High-resolution analysis and simulation of convective systems during MC3E with data assimilation and comparison with radar and large-scale forcing data

Zhaoxia Pu and Chao Lin
Department of Atmospheric Sciences, University of Utah

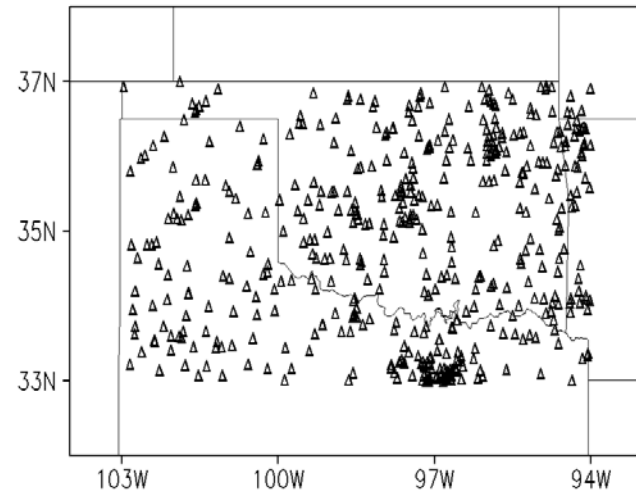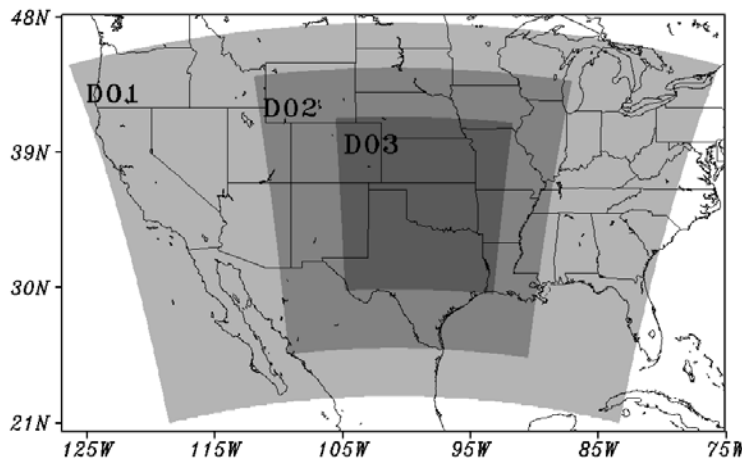**Shaocheng Xie**
Lawrence Livermore National Laboratory

Xiquan Dong
University of North Dakota

MC3E Breakout Session
ASR Spring Science Team Meeting
March 18-21, 2013

Main emphasis – 5 convective cases

- 18 UTC 23 April - 00 UTC 26 April 2011
- 06 UTC 01 May -- 00 UTC 03 May 2011
- 06 UTC 10 May -- 06 UTC 12 May 2011
- 12 UTC 19 May -- 12 UTC 21 May 2011
- 06 UTC 23 May -- 12 UTC 25 May 2011

12km/4km/1.33km

WRF model simulations at high resolution (~1km) assimilation of surface Mesonet and profile observations

Science Questions

- What are the meso-scale and small-scale characteristics during the convective initiation and precipitation?

- What are the mechanisms that control convective initiation? Specifically, what are the roles of the surface and boundary layer processes?

- What are the characteristics and evolution of surface and boundary layer processes during cloud life cycle?
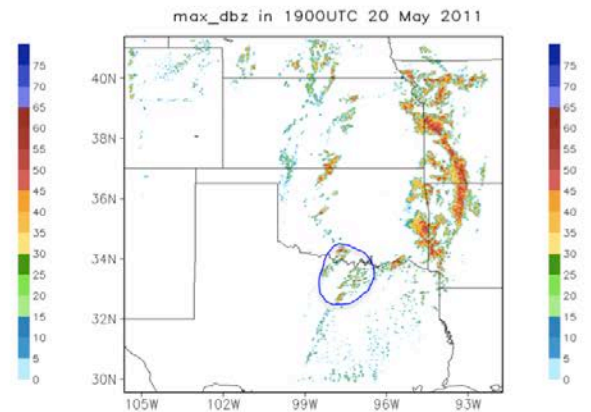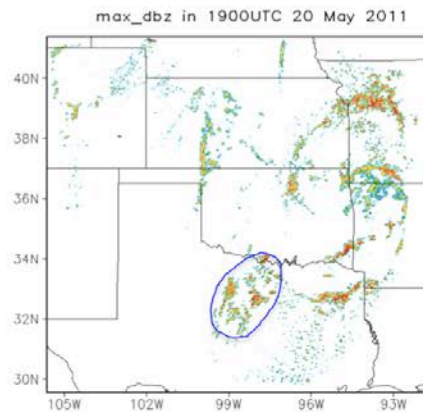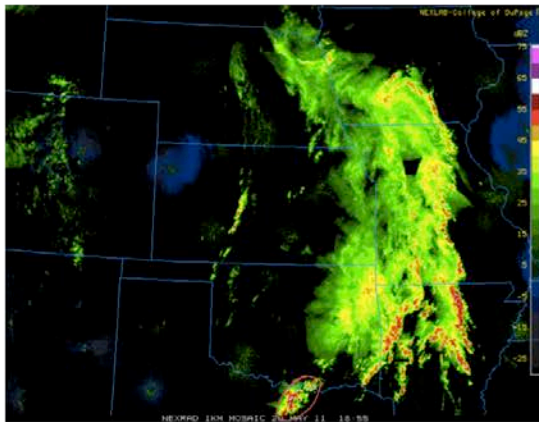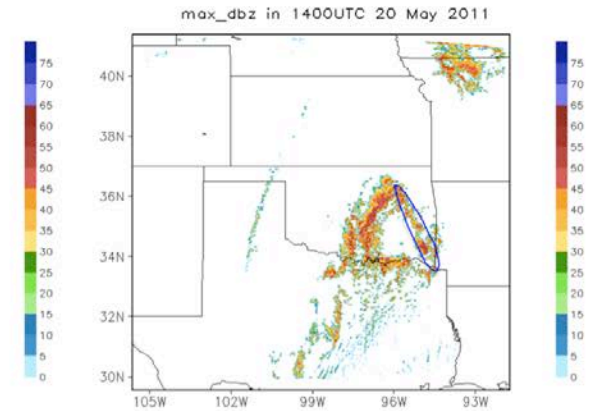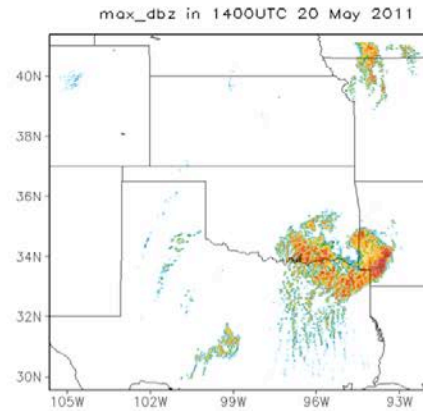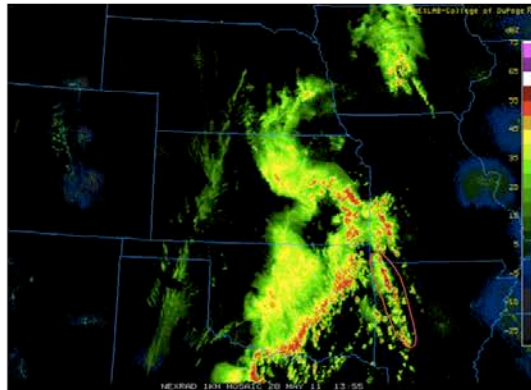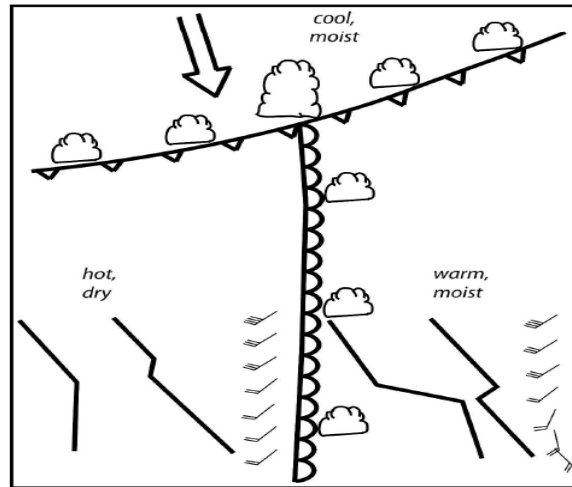
Primary CI

May 19-20 Convective cases
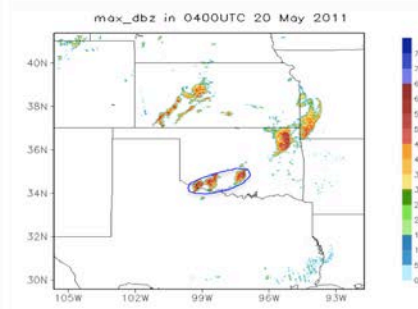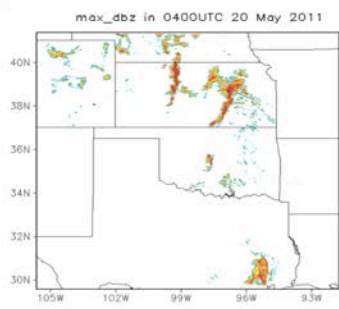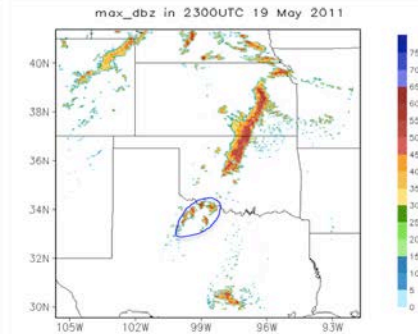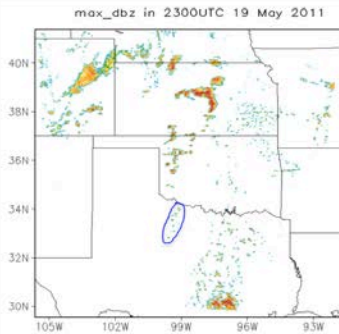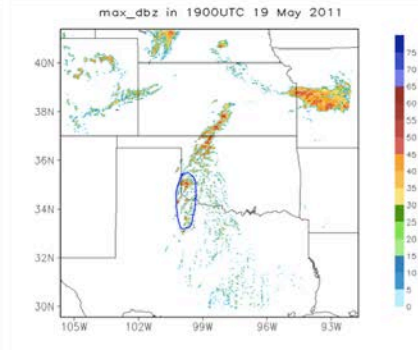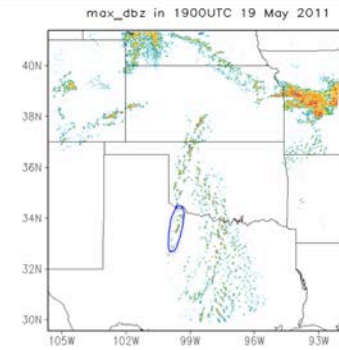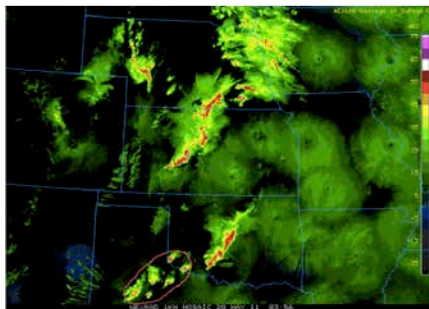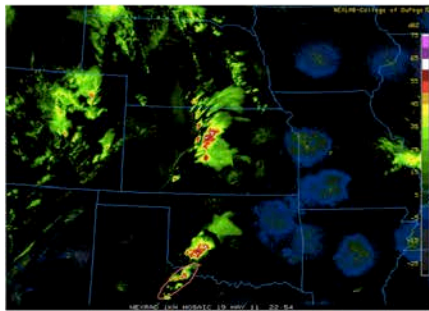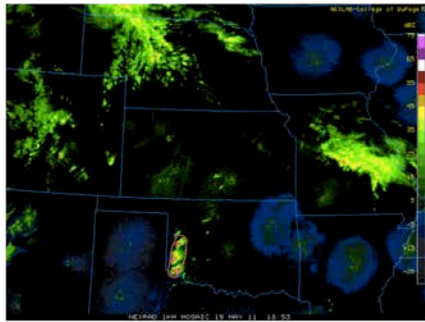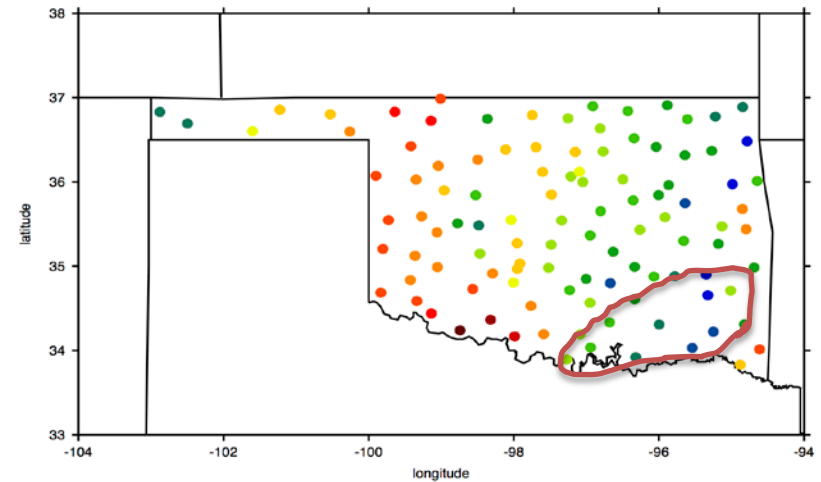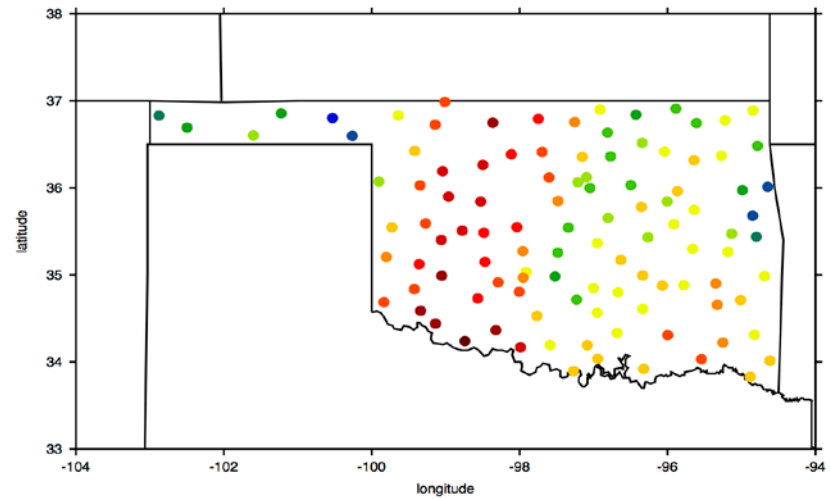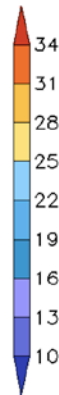
Secondary CI

May 19-20 Convective cases
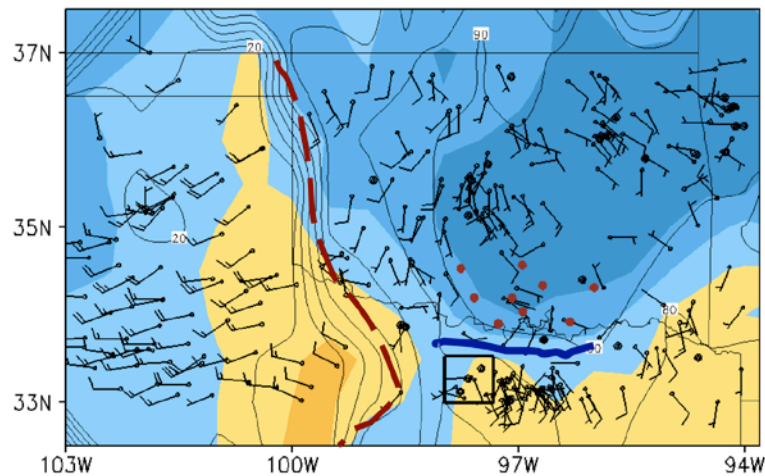
Interaction between cold pool and CI

1800 UTC 20 May 2011

Weiss and Bluestein (2002
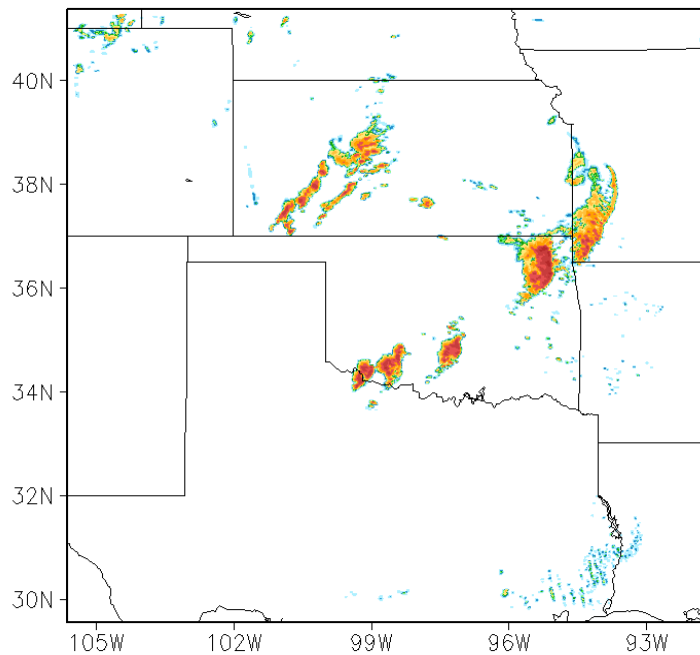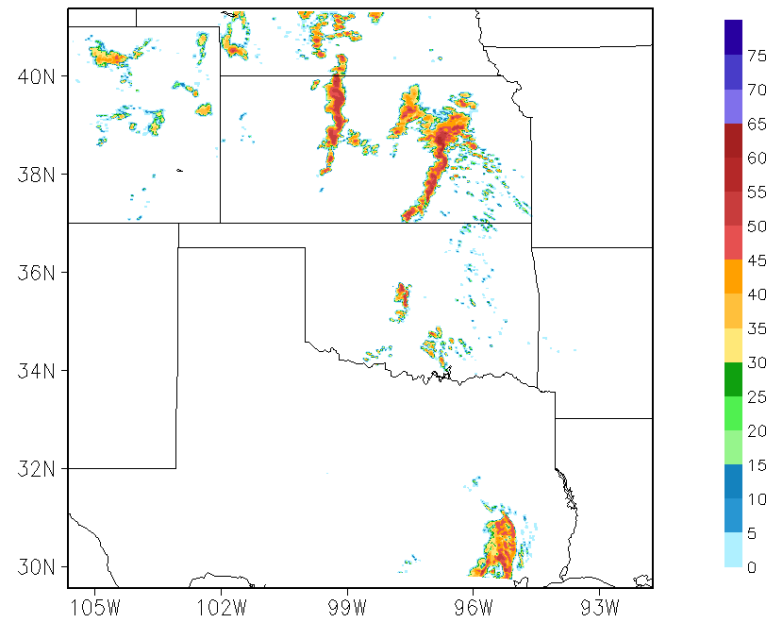
UND data products

(a) 2500 m Z_e
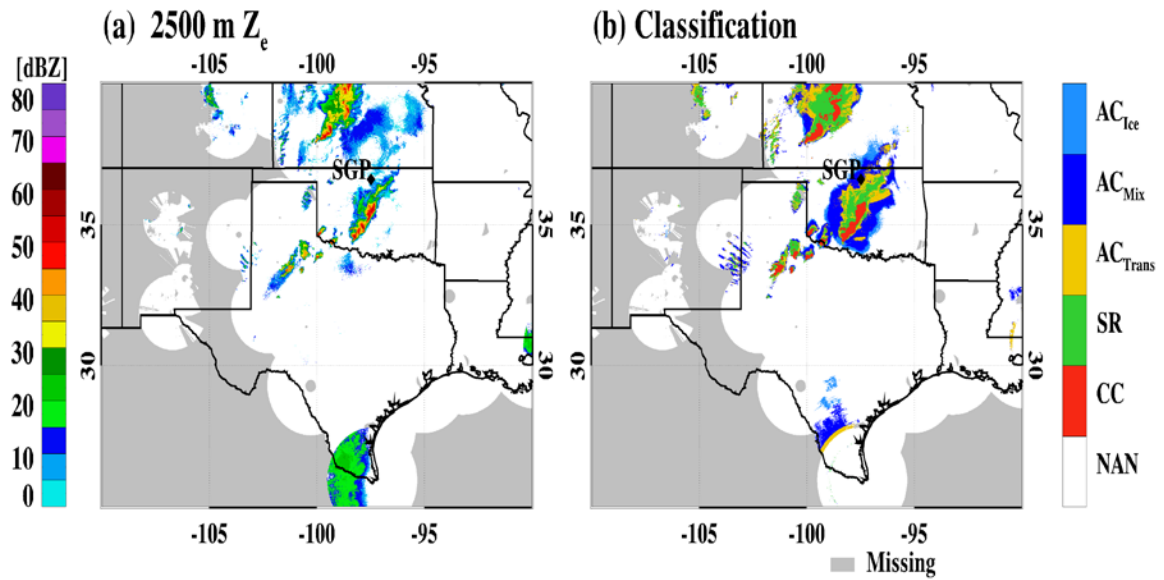
(b) Classification

WRF simulation

max_dbz in 0400UTC 20 May 2011

max_dbz in 0400UTC 20 May 2011

ARM forcing - 75 km

W_wind (m/s) - Start time: 2011-05-19_12:00:00

WRF simulation

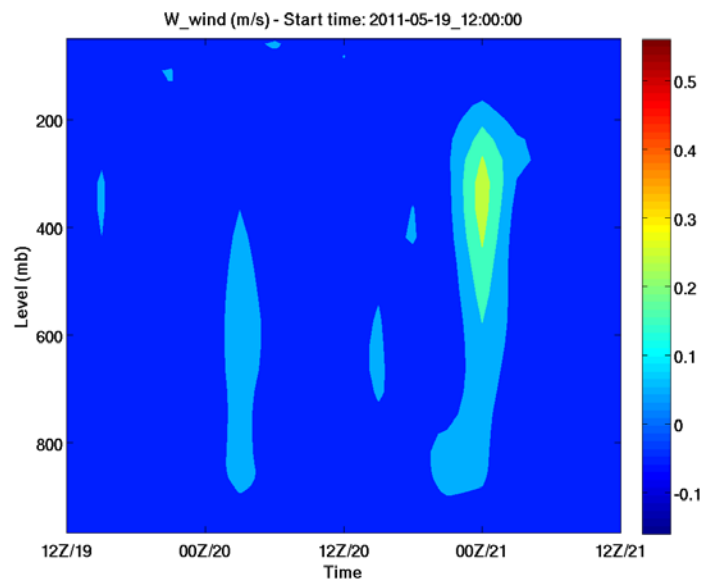W_wind (m/s) - Start time: 2011-05-19_12:00:00

W_wind (m/s) - Start time: 2011-05-19_12:00:00
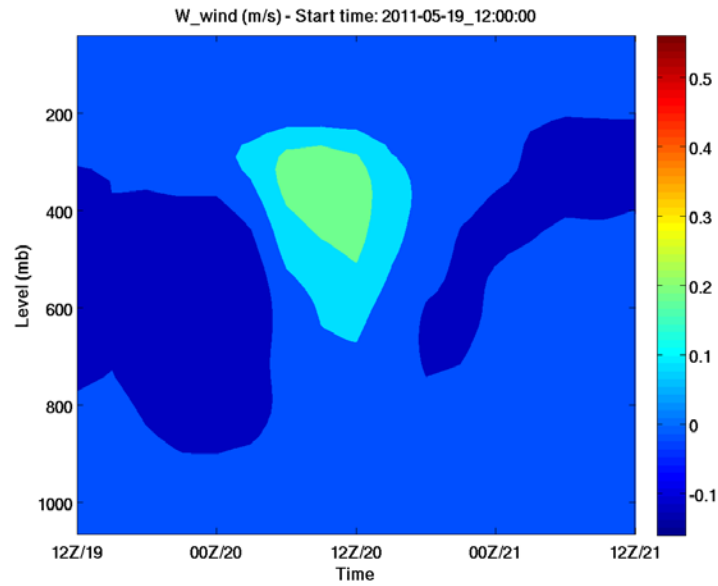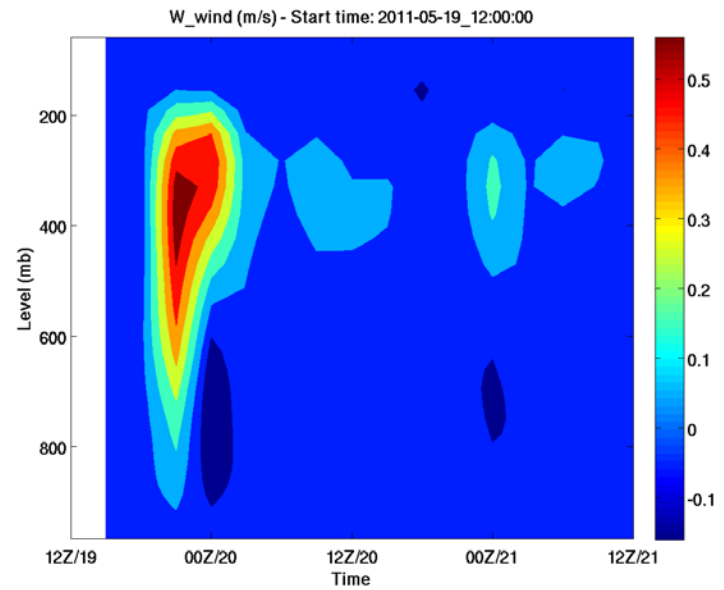
Issues:

- Data quality

- Cloud data and cloud clasification

- Large-scale forcings vs. sub-grid scale characteristics