

Review of

Why did the storm ex-Gaston (2010) fail to redevelop during the PREDICT experiment?

Ref.: acp-2015-692

Recommendation: Minor revision

The authors investigate the non development of ex-Gaston using the ECMWF analysis data. By using a dividing streamline methodology, as well as a hyperbolic trajectory methodology, the authors confirm that the “pouch” region was compromised and dry air was able to penetrate. The negative effects of dry air on convective updraughts and vorticity production are described in detail. This manuscript is very polished and I recommend that this study be accepted with some minor revision.

General comments:

This is a very useful study that explains coherently why ex-Gaston failed to redevelop. In particular the authors go to great lengths to show that the pouch was not robust, and that dry air was able to penetrate on certain days. Most of my comments are minor issues.

Some of my questions are concerned with the different explanations offered by Gjorgievska and Raymond (2014). With respect to the Lagrangian analysis performed, are there any different conclusions between this study and that of Rutherford and Montgomery (2012)? GR14 state that “Nor did the Lagrangian analysis of Rutherford and Montgomery (2012) show dry air intrusion between the first two Gaston missions.”

The analysis of the dropsondes within the 4° box (Fig. 10) shows only a single sounding that shows evidence of a temperature inversion. GR14 claim that they see a temperature inversion in their saturated moist entropy 4° box average. I fail to see how a single sounding with an inversion could influence the box average so strongly. Can you think of possible reasons why there are such discrepancies between your results and those of GR14 in terms of inversions?

Minor comments:

- Page 2, lines 23-25. The terms critical layer and critical latitude have not been defined. A definition here is necessary for readers not familiar with pouch theory.
- Page 3, lines 12-13. “NASA's ongoing missions ...” should be updated to 2016?
- Page 4, line 20. “and NHC”, should be “and the NHC”.
- Page 5, line 11. How is the pouch center calculated here?
- Page 10, line 23: “Dry air reduced both the updraught and..” I assume you mean updraught strength?
- Page 11, line 13: Can you explain how dry air results in divergence near the 600 hPa level?
- Page 12, line 7-8. “11 of the profiles show evidence of a dry layer above 600 hPa”. This sentence needs a “not shown” at the end.