin and Drainage maps. Results will be used for evaluating the connection of STSS and local hydrologic features. Preliminary drilling in the field and well logs from Texas Water Development Board (TWDB) groundwater database were used in GIS and Rockworks to develop subsurface 3D model for STSS. While GIS spatial analysis continue along with Rockworks plotting, additional field data collection are also in progress.