

The fallacy of more frequent and intense coastal storms (extratropical cyclones) in far western Lake Superior

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Common refrain: “With climate change, more storms are affecting Minnesota Point”

Public officials and policymakers frequently claim that anthropogenic climate change and a warming lake are causing more frequent and intense storms. This increased ‘storminess’ is claimed to accelerate erosion of Minnesota and Wisconsin Points.

Hypothesis: If the above claim is correct, then long-term meteorological records should show an increase in the frequency and / or intensity of extratropical cyclones.

What do we mean by storms? We are interested in strong wind events associated with the passage of deep low-pressure systems, known as **extratropical cyclones** (Fig. 1). In the Duluth-Superior area, significant coastal erosion occurs only during these events, in response to strong northeasterly winds and large waves. Such events tend to cluster in the ‘shoulder’ seasons, e.g. the infamous ‘Gales of November.’

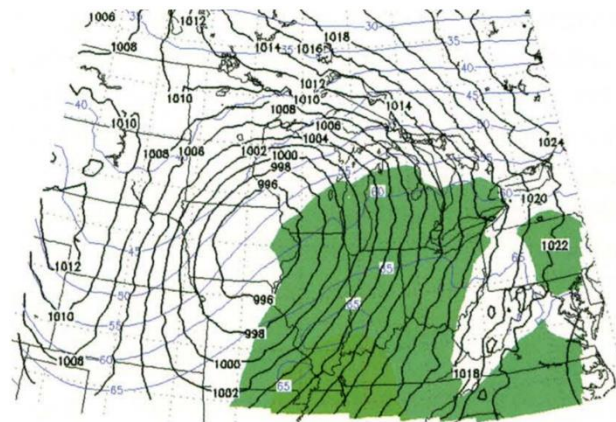


Figure 1. Barometric pressure (mbar) map of an extratropical cyclone on November 10, 1975. Cyclone center (‘eye’) over east-central Iowa. From Hultquist et al. (2006).

What did we do? We analyzed 75 years of hourly meteorological observations at the National Weather Service’s Duluth station. By calculating the 24-hour decrease in barometric pressure from weather records, we could reconstruct the passage of extratropical cyclones. We used the magnitude of the 24-hour drop in barometric pressure as a proxy for storm strength.

What did we find? Our analysis revealed **no statistically significant change in either cyclone frequency or intensity** (Fig. 2; next page). The frequency of occurrence of the most intense storms *decreased* slightly (insignificant statistically) in the past 75 years.

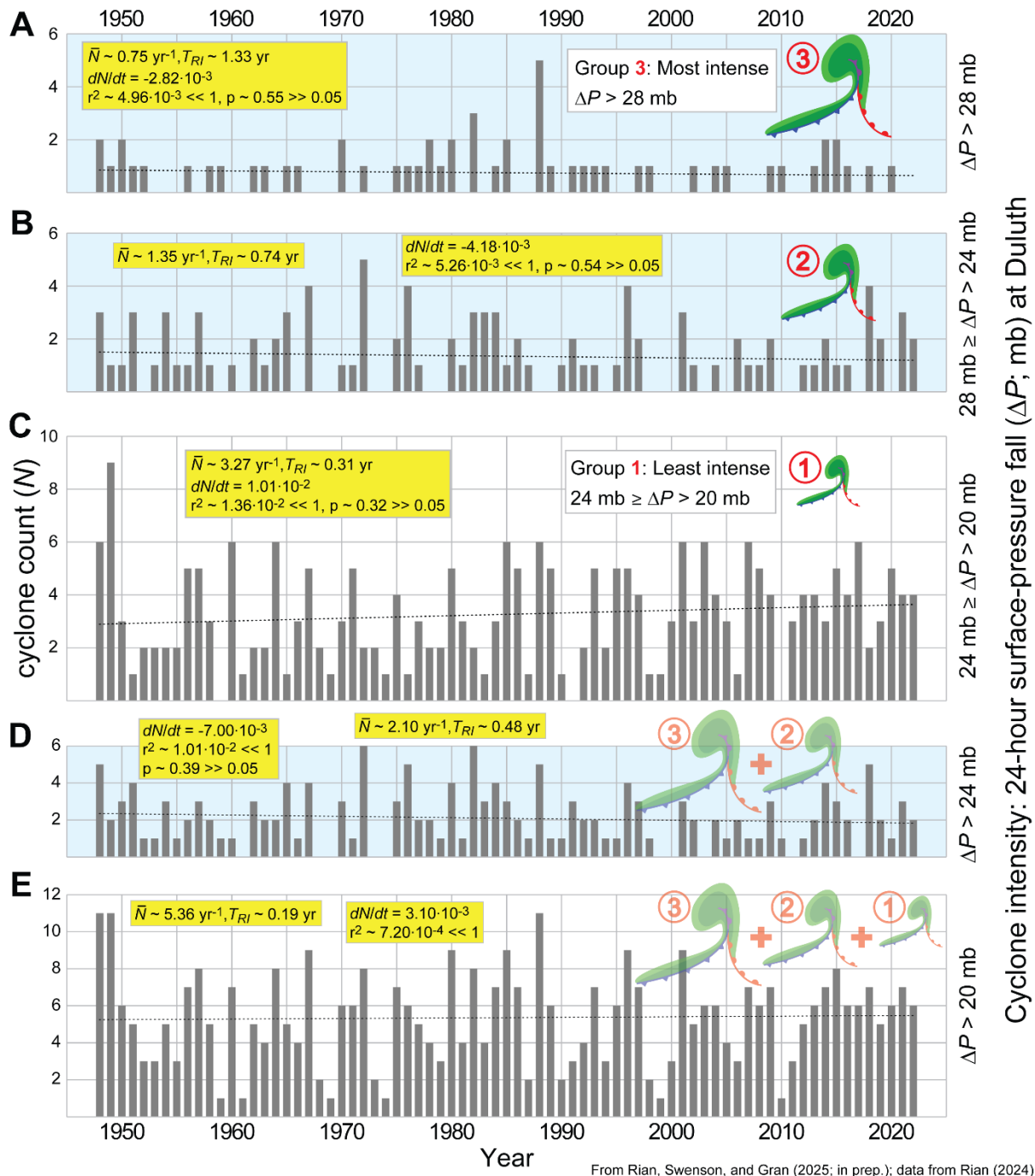


Figure 2. Time series of cyclone frequency for the far western arm of Lake Superior. Panels **A – D** show the number of cyclones per year, where each panel reflects storms of a specific intensity range, as defined by the 24-hour fall in barometric pressure. Panel **A** reflects the most intense storms, panel **C** the least intense. Panels **D** and **E** are composites of time series in **A – C**. Summary statistics in yellow boxes.