Decadal Relationship Between Foredune and Beachface Volume Change at an Inlet-influenced Florida Barrier Island

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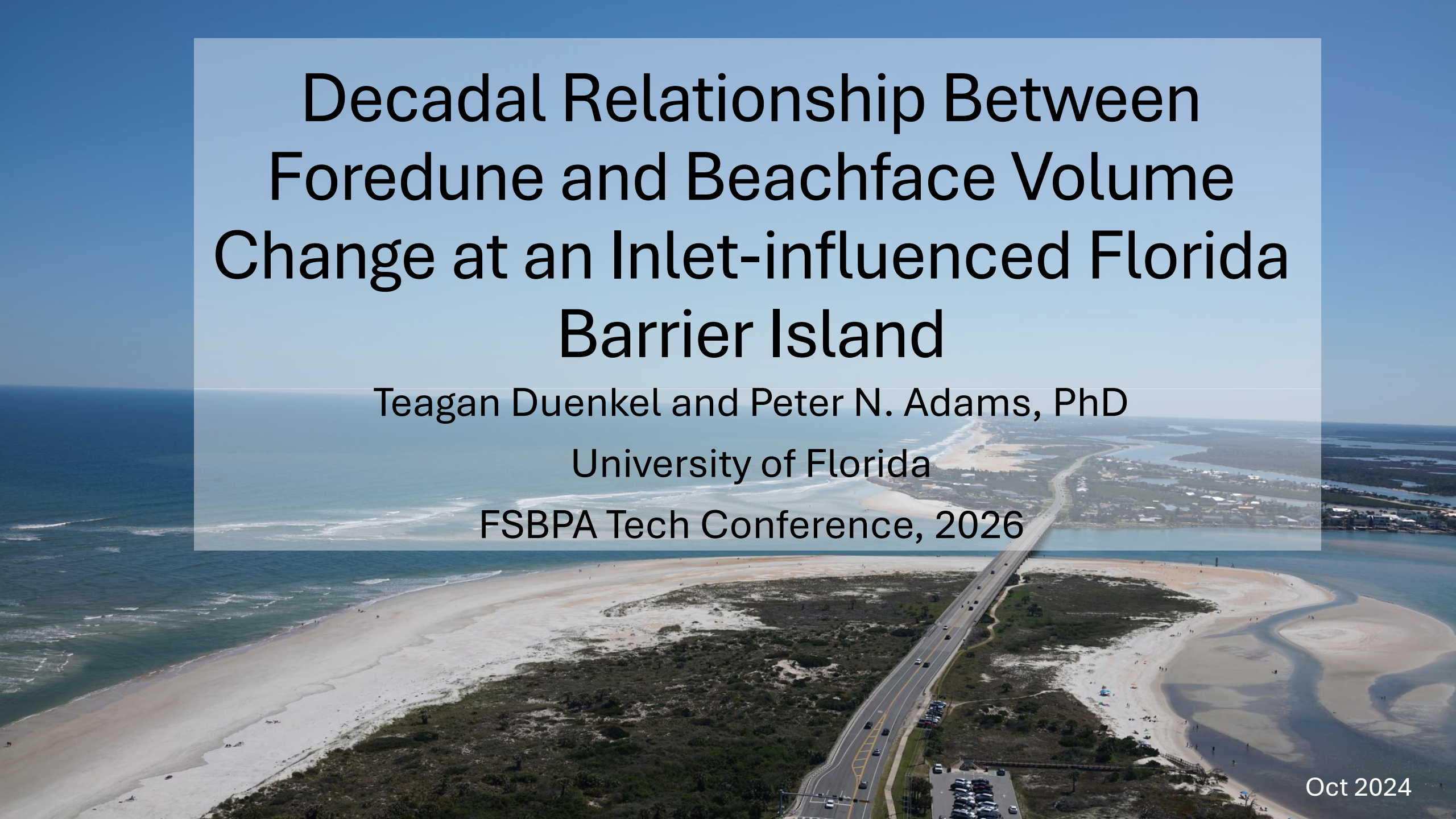
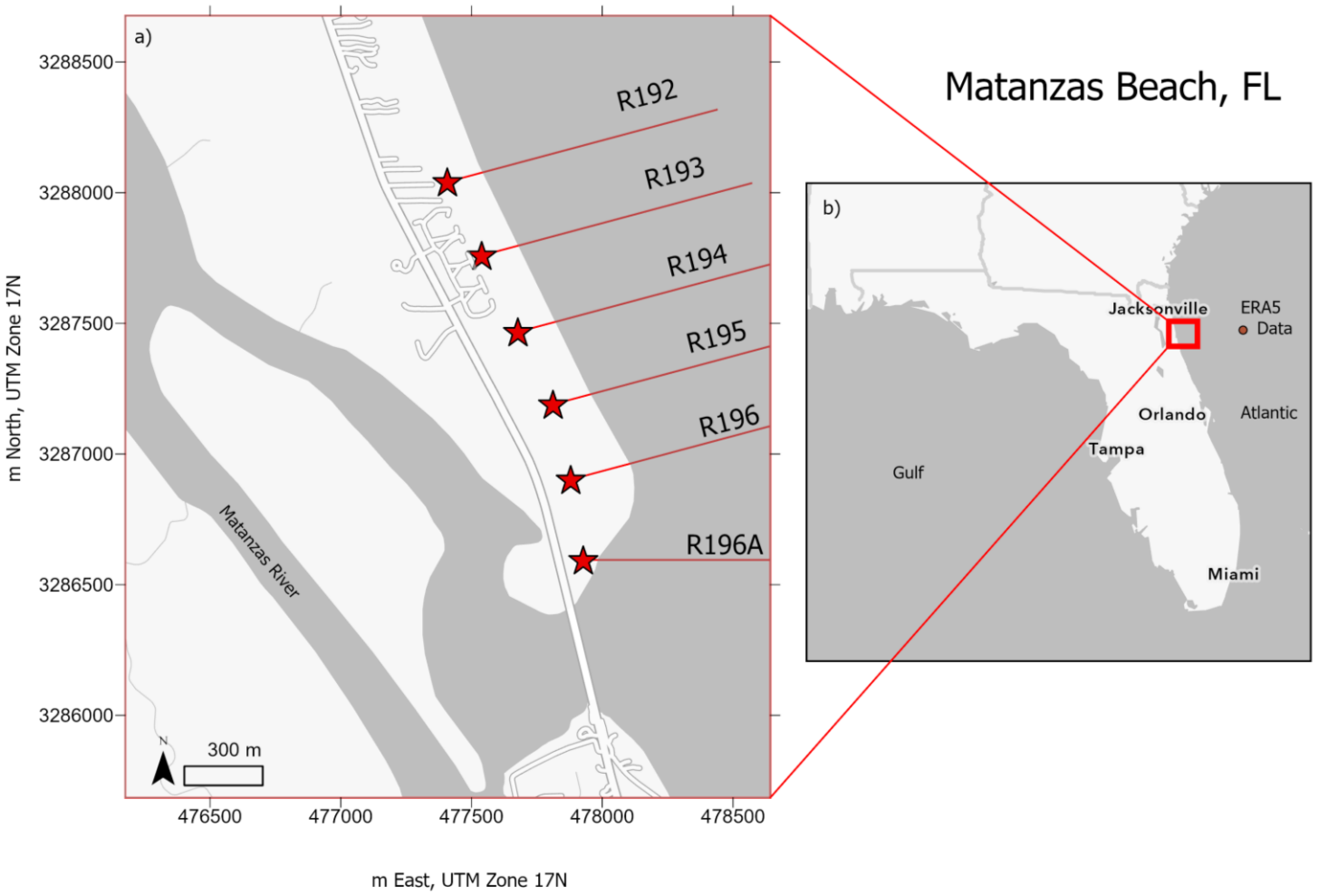
FSBPA Tech Conference, 2026



Motivation

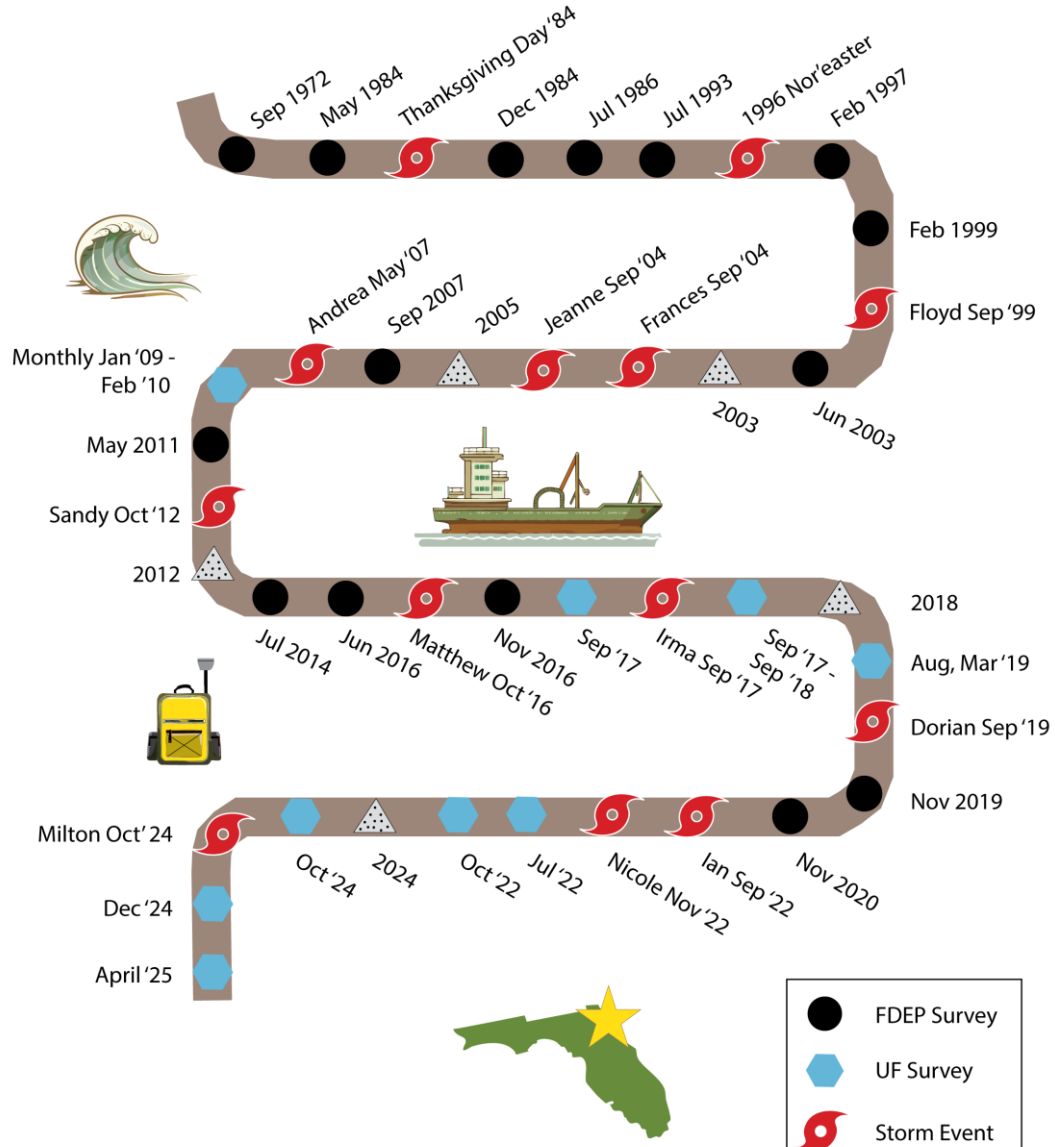
- Inlet-influence on adjacent beaches is widely recognized, but multi-decadal morphologic studies are still limited.
- Here we use 50 years of FDEP profiles and over a decade of UF RTK surveys at an unstructured inlet to better understand foredune-beachface coupling.

We are 11 mi north



Matanzas Beach, FL

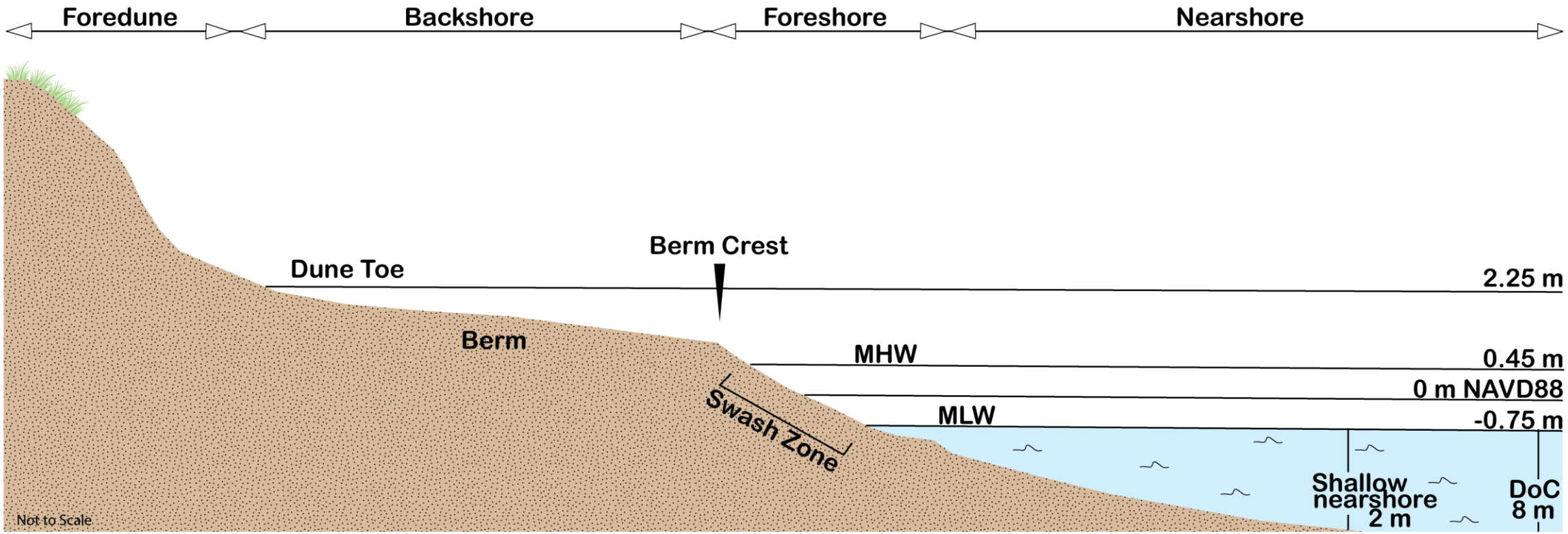
Event and Survey History of Matanazas Beach, FL



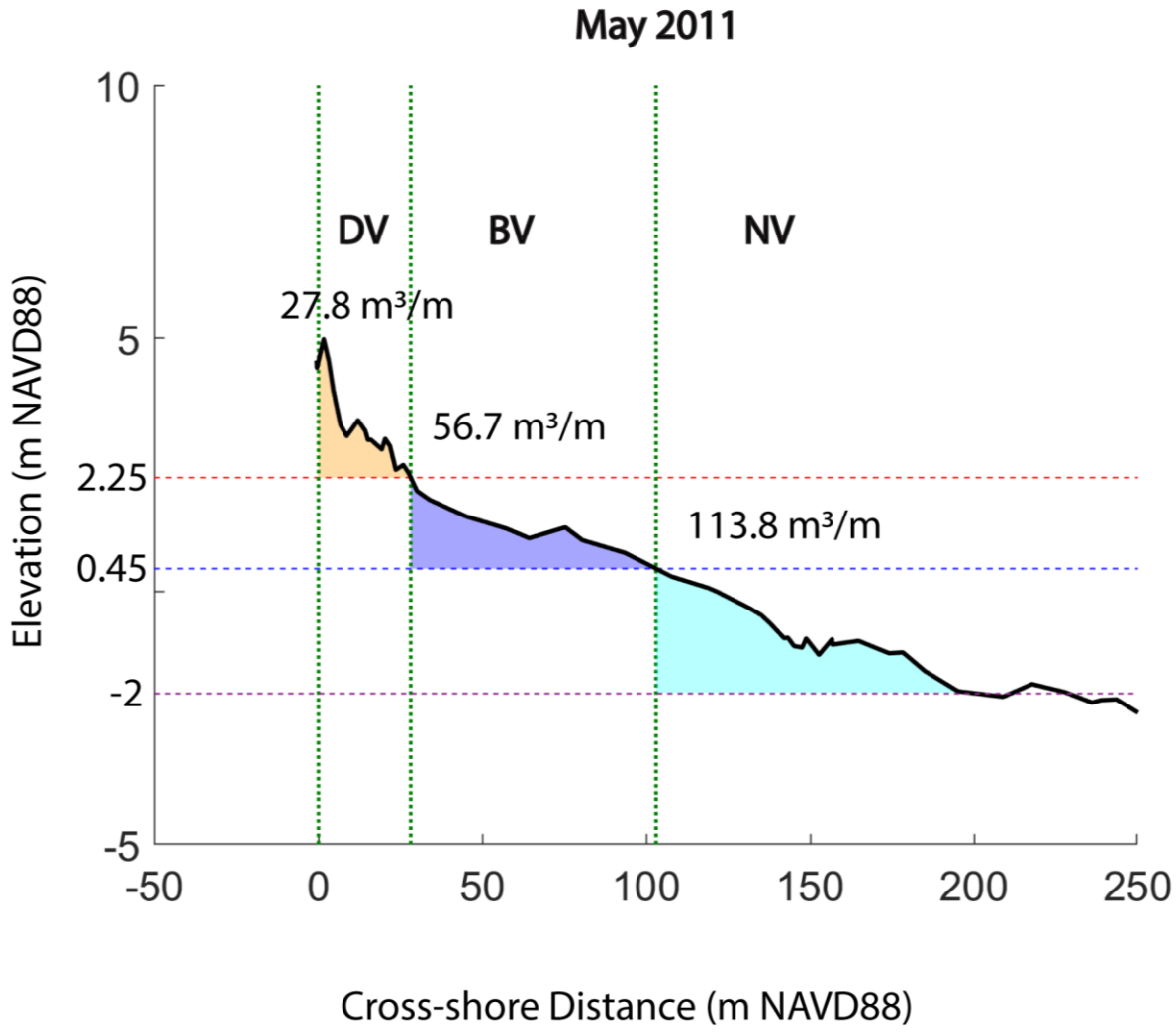
Vertical Datum: NAVD88 m

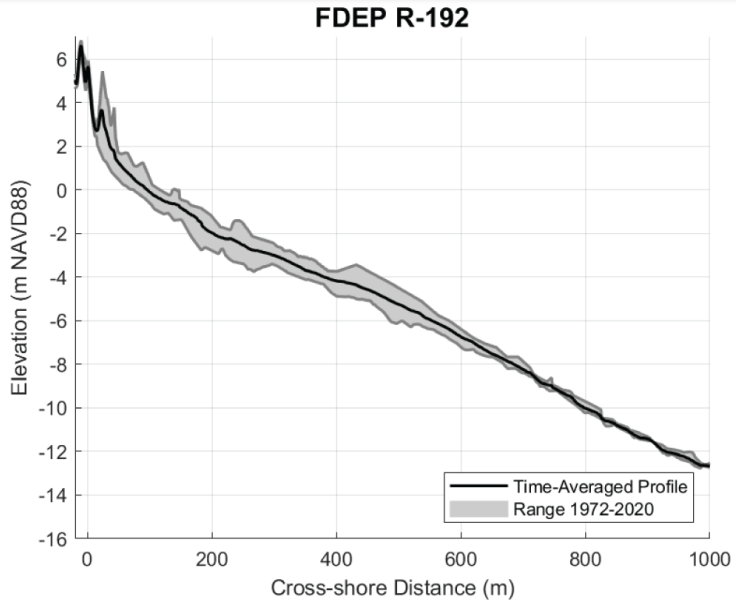
Dune Toe 2.25 m
MHW 0.45 m
Shallow nearshore/inner surf -2 m

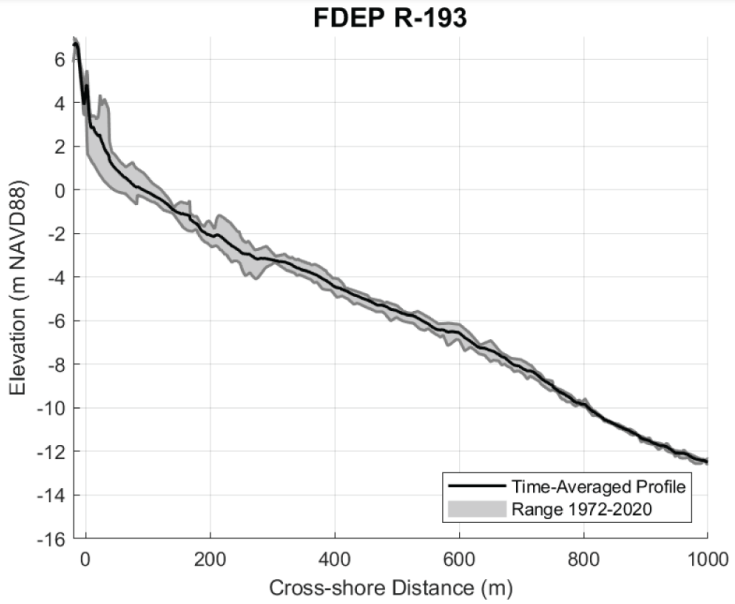
Matanzas Beach Profile Schematic

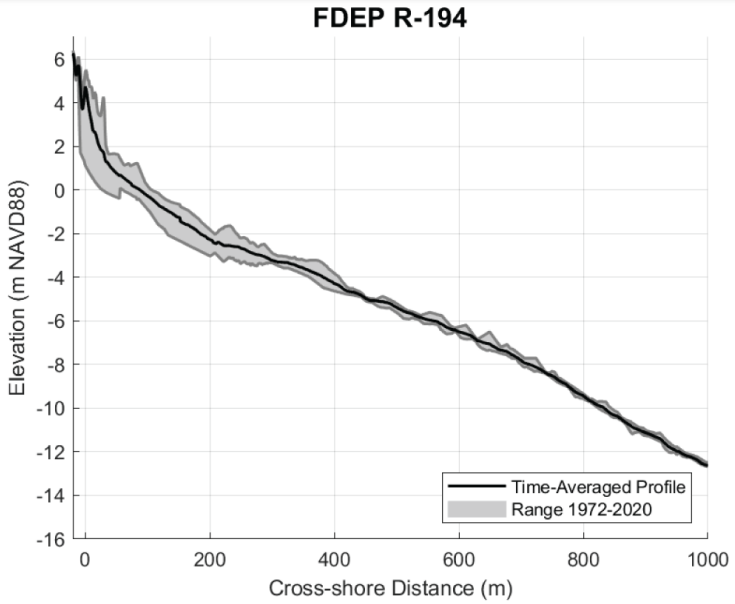


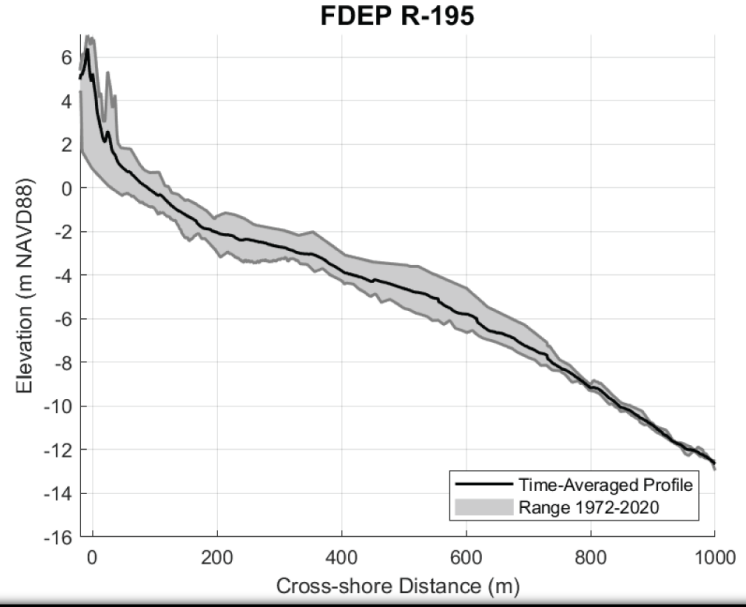
Cross-shore volumetric integration:

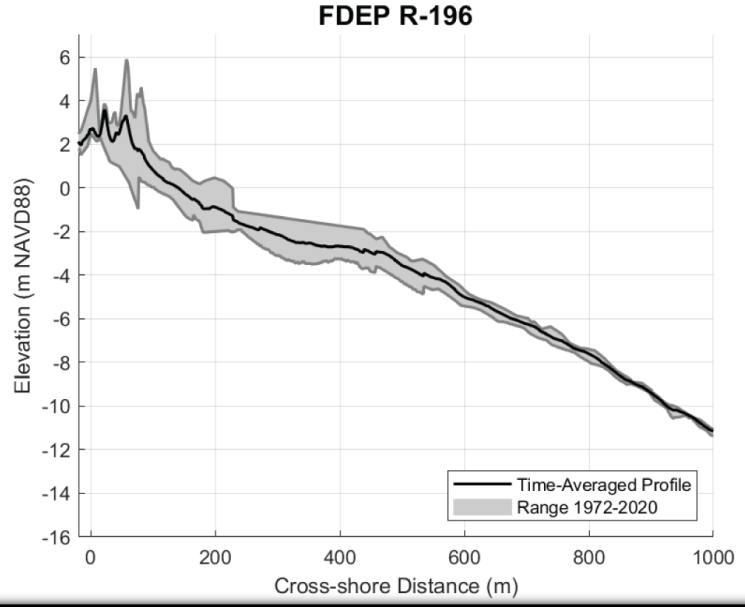


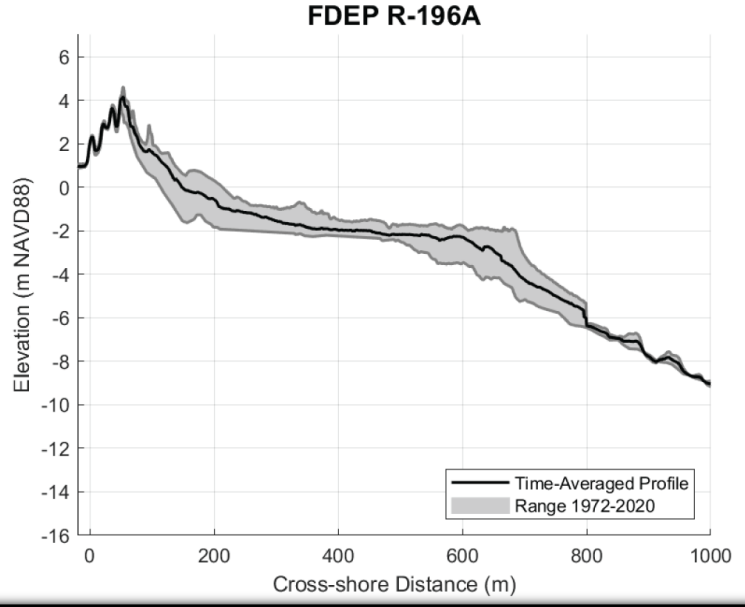

FDEP R-192
Elevation (m NAVD88)
Cross-shore Distance (m)
Time-Averaged Profile
Range 1972-2020


FDEP R-193
Elevation (m NAVD88)
Cross-shore Distance (m)
Time-Averaged Profile
Range 1972-2020

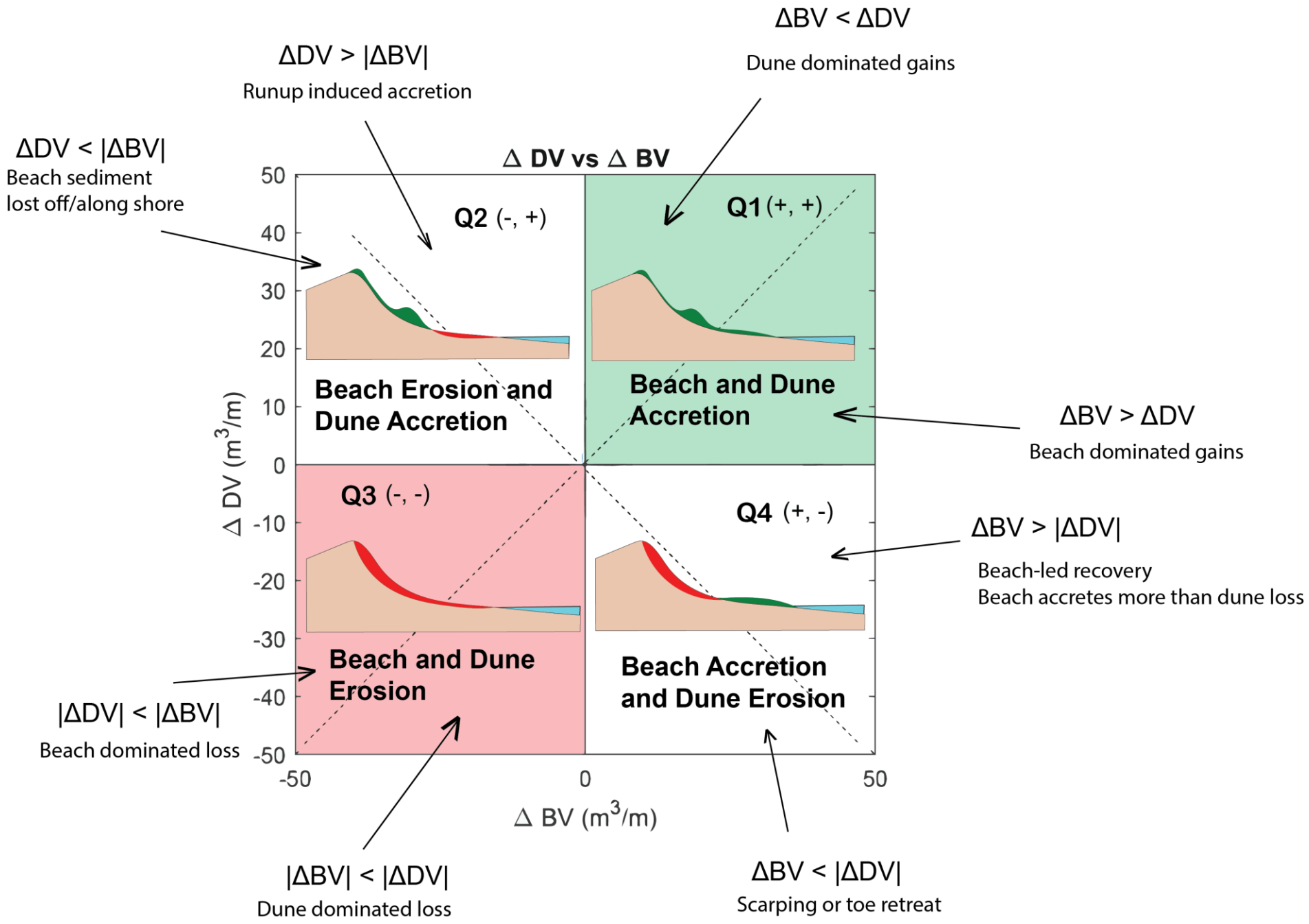

FDEP R-194
Elevation (m NAVD88)
Cross-shore Distance (m)
Time-Averaged Profile
Range 1972-2020


FDEP R-195
Elevation (m NAVD88)
Cross-shore Distance (m)
Time-Averaged Profile
Range 1972-2020

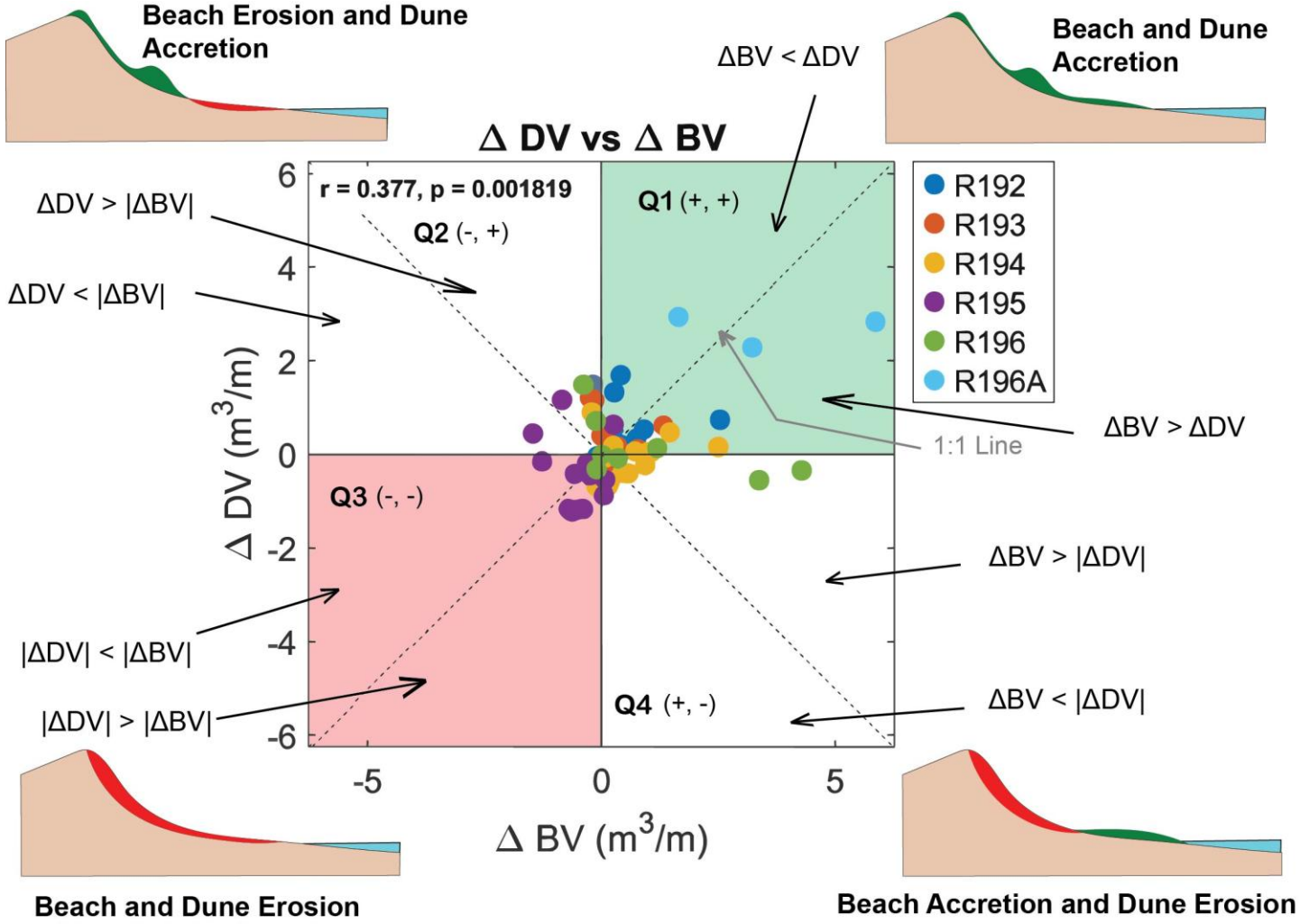

FDEP R-196
Elevation (m NAVD88)
Cross-shore Distance (m)
Time-Averaged Profile
Range 1972-2020

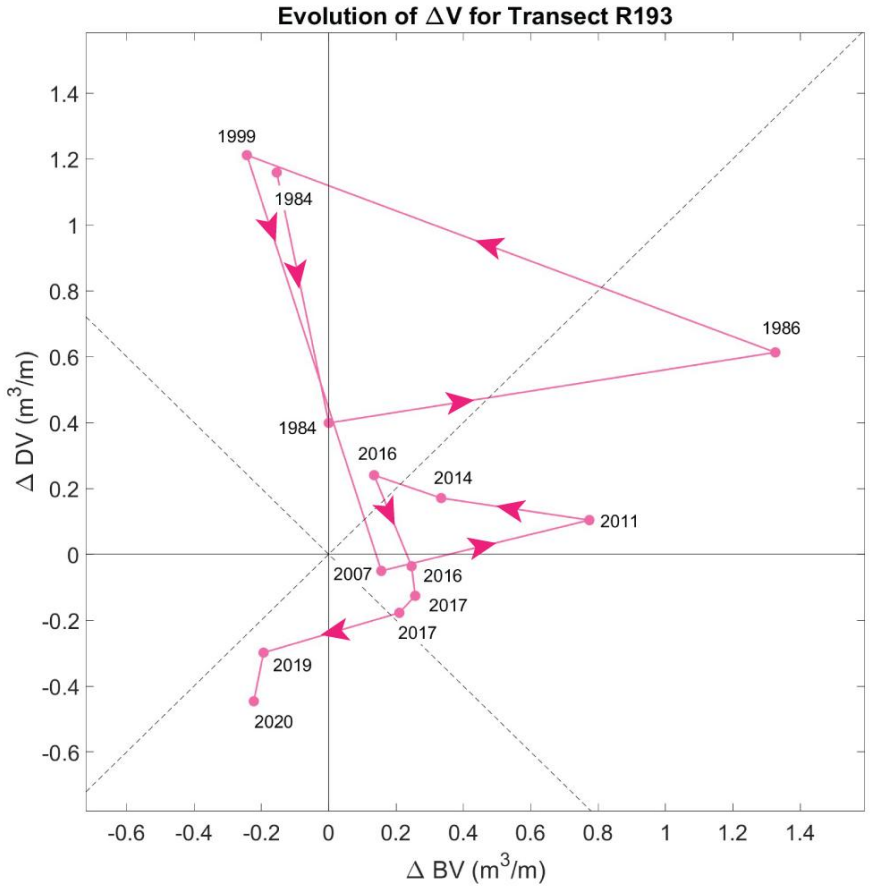

FDEP R-196A
Elevation (m NAVD88)
Cross-shore Distance (m)
Time-Averaged Profile
Range 1972-2020

- Correlation of the **change in beach volume** to the **change in dune volume** normalized by time
  - First, relative to <u>Baseline</u> survey
  - Later, <u>Sequential</u> change



Baseline-referenced





Points = volume change relative to baseline survey volume

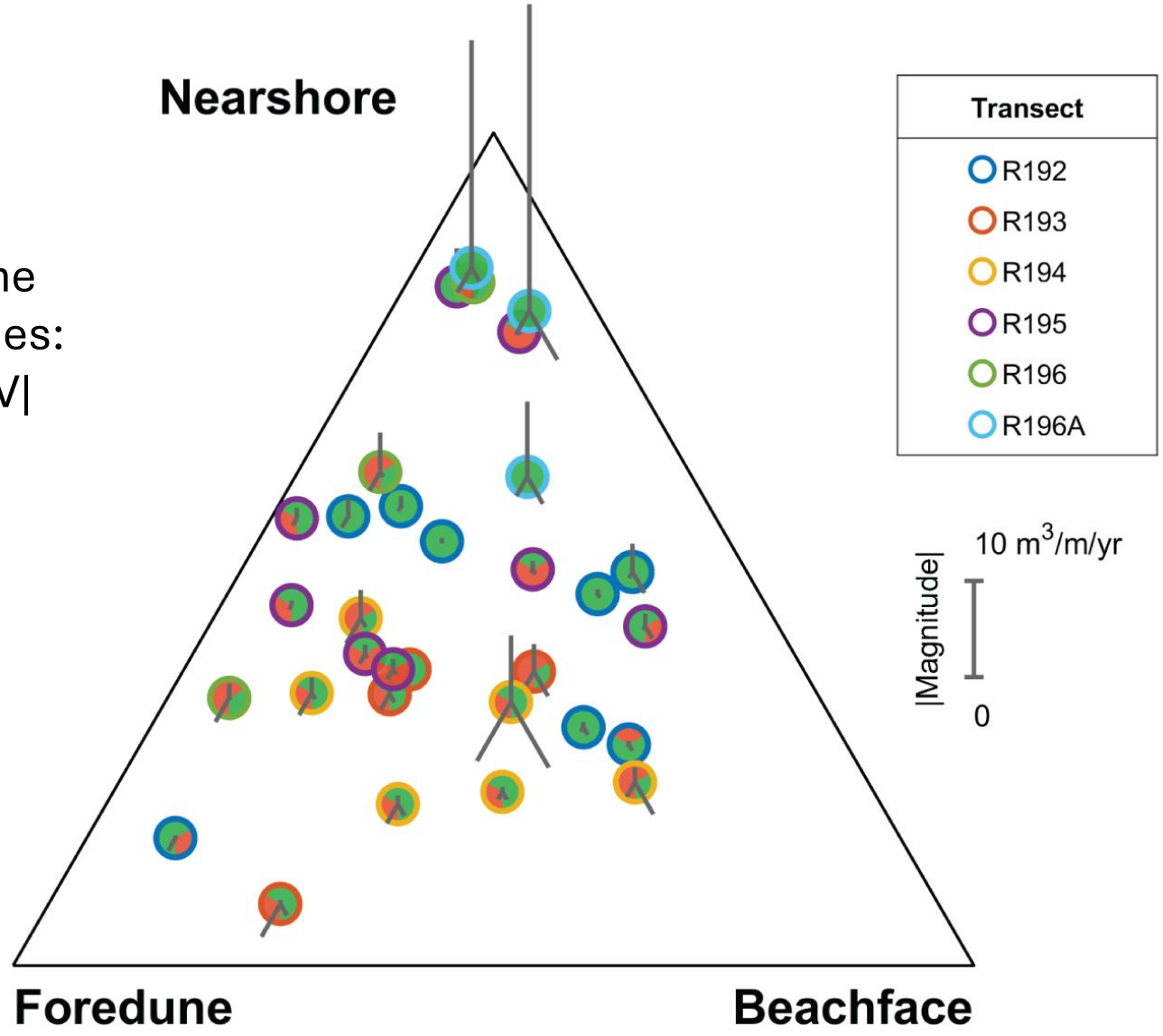
Fractions of total volume change among three zones:

$S = |\Delta DV| + |\Delta BV| + |\Delta NV|$

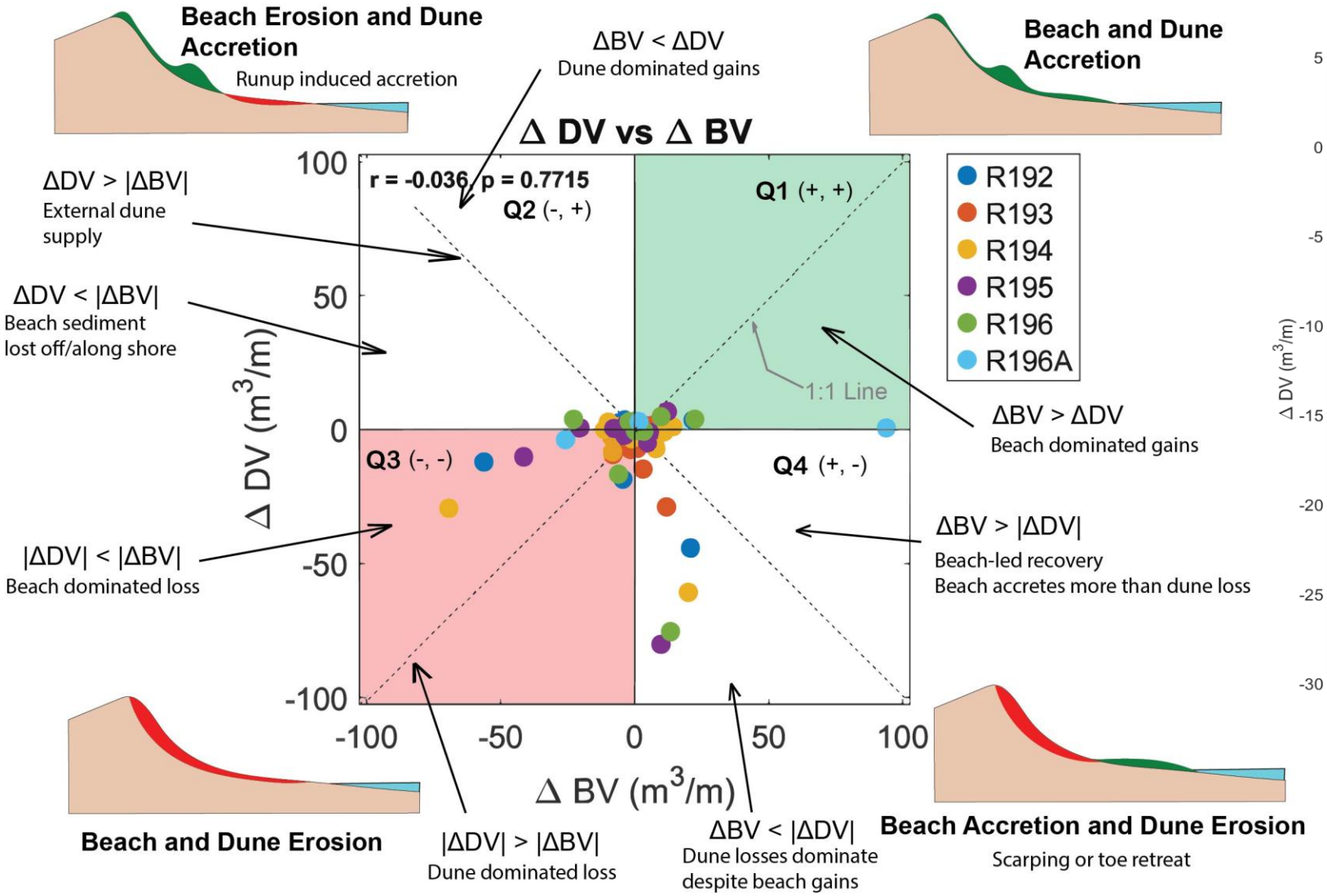
$fD = \Delta Dv/S$

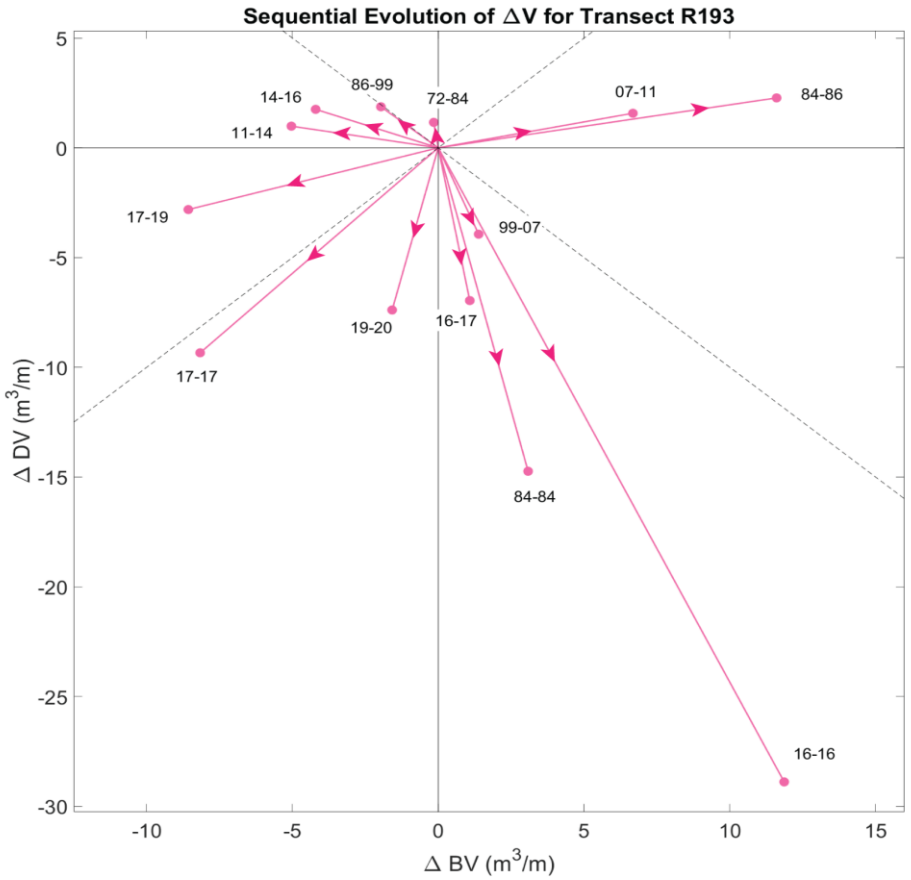
$fB = \Delta Bv/S$

$fN = \Delta Nv/S$



Sequential Change





Points = volume change between consecutive surveys

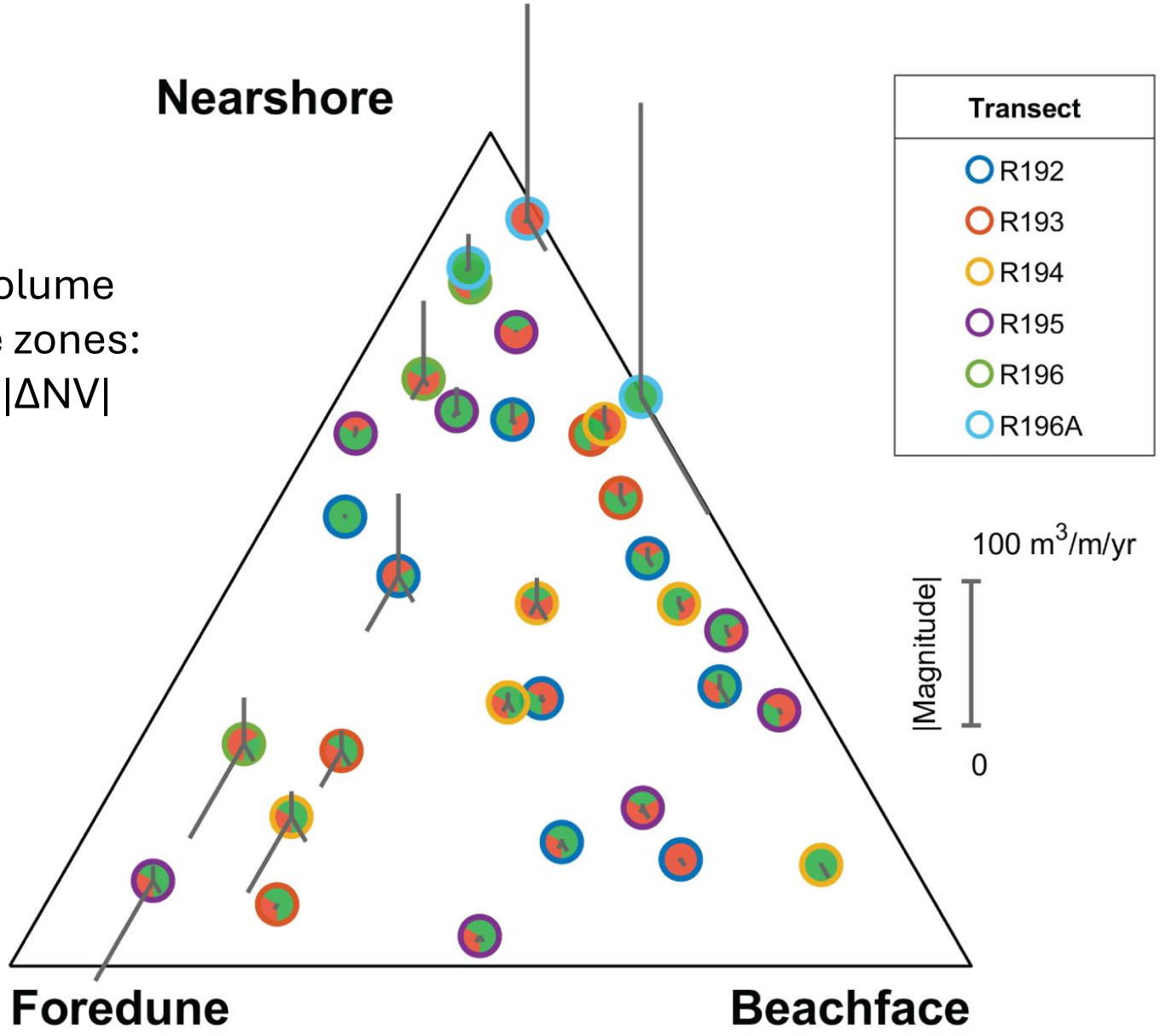
Fractions of total volume change among three zones:

$S = |\Delta DV| + |\Delta BV| + |\Delta NV|$

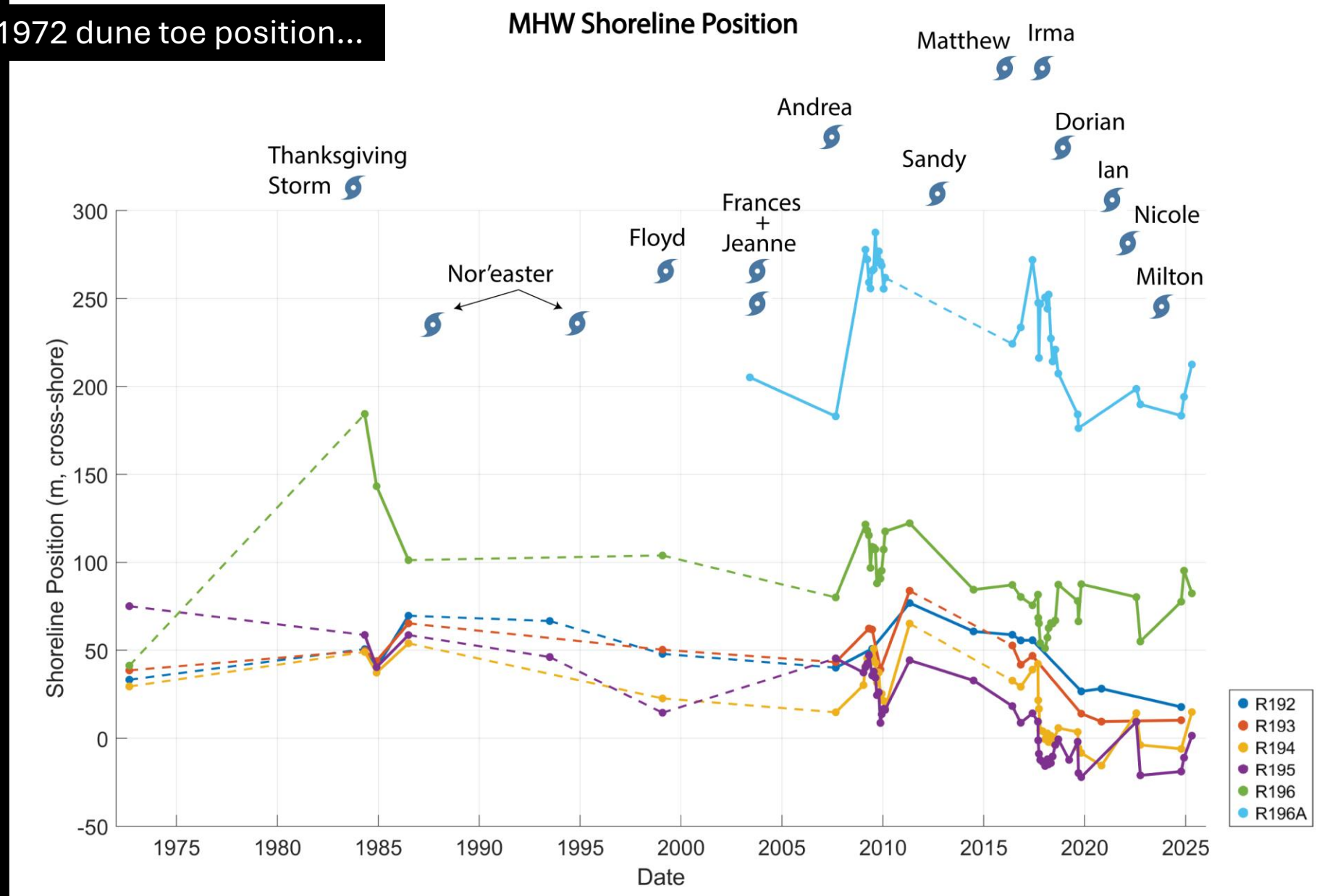
$fD = \Delta Dv/S$

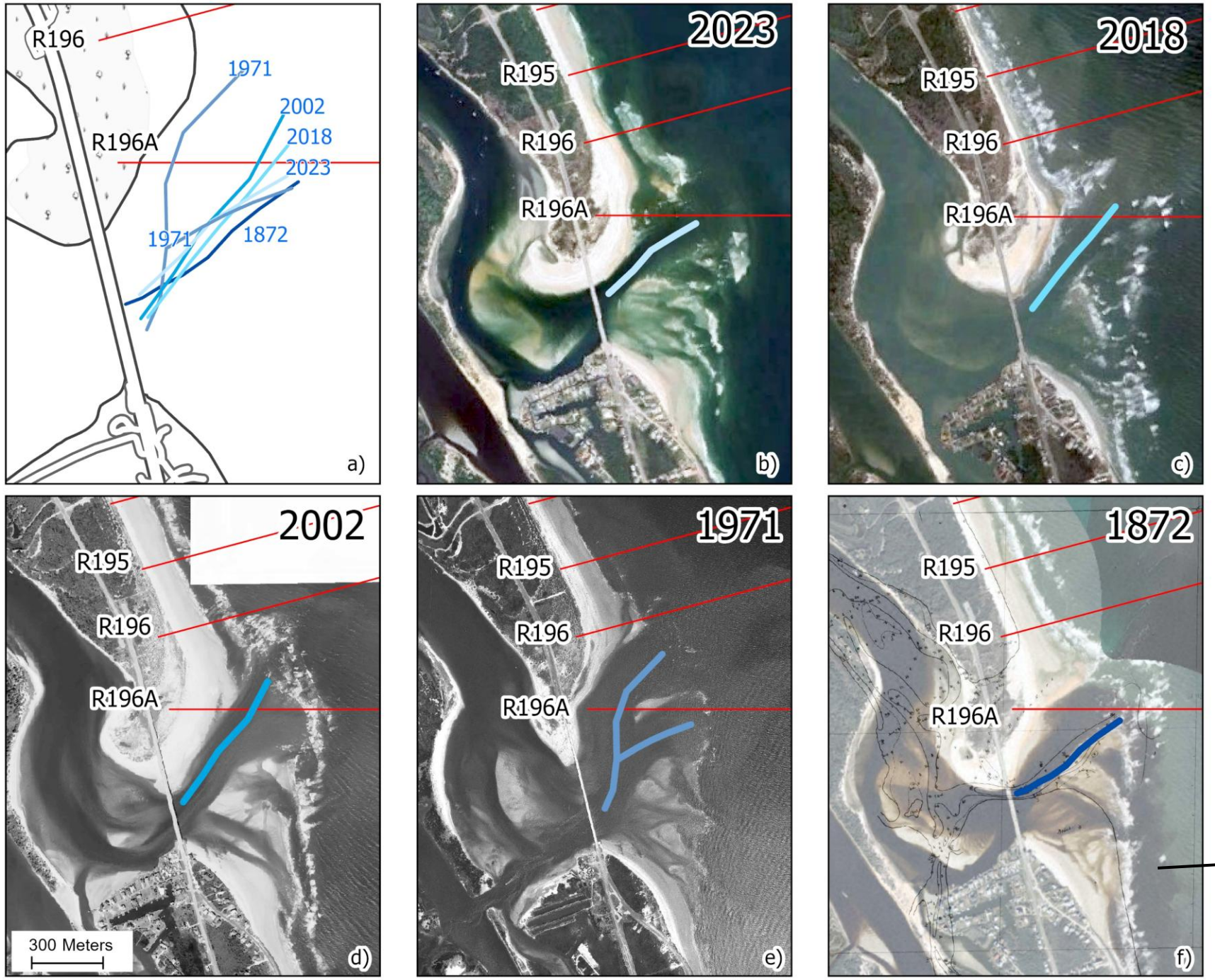
$fB = \Delta Bv/S$

$fN = \Delta Nv/S$

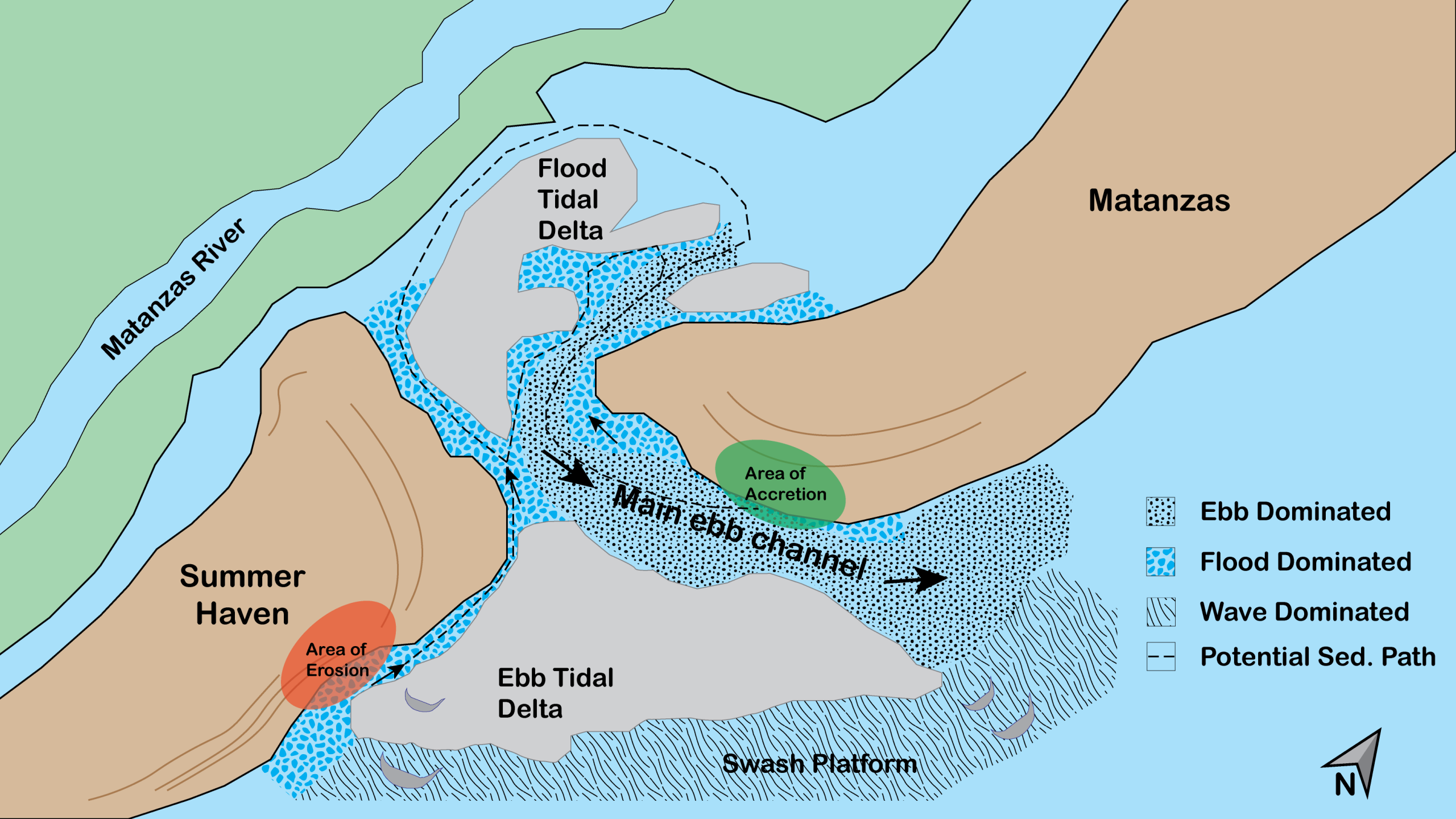


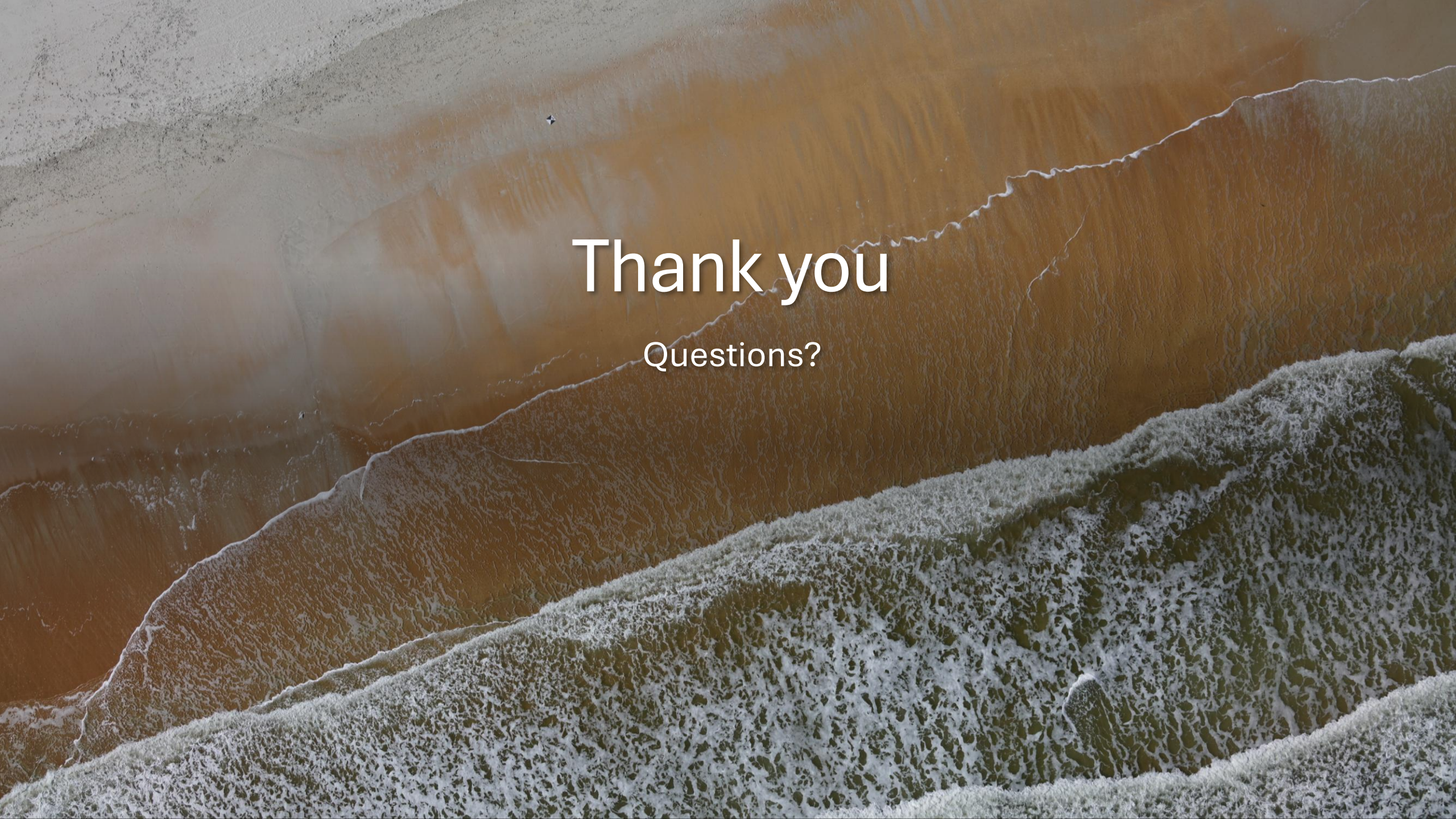
Relative to 1972 dune toe position...





1872 map with 2023 imagery overlain


Matanzas River
Flood Tidal Delta
Matanzas
Area of Accretion
Main ebb channel
Summer Haven
Area of Erosion
Ebb Tidal Delta
Swash Platform
Ebb Dominated
Flood Dominated
Wave Dominated
Potential Sed. Path
N


Thank you
Questions?