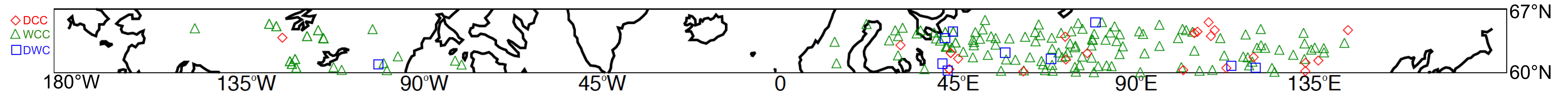


Extreme Convection at High Latitudes as Seen by GPM DPR

Robert Houze^{1,2}, Stacy Brodzik¹, Jingyu Wang², Jiwen Fan²

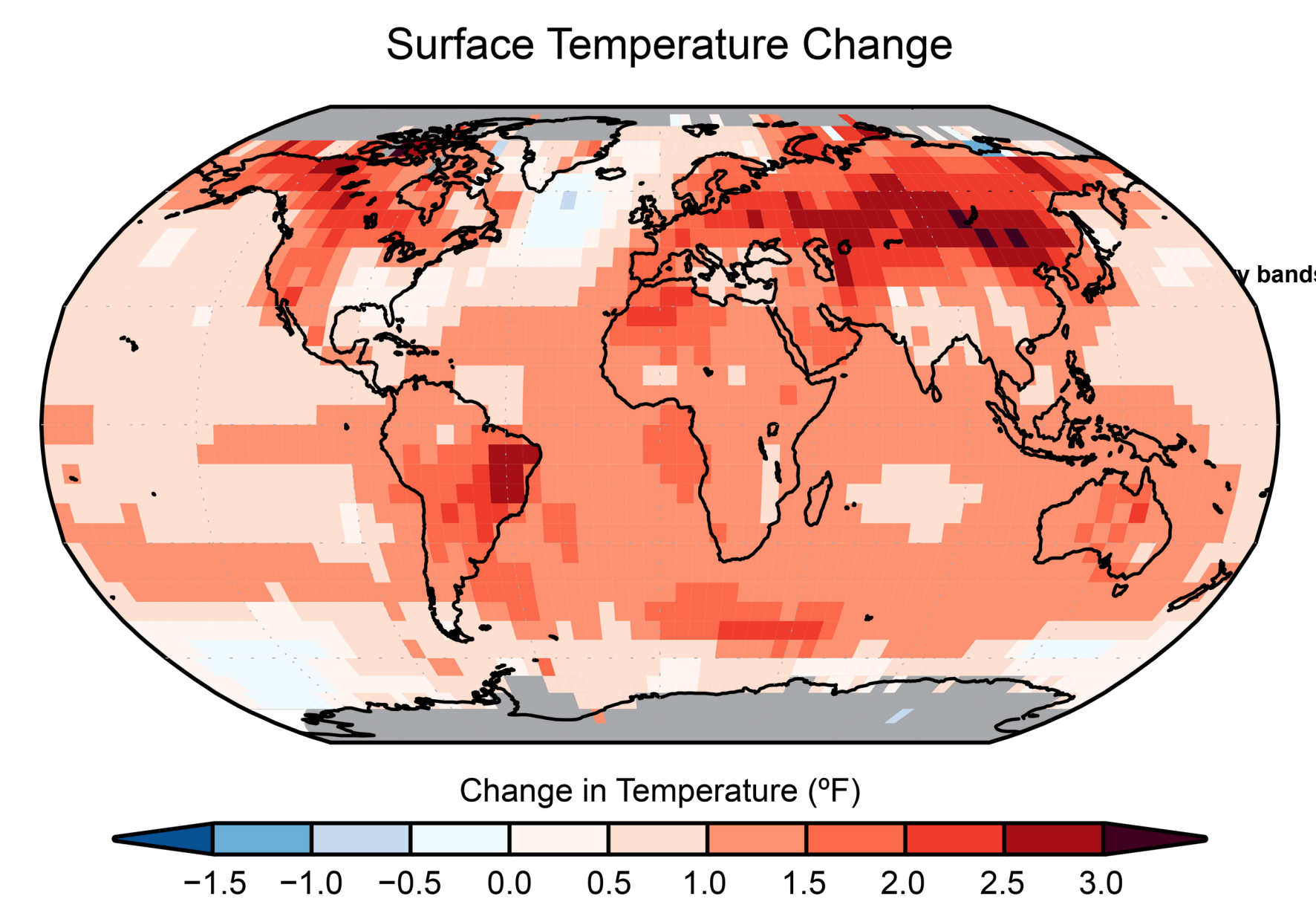
¹University of Washington, ²Pacific Northwest National Laboratory

Extreme Convective Events (2014-2017)



Background

- GPM shows extreme convective events at high latitudes when temperatures are high.
- IPCC shows global warming is greatest at high latitudes
- Does this imply more extreme convection at high latitudes in the future?

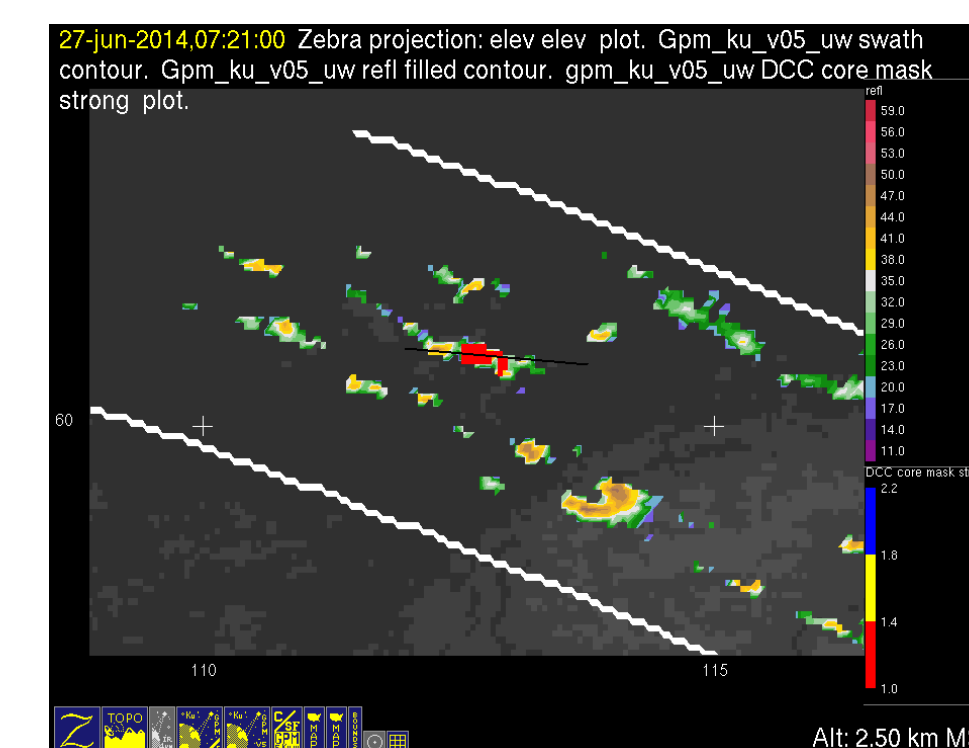


USGCRP, 2017: Climate Science Special Report: Fourth National Climate Assessment. doi: 10.7930/J0J964J6.

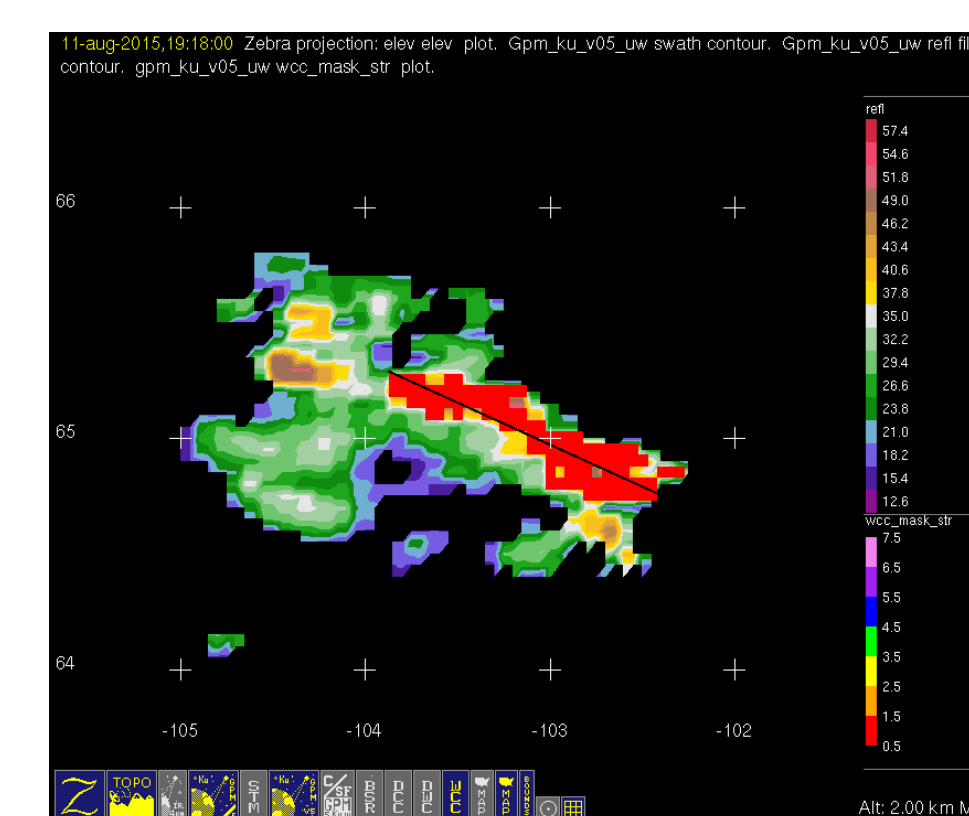
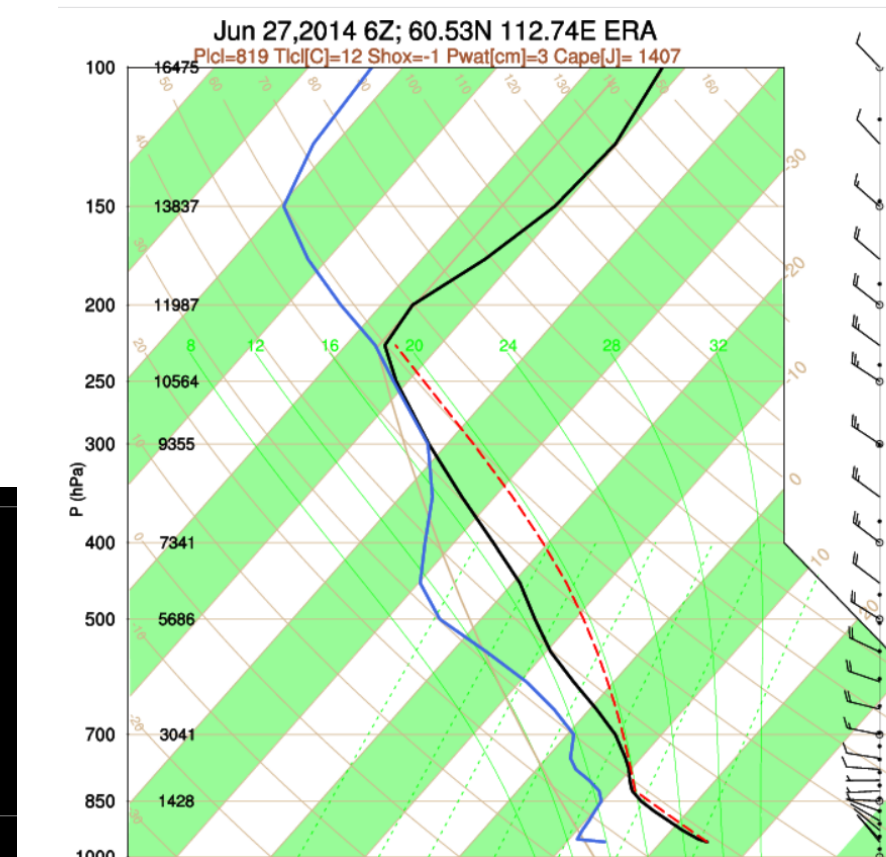
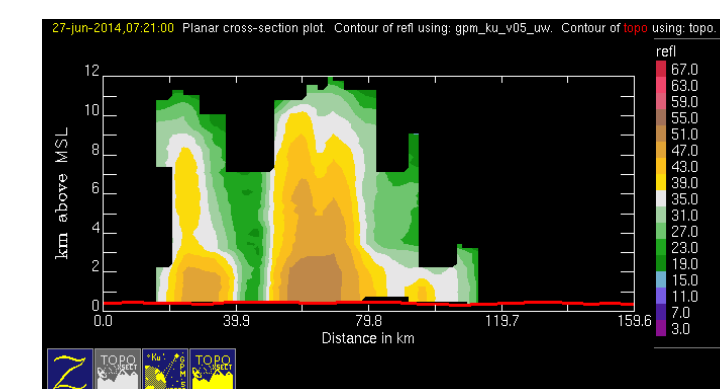
Extreme Convective Events seen by GPM DPR at High Latitudes

Definitions of extreme convective events

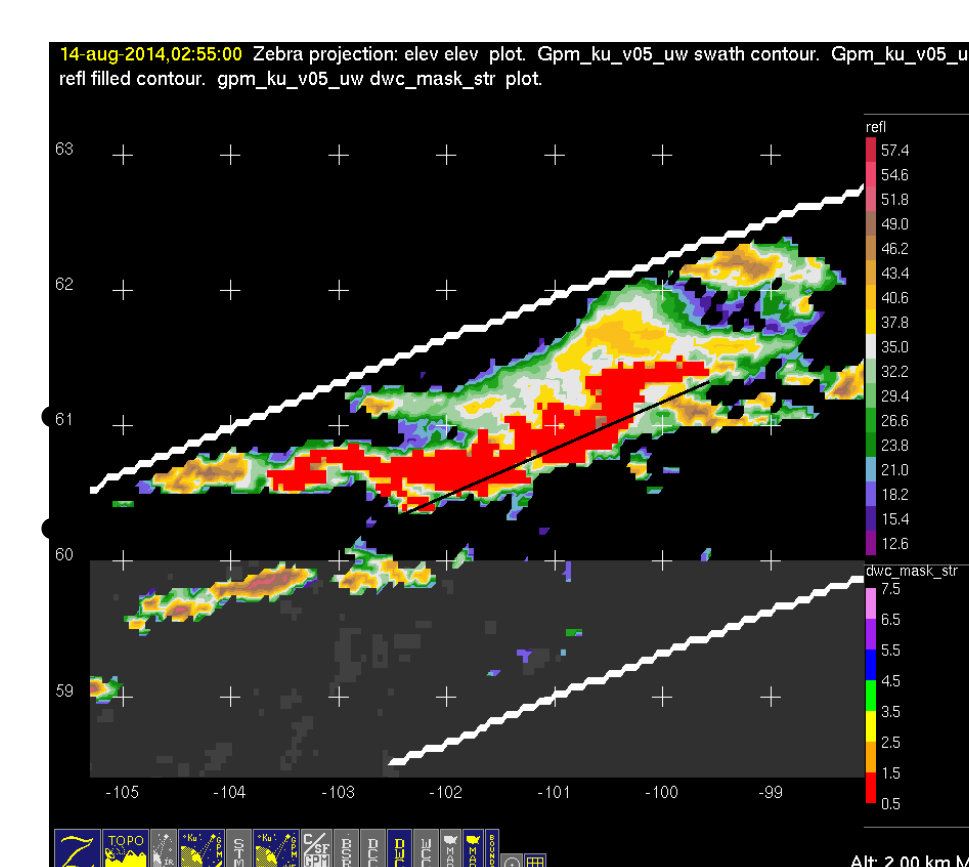
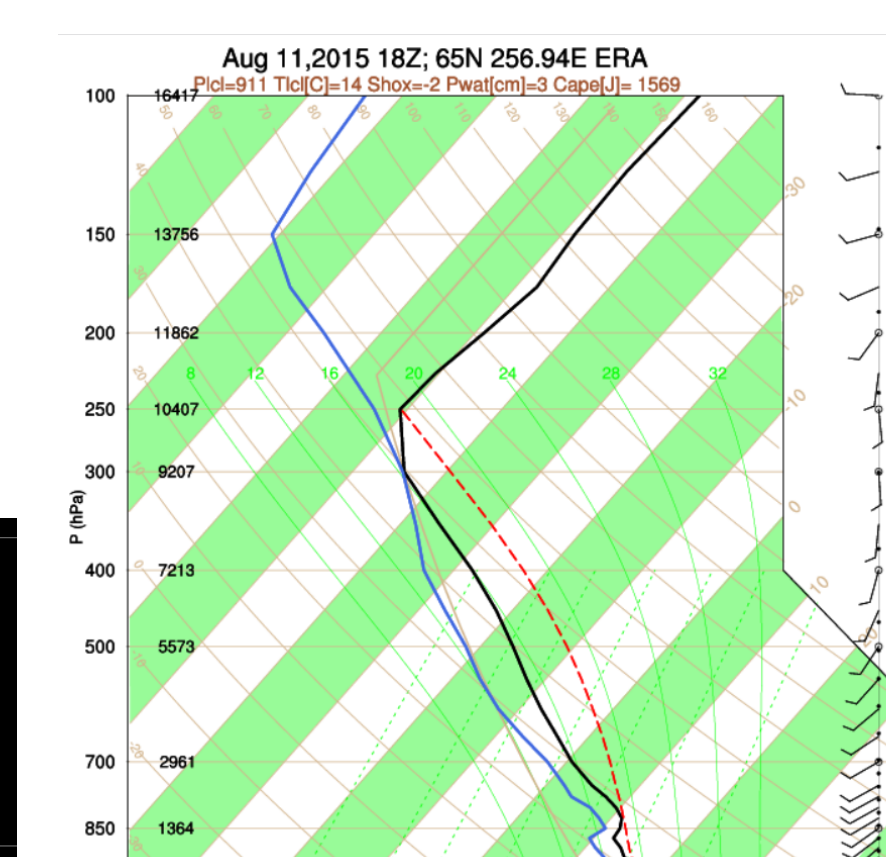
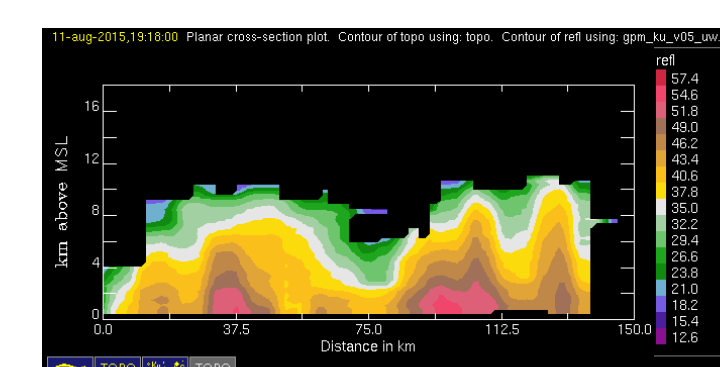
- DCC→Deep conv. core—3D echo >40dBZ & ≥10 km
- WCC→Wide conv. core—3D echo >40dBZ & ≥ 1000 km²
- DWC→Deep wide core—3D echo object both deep & wide



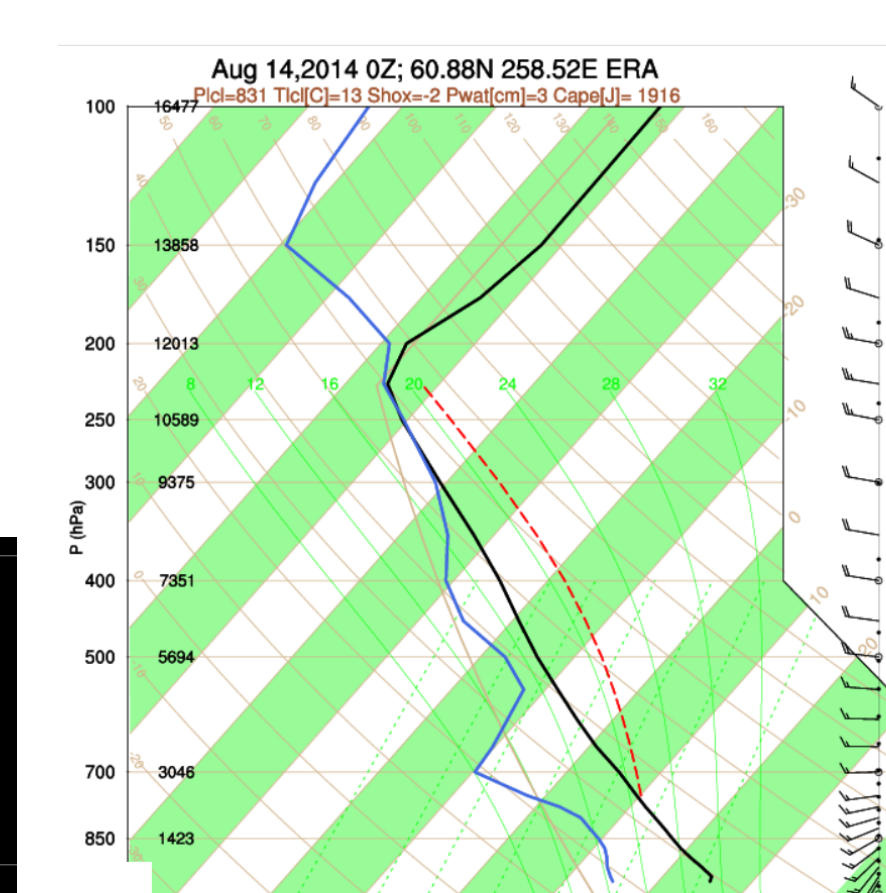
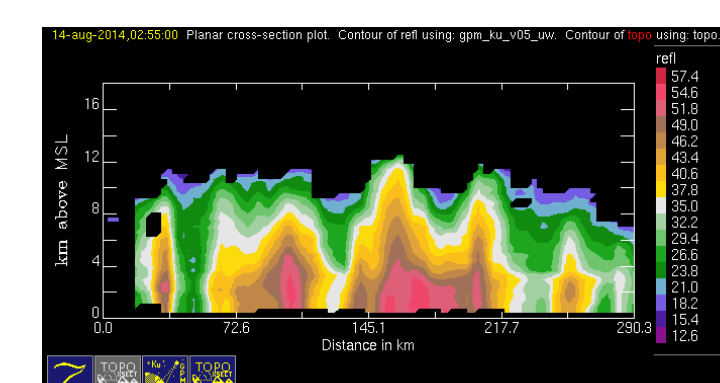
DCC



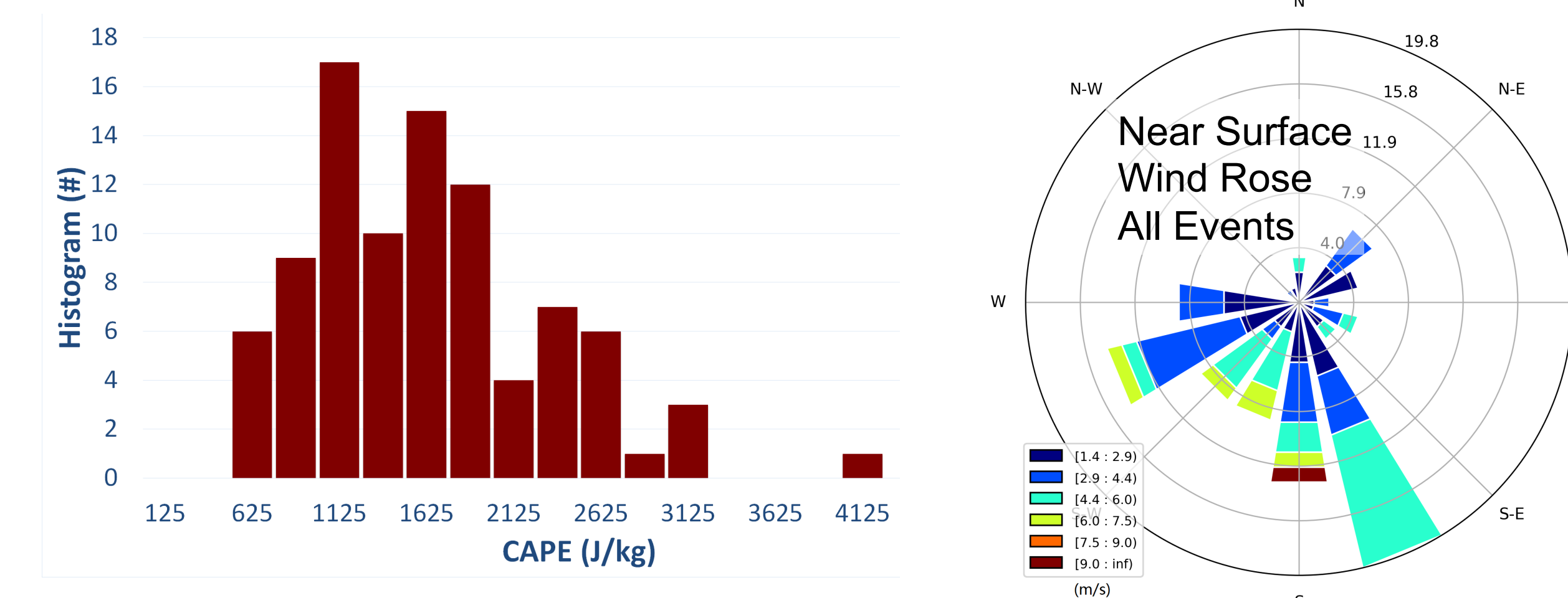
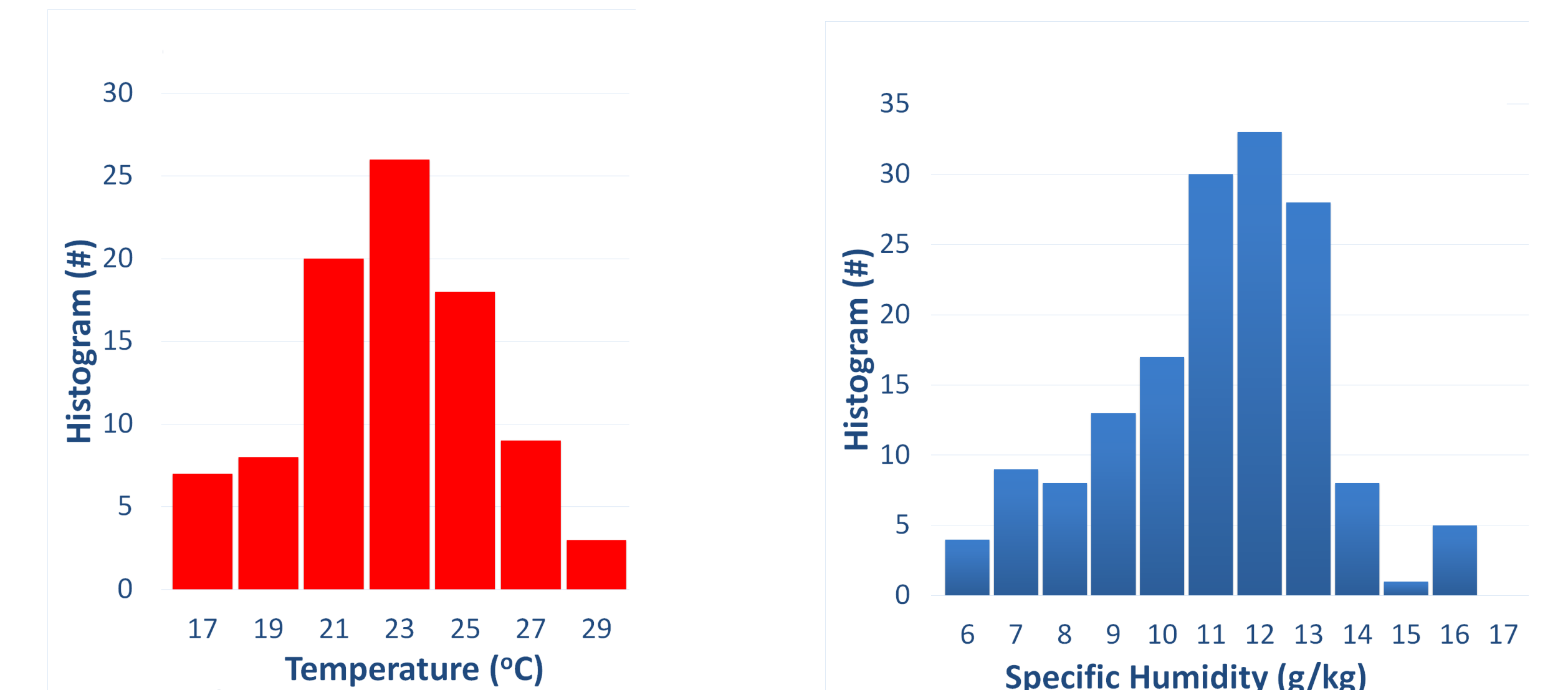
WCC



DWC



Discussion of Soundings



- Surface T in the 20's (°C)
- Specific Humidity often over 10 g/kg
- CAPE mostly 1000-2500 J/kg
- Surface winds mostly southerly

Objectives

- Show that deep, intense, and wide convective systems occur at very high latitudes, where global warming is most pronounced
- Illustrate the characteristic structures of intense convection at high latitudes
- Determine the temperature, wind and moisture conditions associated with deep, intense, and wide convective systems at high latitudes

Summary

- GPM shows that extreme convection (DCCs, WCCs, DWCs) occur frequently at latitudes north of 60°
- Extreme convection occurs when it is very warm at high latitudes
- Global warming at these latitudes suggests high latitude extreme convection will increase
- The synoptic conditions favoring these events need to be studied

Acknowledgments
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