



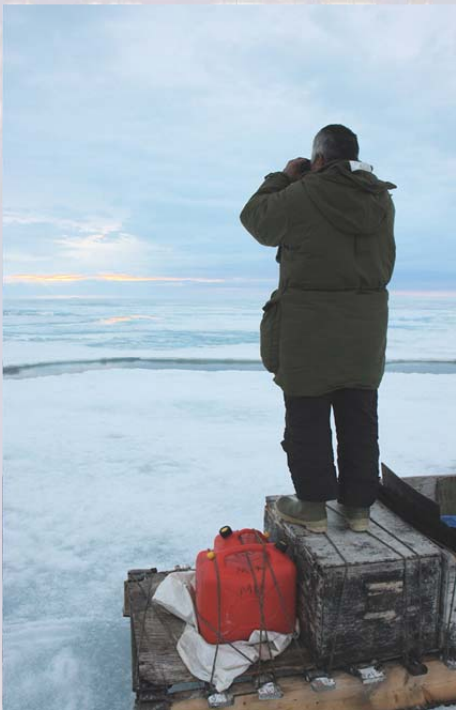
# Long-Term Trends in the Temporal Patterns of Weather

## Betsy Weatherhead\*



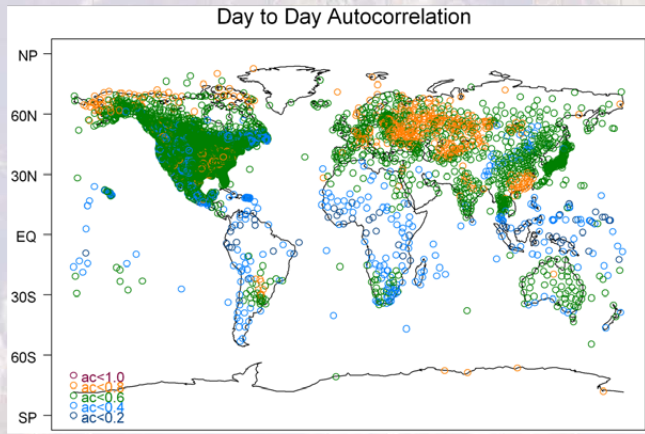
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NOAA plays a strong leadership role in understanding and predicting both weather and climate. This study explores the inter-play between climate and weather.



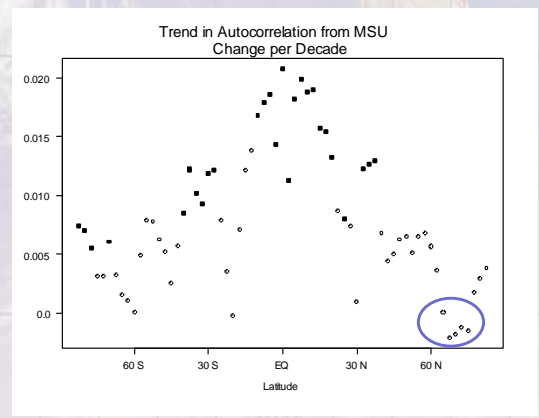
Inuit observations provide a strong statement that day-to-day changes were more unpredictable. This phenomenon is unique to areas near the Arctic; analysis of global data shows that day-to-day persistence is increasing.

The persistence of weather is a commonly understood trait: if today is warmer than usual, tomorrow will likely also be warmer than usual. The spatial scale of synoptic weather patterns has been studied in an unprecedented detail since the onset of global satellite systems. The temporal scale of these patterns also reveals information about both how the Earth behaves and how it is changing.



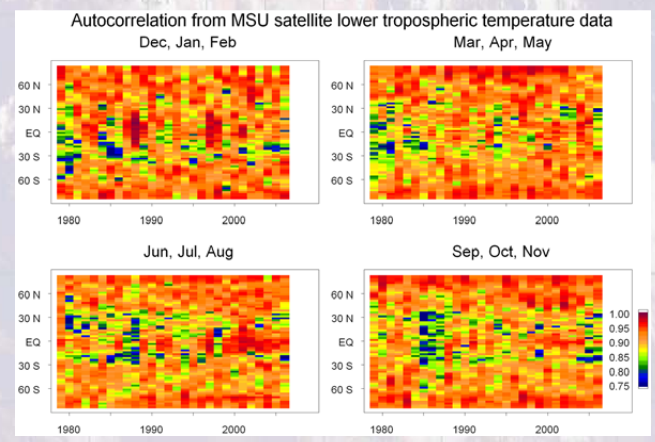
### Trends in Persistence

Over the past thirty years, the day to day changes in autocorrelation of latitudinally averaged temperature values is apparent for all four seasons with a strong latitudinal gradient. The strong latitudinal trend is most apparent in averaged temperature products. Significant trends above are indicated by the solid dots. The trends below show that the trends are dominated by low autocorrelation in the 1970's with large year to year variation.



### Why is Persistence Important?

- Persistence may tell us something unique and independent from other parameters about how and why the climate is changing.
- Persistence, on its own, is an important aspect of climate because of how the Earth responds to persistence. Weather, as an environmental stressor, is much more harmful if it persists for long periods.
- As an example, the same amount of precipitation can support an ecosystem if it occurs in an interspersed manner (low persistence) and will cause major damage if it occurs in a short time period followed by no precipitation.



Examination of pressure data, as well as vertically resolved data, will help determine whether this phenomenon is restricted to the near surface parameters or is reflective of the speed at which weather systems are moving.

**Changes in day-to-day autocorrelation have occurred over the past several decades.**

**Persistence characteristics of weather affect the Earth system, particularly when weather acts as a stressor, such as in conditions of drought or high pollution events.**

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