The Geological Origins of the South Texas Sand Sheet Kenedy, Kleberg, and Brooks Co., Texas Randy Bissell

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What is the South Texas Sand Sheet?



The **South Texas Sand Sheet** is a unique natural region of the Texas Gulf Coast covered by a thin veneer of windblown sand covering the greater part of Kenedy, Kleberg, and Brooks Counties.

Portions of the expansive **King Ranch** along with most of the **Kenedy Ranch** and **East Ranch** are located on the sand sheet.

Texas Towns on or at the edges the sand sheet include Falfurrias, Riviera, Kingsville, Sarita, and Raymondville.

The South Texas Sand Sheet – by the numbers:

- Covers about 4000 sq. miles (greater than the area of Delaware)
- A veneer that's only **1 to 100 feet thick**.
- Formed in the last **8000 years**. The geologic epoch referred to as the **Holocene**.
- Has many more cattle than people.

Hosts <u>amazing</u> habitats – irreplaceable plant, mammal, and bird species. Is a Texas and US National natural treasure.

https://wildlife.tamu.edu/files/2013/07/ecoregions-map-1024x1024.jpg

The South Texas Sand Sheet - One of the Largest* Geologic Features in Texas

*Texas-sized rivals: Llano Uplift Central Texas, Big Bend NP Complex, Panhandle Plains





Photographic Guide to the

A







Dexter Peacock & Forrest S. Smith

https://www.ckwri.tamuk.edu/publications/book/ photographic-guide-vegetation-south-texas-sand-sheet

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- Expansive coastal prairie.
- Grasslands with active dunes, vegetated dunes, plains, and interdune areas.
- Biodiverse with 50 endemic plant species.
 15 unique plant species on the Sand Sheet.
 Several isolated habitats.

Have you ever been to Brownsville or McAllen?

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KENEDY CO. ~ THE LAND OF THE FAMOUS SOUTH TEXAS RANCHES



Generalized Geological Map of South Texas

Holocene Silt Holocene Sand 11,700 ybp 120,000 ybp Late Beaumont Sand Beaumont Formation Lissie Formation

Goliad Formation



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Cameron

pre.

County





This <u>sheet</u> of sand stretches 80 to 100 miles inland from the Gulf and blankets the coastal plain with a thin layer of sand and silt.

Older geological layers and a landscape are believed to be buried beneath the sand sheet.

The sheet began forming <u>after</u> the Wisconsin Ice Age as sea level has approached its current state – about 8000 years ago until now.





South Texas Sand Sheet – Relevance and Importance





https://wildlife.tamu.edu/files/2013/07/ecoregions-map-1024x1024.jpg



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Our South Texas Sand Sheet

- Southern Part of the Wild Horse Desert
- A portion of the Nueces Strip
- Known as "Llano Mesteño"

The land area between the Nueces River and Rio Grande (Rio Del Norte/Rio Bravo)

- Total area exceeds 4000 mi², covered by a Holocene sand and silt layer 1-30 meters thick.
- Extremely dry. No streams or rivers.
- Inhospitable sand dune, thorn scrub, cacti, and grassland desert terrain.
 - Separated native cultures.
 - Tonkawa & Karankawa
 - Coahuiltecans
 - Contested in history:
 - Anglo-Texan Settlers (1821-1835)
 - Texas Republic (1836)
 - US Annexation & Mexican War (1846-48)
 - Reportedly one million horses in the early 1800s.
 - Scores of people <u>still</u> die crossing the Llano Mesteño each year.



https://i.ebayimg.com/images/g/p7EAAOSwjQJIzP2h/s-l1600.jpg

Our South Texas Sand Sheet

- Wild Horse Desert
 - Nucces Strip
 - Laho Mesteño
 - Fland area between the Nueces River and Rio Grande (Rio Del Norte/Rio Bravo)
 - Total area exceeds 4,000 mi², covered by a Holocene sand and silt layer 1-100 feet thick.
 - Extremely dry. No streams or rivers.
 - Inhospitable sand dune, thorn scrub, cacti, and grassland desert terrain.
 - Separated native cultures.
 - Tonkawa & Karankawa
 - Coahuiltecans
 - Contested in history:
 - Anglo-Texan Settlers (1821-1835)
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Comparisons of Coastal Deserts of the Atlantic Basin





Which Texas Rivers Reach the Gulf of Mexico?





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THE "LOST" ESTUARY AND WATERSHED

Native artifacts have been found in deflation troughs behind a parabolic dune in Brooks Co.

PRASE

PARORIANS

This suggests human occupation in a watershed buried by the sand sheet.









Factors Relating to The South Texas Sand Sheet

- Convergence of Longshore Currents. Abundance of Sand and Silt (Loess).
- Low Relief Coastal Plain.
- Continually **Dry** Climate.
- Limited Drainage.
 - ✓ Underdeveloped Rivers.
 - ✓ Sand-choked Valleys.
- Constantly and Consistently **Windy**.
- Holocene Sea Level.
 - Sediment supply exceeds accommodation.
 - ✓ Regular shoreline incursions.
 - ✓ Cycles of wet/dry climate.

LATE PLEISTOCENE – HOLOCENE SEA LEVEL HISTORY ALONG THE TEXAS COAST



THE SOUTH TEXAS SAND SHEET – A THEORY OF FORMATION





Small Oscillations Up & Down are Important!



"New" concept: <u>Subaerial</u> Accommodation*

Unique **semi-arid to arid** locations along **passive margin coastlines** where sediment **abundance** <u>so</u> **exceeds the available space** for subaqueous deposition that sediment **accumulates** <u>above</u> sea level <u>episodically</u> but is <u>continually</u> subjected to strong eolian processes.

*The traditional principle of accommodation has most often been used to describe the subaqueous space available for sediment accumulation in passive sedimentary margins and basins.

https://www.cambridge.org/us/files/7113/6682/0319/1535_200388.pdf





SUBAERIAL ACCOMMODATION IN ACTION: DUNE DU PILAT NEAR BORDEAUX, FRANCE



Mapping and chronology of coversands and dunes from the Aquitaine Basin, southwest France – 2020 by Pascal Bertran, Eric Andrieux, Mark D. Bateman, Markus Fuchs, Michael Klinge, Fabrice Marembert



Les petits malheurs de Mickey Mouse.

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Learnings – South Texas Sand Sheet

- Our South Texas Sand Sheet <u>covers over 4,000 miles² larger than Delaware.</u>
- The unforgiving climate and landscape of the Wild Horse Desert has played a <u>continuing role in Texas history</u>.
- It is the southernmost of Holocene dunes found across the Great Plains and formed in the last 8000 years.
- Similar to coastal ergs, deserts, and sand plains seen along the Atlantic passive margin today.
- One of the largest (recent) geological features in Texas.
- The Sand Sheet may <u>bury an ancient inhabited estuary and watershed</u>.
- <u>Unique geologic, climatic, and oceanic factors converge at Kenedy Co.</u> producing the South Texas Sand Sheet.
- Minor oscillations of sea-level are a key factor in the nourishment of the South Texas Sand Sheet.
- Cycles in temperature and sea-level have allowed for <u>accumulation and redistribution</u> of the sand inland.
- <u>"Subaerial Accommodation</u>" is a phrase characterizing the process that produced the STSS.
- Southern France may best represent a modern example of subareal accommodation as a vegetated sand sheet.

Benefits of Further Sand Sheet Investigation



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Integration of past field-based research with the latest thoughts on Gulf of Mexico evolution.

Consolidation and comparison of age date controls on sediments and landforms from Padre Island inland to the western Sand Sheet.

Improved model for the stages of evolution of South Texas Estuaries and river basins through the Holocene.

Conservation *follows* appreciation. Improve public awareness of this special South Texas landscape.



Who best preserves Texas' natural landmarks?



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