Response to Reviewer #1:

The reviewer raises a number of interesting points, which we address below and incorporated as minor changes to the manuscript. We also note that major changes have been made to the manuscript in the section describing the CAP tilt (Section 3.6). That portion of the paper has been greatly simplified and much of the math has been removed in favor of a simple representation of the force balance affecting the CAP tilt. We have also reduced the total number of figures from 19 down to 15.

1.) We have reworked Fig 1 to provide a number of improvements. We believe the location of the river, which is the low point in the valley at any latitude, is more easily distinguished in the new presentation. A number of other features are also now more clear.

2.) The upstream sounding location is now clearly marked in Fig. 1. While not directly upstream of the South Mountain transect of weather stations the sounding nevertheless samples the structure of the atmosphere in the Utah Valley, which is upstream of the SLV throughout the period of strong southerly flow above the CAP. Upstream in this sense refers to the flow aloft and not the local variations in flow direction within the CAP in the SLV. In our approximations of the Froude number we neglect the near surface inversion layer because it reflects the local conditions near the launch site, which is at a low point in the Utah Valley. The remainder of the temperature structure above the surface based layer is, however, consistent with the observations in the Utah valley directly upstream of the traverse mountains as well as with the temperature of the flow plunging down the lee slopes (e.g. 298 K in the capping layer). What is particularly clear from the sounding is the presence of a strong capping layer near the height of the ridge and sufficient cross barrier flow to produce a mountain wave response.

3.) Most of the waves do not show a clean billowing shape and do resemble turrets, however at least one wave in each of the three panels exhibits a slight inversion of the aerosol gradient indicative of some degree of wave breaking. For example, the waves at 12:26, 04:03, and 10:56 in the three successive panels each show some evidence of overturning. Stretching the aspect ratio of the figures makes this easier to see. However due to space constraints I have opted to retain the original format. I have added the qualifying statements:

“some resembling KHW”

and

“Compared to earlier the wave structures are more chaotic and less clearly billow shaped. “

Lab experiments by Strang and Fernando (2001) similarly show that while KHI is the key mechanism for wave breaking in stratified shear flows that the wave field does not always have clean billows, especially once waves start interacting.

4.) This figure has been incorporated into what is now Fig. 2 and a description of the date and location, SM6, are added to the caption.

5.) I have added the instrument locations to this caption.

6.) We would prefer to retain the LES as part of this paper because we rely, in part, on the dynamical reasoning from the simulation to help develop the conceptual model that we present in the summary. The simulation was included in the first place because of insufficient data to fully detail the flow across the Traverse mountains.