The background features a dark teal-to-purple gradient. Several colored circles of varying sizes are scattered across the slide: a small purple circle and a medium green circle on the left; a small orange circle and a large light blue circle in the top right; and a small blue circle, a small purple circle, and a medium light green circle in the bottom right.

Transformation of the Rio Grande Delta after One Hundred Years of Human Intervention

Proposal by
Edoardo Davila

MARS-5370

Introduction

- The Rio Grande formed a delta of 7,770 km² that spans from Southeast Texas to Northeast Tamaulipas with a shoreline length of approximately 300 km, and begins near the city of Harlingen, 70 km from shore (Figure 1).
- Nowadays, fifteen major dams and diversions, and many more minor structures, have been built in the last 100 years.
 - Amistad dam and Falcon dam are located at 546 km and 212 km from the mouth of the river, respectively.
- Sinuosity is a common concept use in geomorphology to represent the ratio between river length and valley length

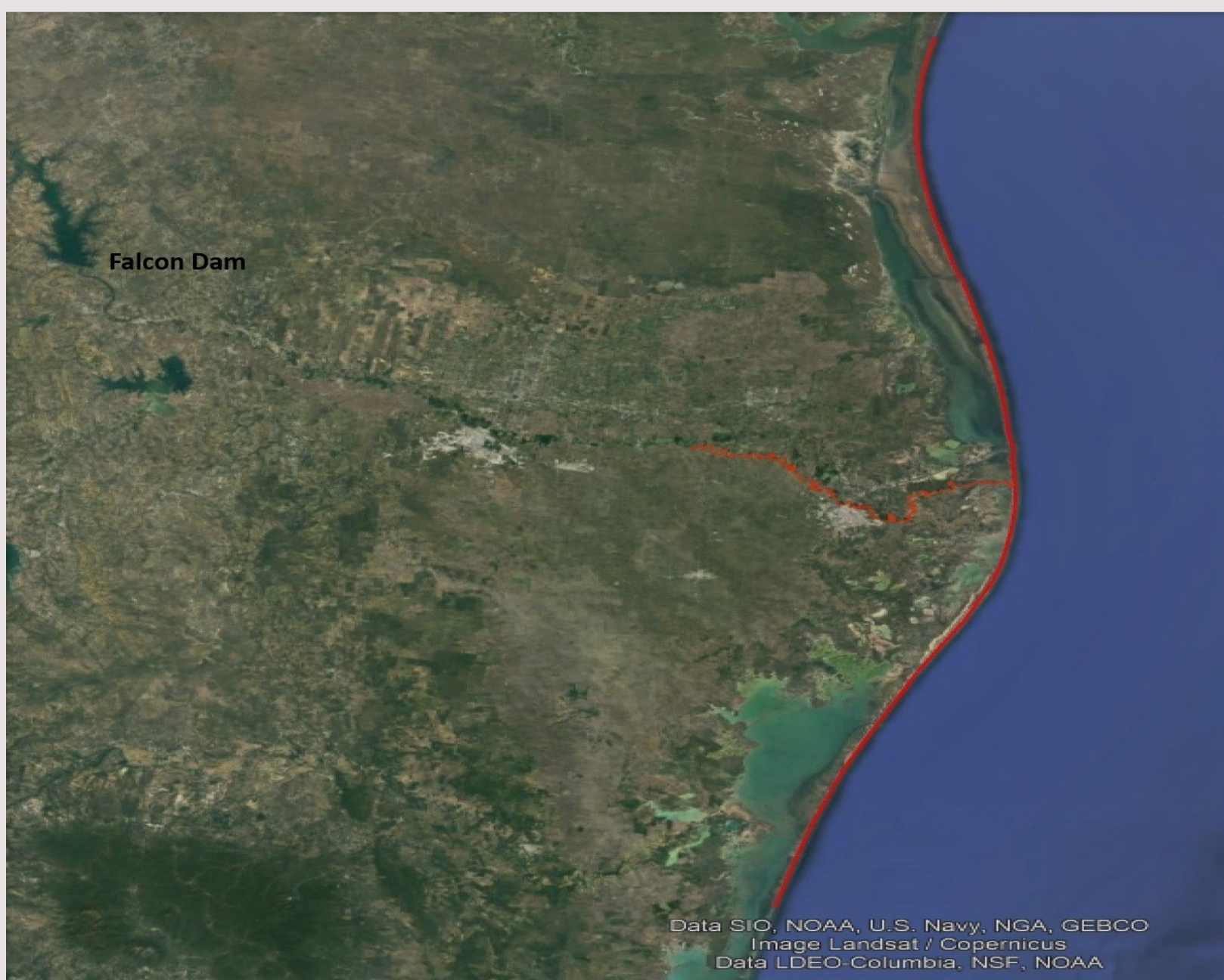


Figure 3. The Rio Grande delta. The Rio Grande and the delta shoreline are delineated in red. Falcon Dam is seen in the right up corner.

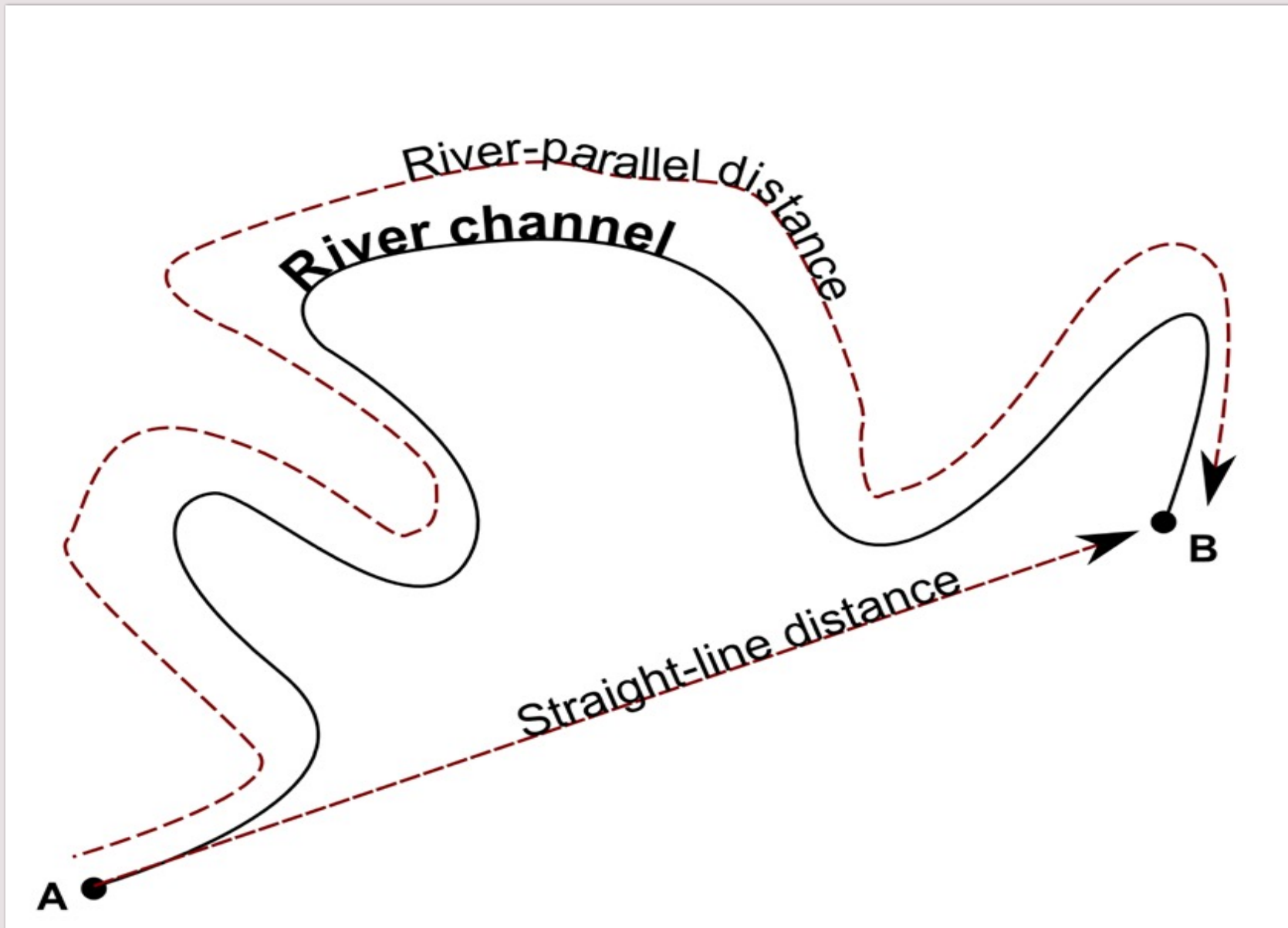


Figure 2. Sinuosity. River length indicates the distance travelled through the river. Valley length indicates the distance travel through the valley parallel to the river.



Objective

- This study will test the hypothesis that as result of the significant decline of water discharge, and the almost complete elimination of suspended sediment to the coast, over the last one hundred years, the river has adjusted its channel in the delta region by reducing its sinuosity.
 - Has human activity changed the delta section of the Rio Grande?
 - Can sinuosity, flow, and sediment data provide enough data to proof that human activity has affected the river?
 - If change is detected, can it be related to human activity?



Methods

- Analyzed government data on sediment load and water discharge.
- GIS provides the tools for georeferencing processes, creating models of the Rio Grande in 1912 and 2014, measuring valley length and river length.
 - Georeferenced 1912 maps
 - Create polygons representing the Rio Grande in 1912 and 2014
 - Divide Rio Grande into four sections
- Python will be used to quantify the changes detected in Rio Grande.

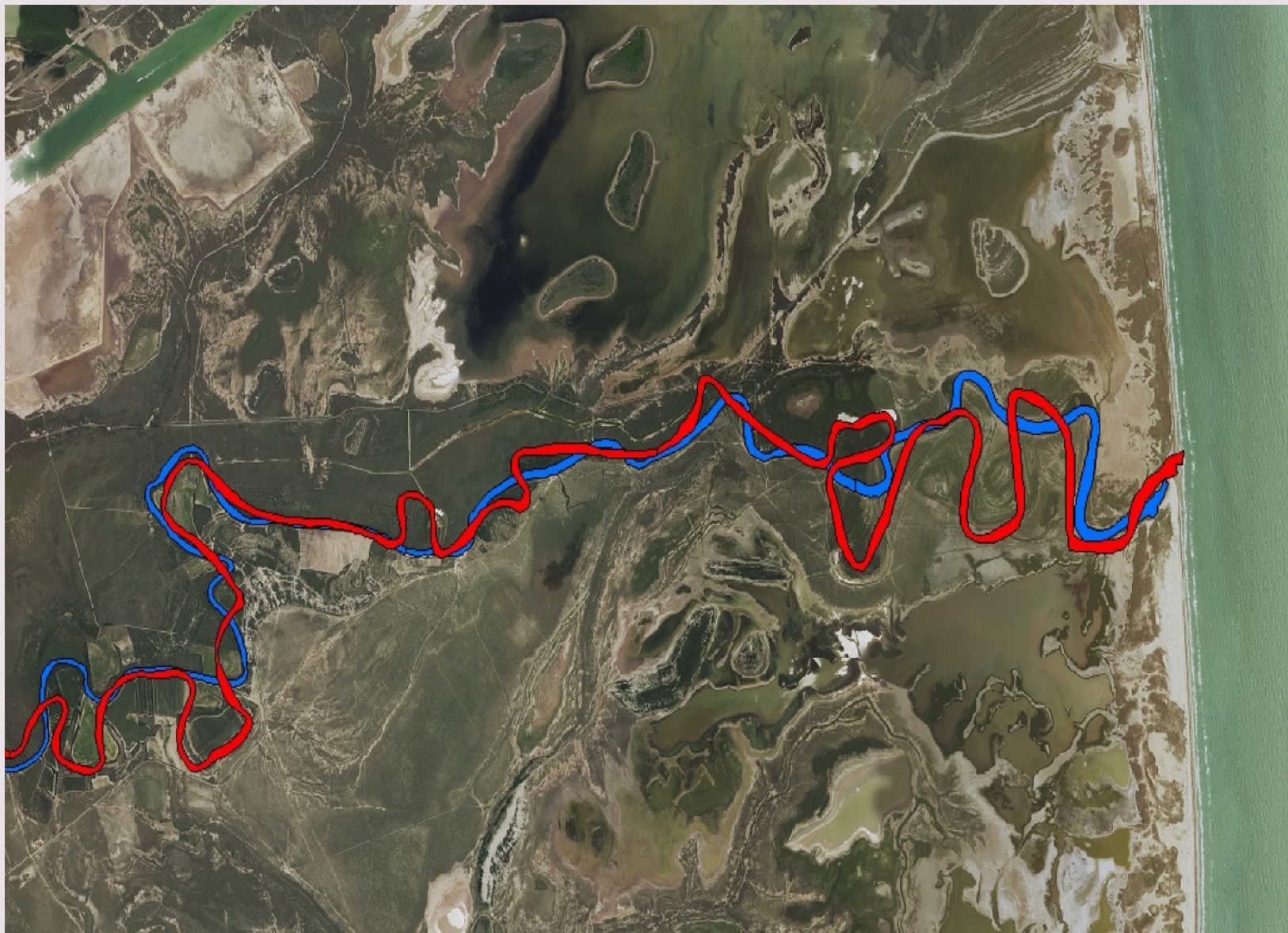


Figure 3.- Rio Grande in 1912 (Red) and Rio Grande in 2014 (blue) as it reaches the Gulf of Mexico.