

NOAA Climate Prediction Center Products for Decision Making: The Weather-Climate "Linkage"

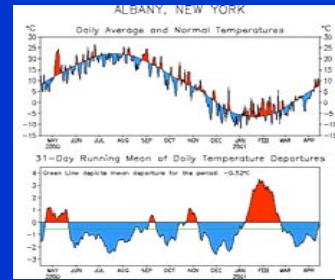


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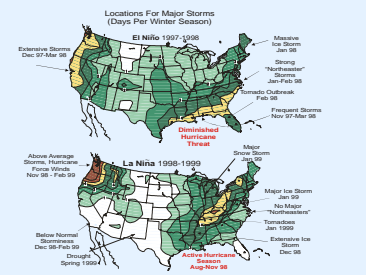
Introduction

- NOAA's Climate Prediction Center (CPC) develops and delivers climate products for decision makers & applications
- These products emphasize climate variability, real-time climate "nowcasts," climate outlooks from "Week-2" through seasonal to interannual time scales, and weather-climate links
- NOAA will refine and expand these products based on user feedback, improving information on confidence & uncertainty
- Educational materials improve our understanding of the role of climate and weather in our everyday lives
- CPC's experience & partnerships in describing climate trends & variability, and in linking weather & climate, are resources for the next generation of climate models.

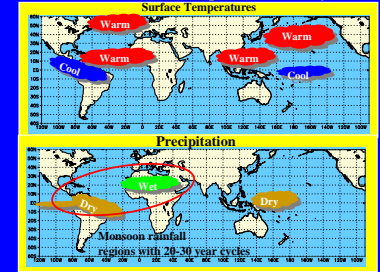
Climate Versus Weather



Examples of Climate Control Over Weather Patterns. The Basis of Linking Climate and Weather



Active Atlantic Hurricane Phase of the 20-30 Year Tropical Climate Cycle



Issues: Climate ↔ Weather

- Basic theory and models suggest *climate change* may be first expressed as changes in the behavior of the leading *modes* of natural *climate variability*.
- The leading *modes* of natural *climate variability* give considerable information about the regional behavior of *weather extremes*.
- What are the relationships between *extreme weather events*, *climate variability* and *climate change*?

Seasonal Climate Impacts Depend on the Simultaneous Influences of:

- Predictable components of natural climate variability, e.g., El Niño/La Niña, Madden-Julian Oscillation (MJO)
- Unpredictable components of natural climate variability, e.g., North Atlantic/Arctic Oscillation (NAO/AO)
- Long-term trends

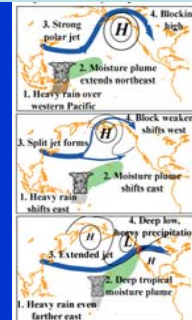
Extreme Events are Mostly Related to Circulation Changes, i.e. to Variability.

Winter conditions before & during some west coast heavy precipitation events

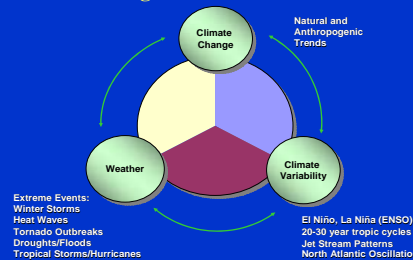
7-10 Days Before Event →

3-5 Days Before Event →

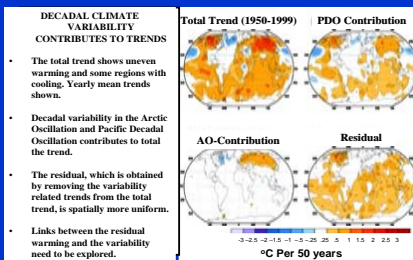
Precipitation Event →



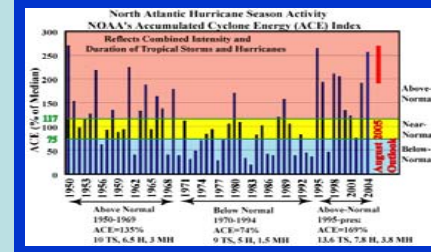
Linking Weather and Climate



Decadal Climate Variability Contributes to Warming Trends

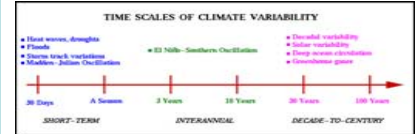


Hurricanes and Climate



Climate Challenges and Solutions

- Warming trend, regime shifts, regional impacts, "abrupt" changes
- Natural variability - El Niño, North Atlantic Oscillation, monsoons, MJO
- Extremes - heat waves, storms, droughts, hurricanes
- Climate Forecast System (CFS) - next version of climate model 2008-2010?
- Multi-Model Ensembles - maximizing skill - NCEP, GFDL, NCAR, UK,...
- Climate Test Bed (CTB) - accelerate transfer of R&D to climate outlooks
- Ongoing Analysis of the Climate System (Reanalysis) - the basic reference



Background

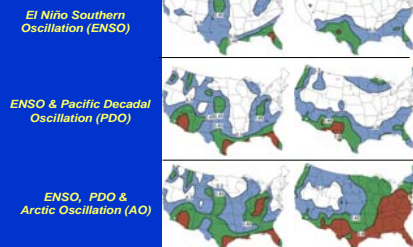
Weather: Describes conditions in the atmosphere at any time or during a short period of time. Examples include: current temperature, a snowstorm, a cold air outbreak.

Weather Forecasts: Have skill days in advance and are "deterministic."

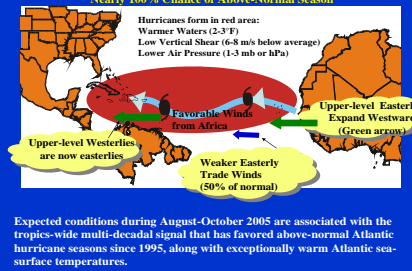
Climate: Describes conditions in the atmosphere or ocean over a relatively longer time period, e.g., week(s), month(s), season(s), year(s), decade(s) or over a large geographical area. Climate can describe phenomena (e.g., El Niño) or be the average of weather events over a period.

Climate Forecasts: Are predictions of averages or departures from average over long periods (e.g., month(s), season(s), or longer). Climate forecasts are "probabilistic."

Wintertime Potential Predictability



Expected Conditions during August-October 2005



Conclusions

- NOAA will continue developing and delivering improved climate products for decision makers and applications.
- These products will improve our understanding of:
 - climate variability and change
 - past, current, future climate conditions on all time scales
 - how weather and climate are linked
- NOAA will refine and expand these products based on user feedback, improving information on confidence & uncertainty
- New/revised educational materials will further improve our understanding of the role of climate and weather in our everyday lives
- NOAA will use its experience and partnerships to develop the next generation of climate products