What causes chronic shoreline erosion?

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It is not storms alone...

If sea level wasn’t rising, the beach would rebuild naturally.

It is not storms alone…

Near the Pony Preserve at Tom's Cove after Sandy

Photo: Chincoteague Emergency Operations Center

Of course, short-term impacts can be significant (even in absence of sea-level rise).
Shoreline change determined by a balance between losses and gains of sand.

Positive Balance = Accretion

Negative Balance = Erosion
Factors that affect this balance...
1. Alongshore Supply and Loss

Waves push water along shore creating the **alongshore current** which moves sand.

On this day....
Net alongshore transport is to the south.
Accretion at the southern end of Fishing Point

"Arc of Erosion"

Patterns of shoreline change arise from effects of coastline shape on transport.
How much sand the alongshore current carries is determined, in part, by coastline shape.
Management efforts also affect the amount of sand transported.

Jetty interrupts the alongshore current $= \text{sand loss} \text{ downdrift}$
Management efforts also affect the amount of sand transported.

Beach nourishment = potential sand gain
Storm waves washing over an island deposit sand on the backshore = \textbf{sand loss} from beach.
3. Regional Effects

Sand that builds a growing tidal delta comes from surrounding beaches → sand loss
When an inlet closes and the tidal delta is eroded → sand gain
The Effects of Climate Change on Shoreline Erosion

- Storms + SLR $\rightarrow$ incr. frequency of overwash $\rightarrow$ incr. loss of sand from beach $\rightarrow$ incr. erosion

- Changes in storm activity $\rightarrow$ changes the mix of wave directions over time $\rightarrow$ alters patterns of shoreline erosion
Zone of wave shadowing

Nor’easter wave crests
For example…changes in storm activity may affect wave shadow zone.
Barriers need to migrate to keep pace with sea level rise. Stabilization efforts prevent this....