

An aerial photograph of a coastal region, likely Isla Salamanca National Park in Colombia. The image shows a long, narrow strip of land, possibly a peninsula or a large island, surrounded by water. The land is covered with dense vegetation, and there are some smaller, isolated islands or patches of land in the water. The sky is overcast with soft, diffused light.

DUNE EVOLUTION AND LOCAL CLIMATE CHANGE IN ISLA SALAMANCA NATIONAL PARK, COLOMBIA

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Dunes–Beach Interaction

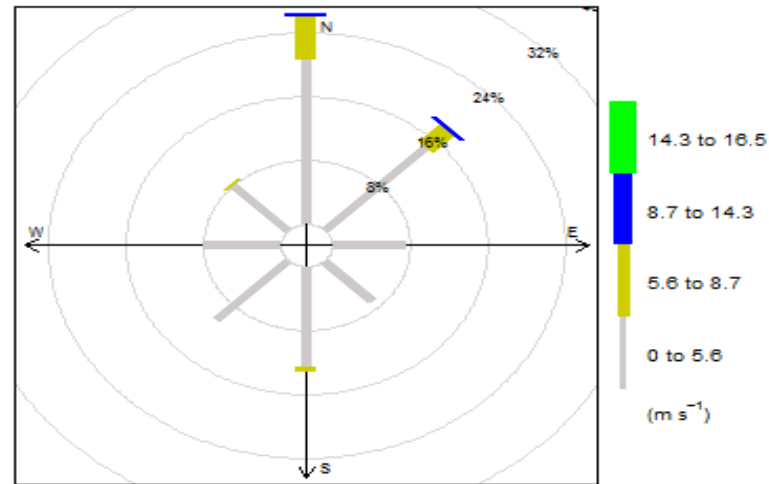
Pye (1983) and others proposed that sediment supplied from eroding coasts may spark transgressive dune activity.

On the other hand, an abundant vegetation coverage on dunes may result in the slowing down of the advance rates of dunes, and diminishing sediment movement.

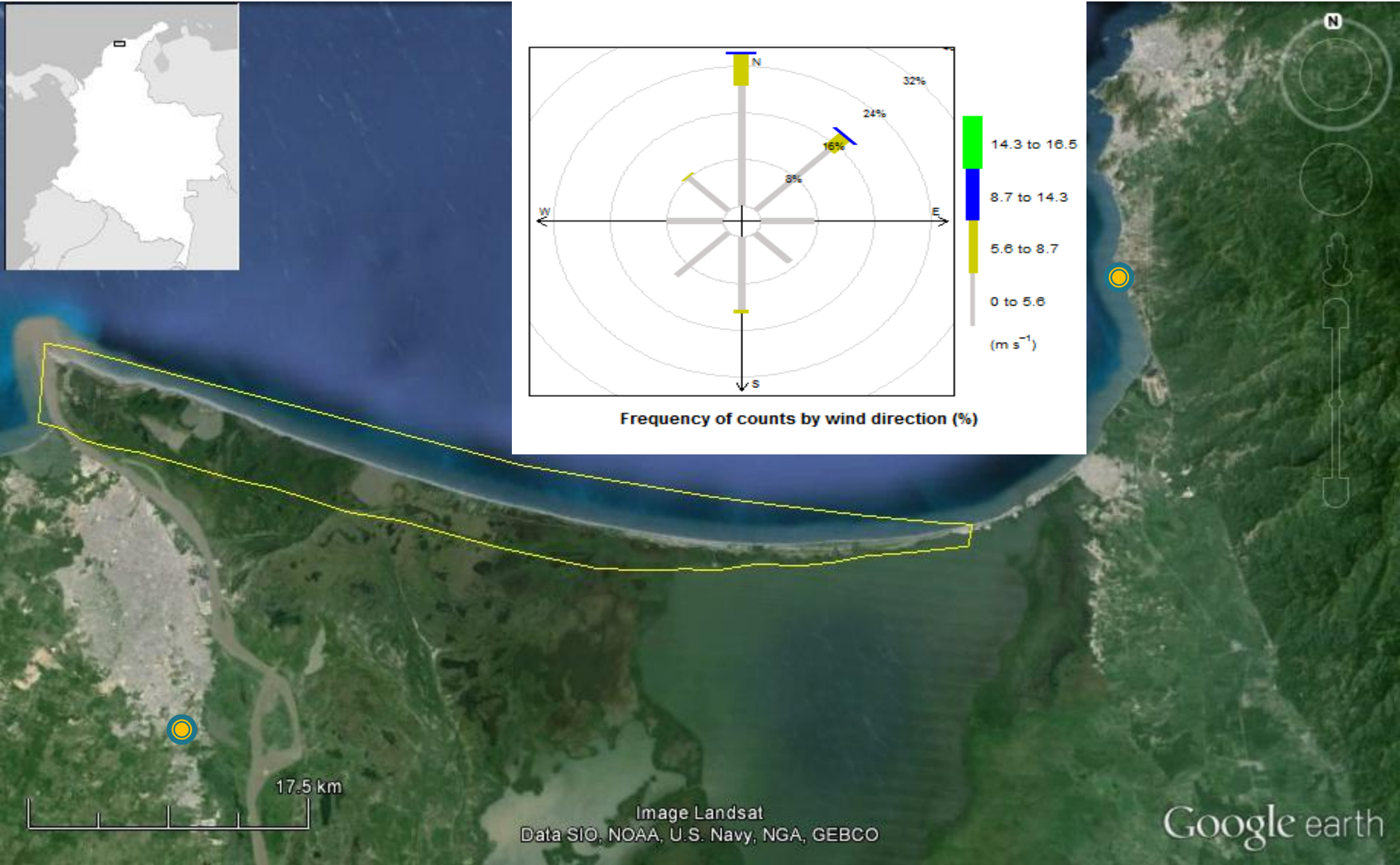
Objectives

- ▶ To understand the processes associated with dune evolution and coastal retreat in a tropical location.
- ▶ To define recent trends of rain and wind over time.
- ▶ To analyze the effect that precipitation and wind may have on dune evolution.

Study site

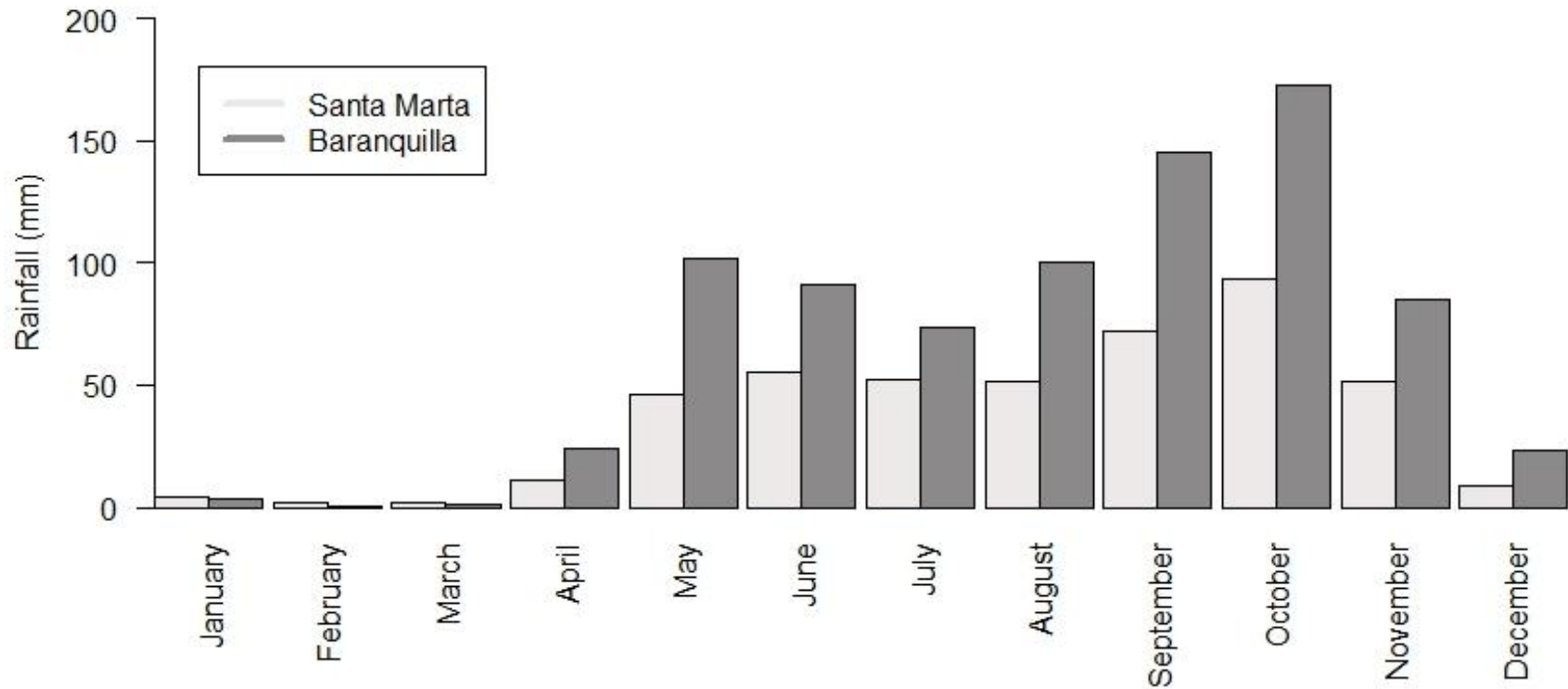


Frequency of counts by wind direction (%)



Rain Seasonality

Average Monthly Rainfall in Santa Marta and Barranquilla



Dune morphology



Dunes as pictured in 1953 and 2010



Dunes as pictured in 1970 and 2009

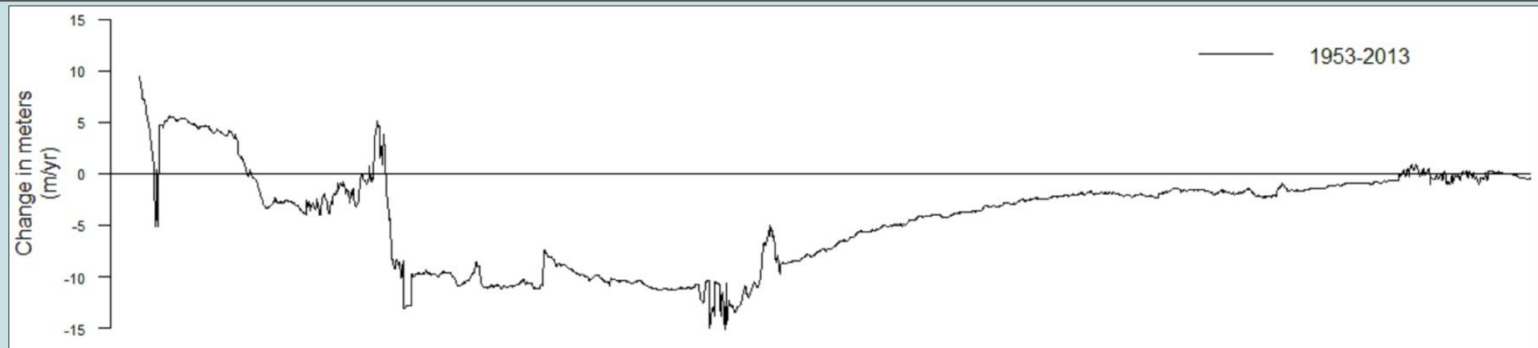


Port development in the Magdalena River



Photo taken by von Erffa, 2009

Coastal Changes



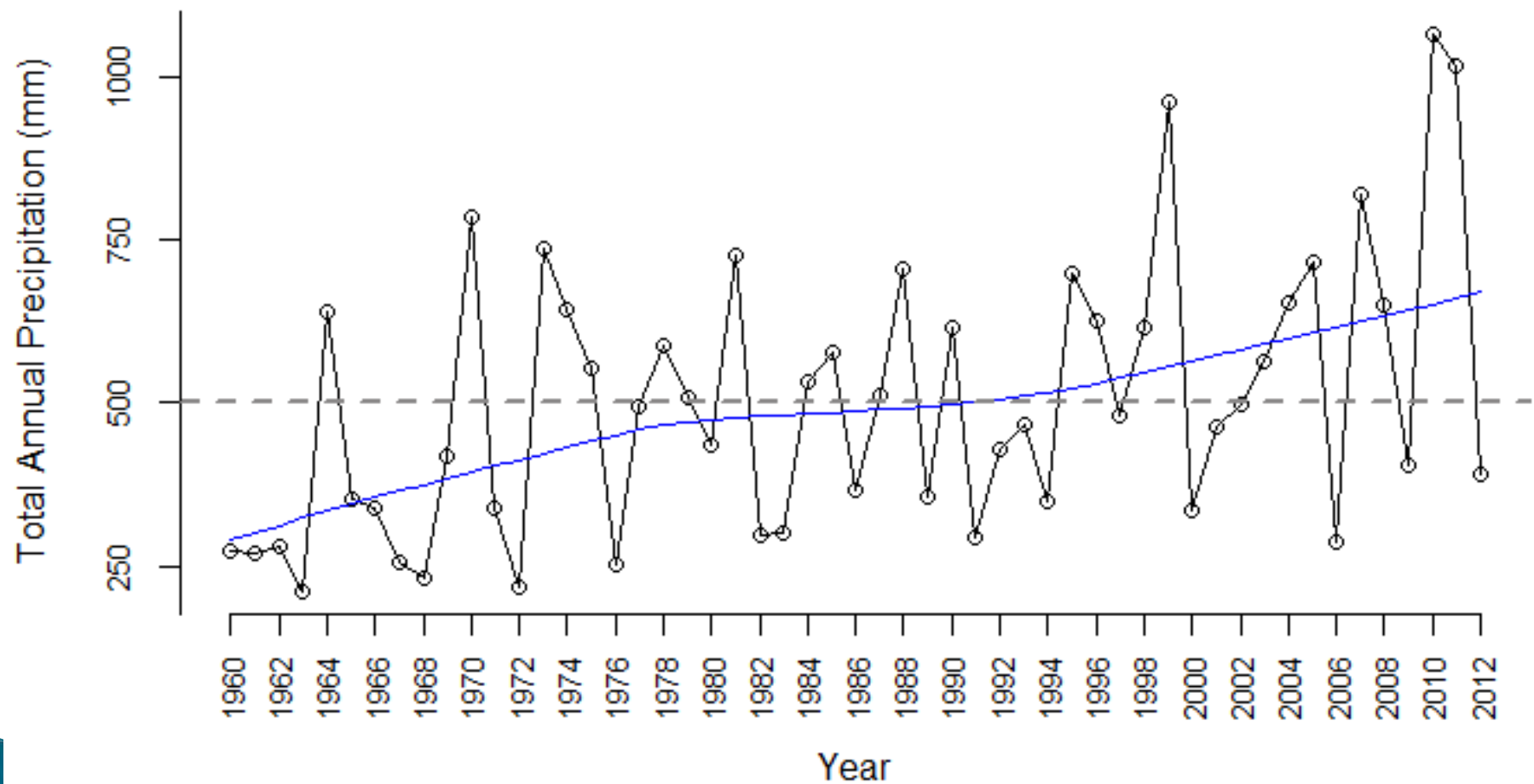
Working hypothesis

Dune stabilization along the study site during the last 60 years has been accelerated by changes on climatic variables such as rainfall and wind.

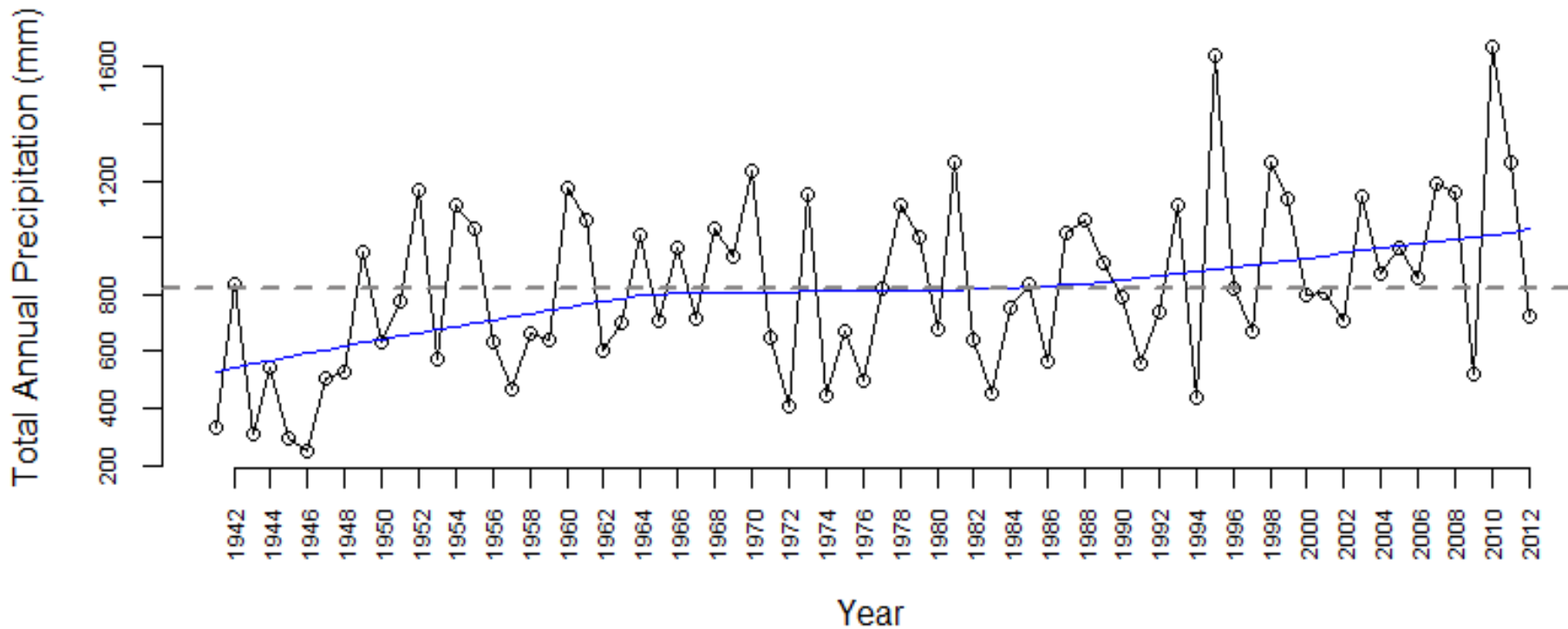
Methodology

- ▶ Monthly (rainfall) and hourly data (wind) from two weather stations located in the outskirts of the study site were analyzed through linear regression models and lowess (a non-parametric curve fitter).
- ▶ The outcomes from both stations were compared and related to the ENSO phenomenon.

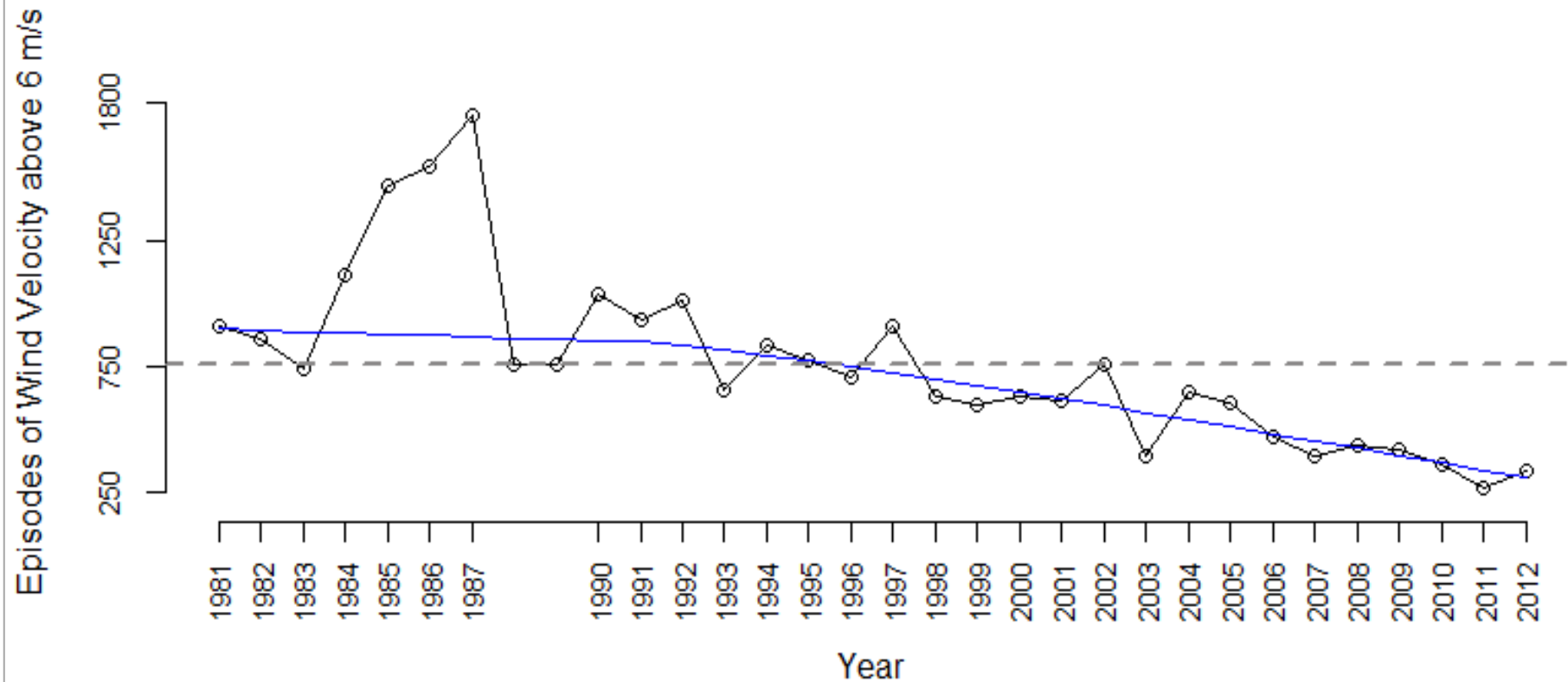
Rainfall findings for Santa Marta



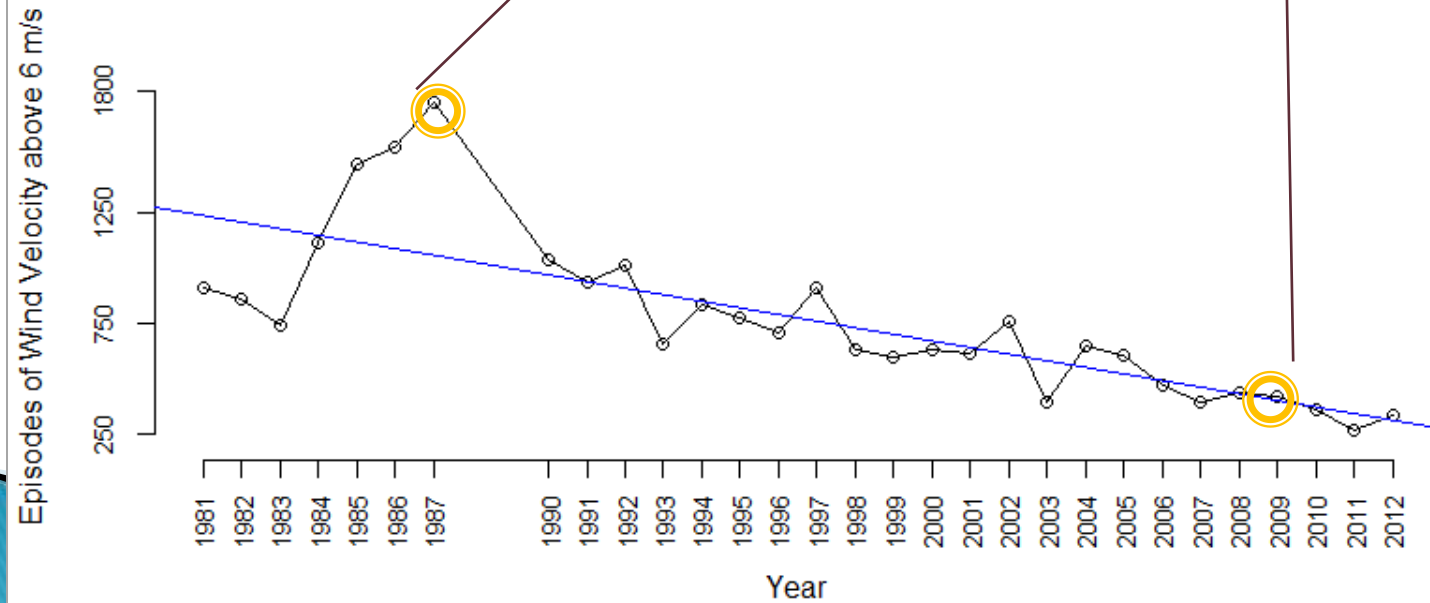
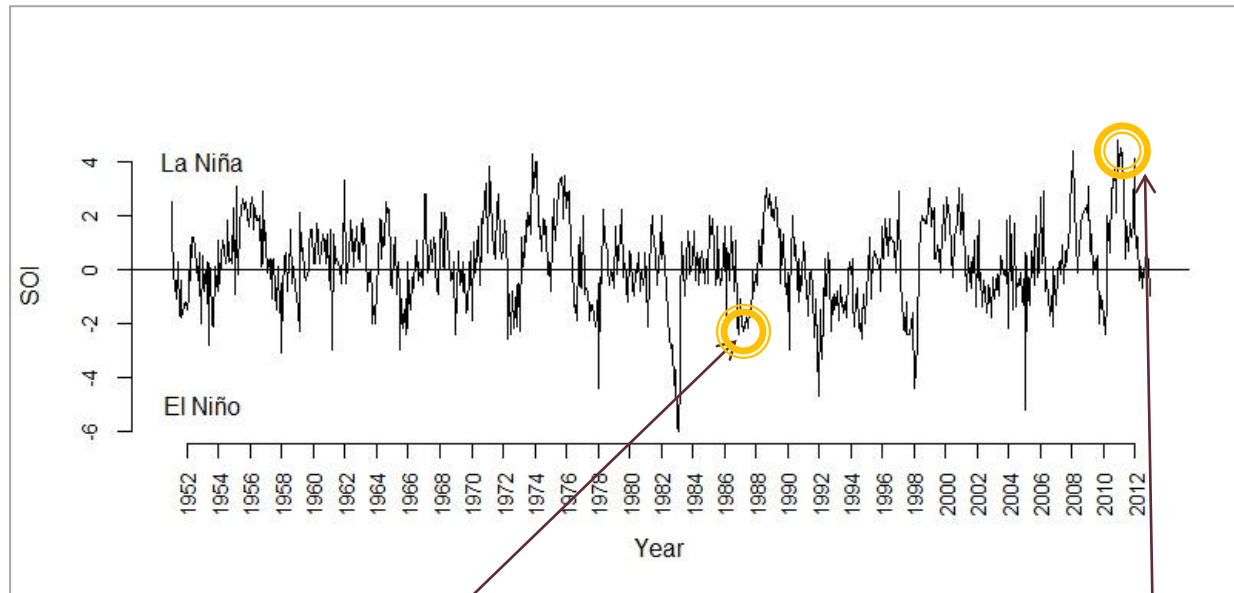
Rainfall findings for Barranquilla



Wind trend in Santa Marta based on hourly data



ENSO and wind



Concluding Remarks

- ▶ Higher precipitation and fewer wind events over 6 m/s have contributed to increased vegetation over the dunes.
- ▶ Inland sediment movement and dune activity were more active in the past.
- ▶ Old parabolic dunes are being truncated at the coast by erosion.
- ▶ Assessing the weight that sediment availability vs. changes in weather have had in the system needs further research.

Acknowledgments

