A Complex Terrain Induced Heavy Snow Event in Southeast Idaho

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Introduction

After a day of rain in eastern Idaho, a cold front passed through the Snake River Plain (SRP) early on the morning of 26 November 2005 bringing a sharp drop in temperatures. Surface winds picked up significantly behind the cold front, with southwesterly gusts up to 40 mph. The rain changed to snow behind the front before ending with little accumulation. Common with strong cold frontal passages in eastern Idaho, northwest winds flowing out of the mountain valleys north of the SRP began to converge with the southwesterly winds in the upper SRP (Andretta and Hazen, 1998). Radar echoes first appeared over the central Idaho mountains north of Idaho Falls (KIDA). As the convergence zone pushed southward, snow spread into the SRP and eventually reached the Pocatello (KPIH) area. Snake Plain Convergence Zones (SPCZ) typically (Andretta, 2002) pass through in a couple of hours and produce only a few inches of snow before moving into the southeast highlands where they dissipate. This SPCZ stalled over the southern SRP, producing snowfalls exceeding 12 inches in parts of Pocatello.

Discussion

Snow spread east to west along the SPCZ during early stages, and by 1400 UTC was approaching the KPIH area. Surface data (Figure 1) from 1400 UTC shows the southern SRP was dominated by gradient and terrain driven west to southwest winds, while the northern SRP was being invaded by northwest winds flowing out of the mountain valleys. This set up a strong convergence zone running the length of the upper SRP. Figure 2 shows the radar echoes associated with the SPCZ at 1300 UTC. The SPCZ was advancing southward, and was expected to pass through Pocatello around 1800 UTC, with a wind shift to the north and snow ending shortly thereafter. The initial forecast called for 1 to 2 inches of snow in the Pocatello area.

During the afternoon hours, strong westerly winds continued across the southern SRP and snow accumulated in the Pocatello area with little change in intensity. While the leading edge of the SPCZ precipitation had moved into the southern highlands, redevelopment was occurring along the back edge. Radar loops indicated redevelopment of a back-building convective nature along axes *perpendicular* to the SPCZ. Two prominent axes are visible (highlighted) in radar imagery from 2214 UTC (Figure 3). Axis A passed through the RDA (KSFX), directly into the Portneuf River Valley (Pocatello) which tapers to a narrow gap between mountains at the south end of Pocatello. Axis A remained stationary through the afternoon and evening, with snow finally dissipating around 27/0200 UTC. Pocatello received snowfall amounts ranging from a low of 4 inches at the airport (outside the Portneuf Valley), to 14.5 inches in the southern part of the city.

Conclusions

The perpendicular axes of convergence appeared to be terrain induced – aligning with the northwest to southeast valleys emptying into the northern SRP from the central Idaho mountains.

Radar data indicates that the strong, channeled northwest winds flowing out of these valleys created convergence “hotspots” along the perpendicular to the stalled SPCZ. One of these convergence axes became aligned with the Portneuf valley and remained stationary for an extended period of time. The combination of this stationary precipitation band and orographically enhanced flow in the precipitation-bearing layer generated heavier snowfall amounts than typical SPCZ events.

Model solutions provided few clues regarding the nature of this event; however, the ETA12 did provide some hints that may have pointed to a longer duration event. As early as the 26/0600 UTC run, a cross section (Figure 4) over KPIH indicated strong low level forcing associated with low level wind convergence and strong upward omega until 27/0600 UTC. In addition, the ETA12 may have also provided an indication for timing the end of the event. The cross section indicated that drier air embedded in northwest flow aloft would descend to low levels around 27/0200 UTC. This coincided with the end of the event. Unfortunately, models did not provide clues regarding the magnitude of the event and snowfall amounts.

Figures on following pages.

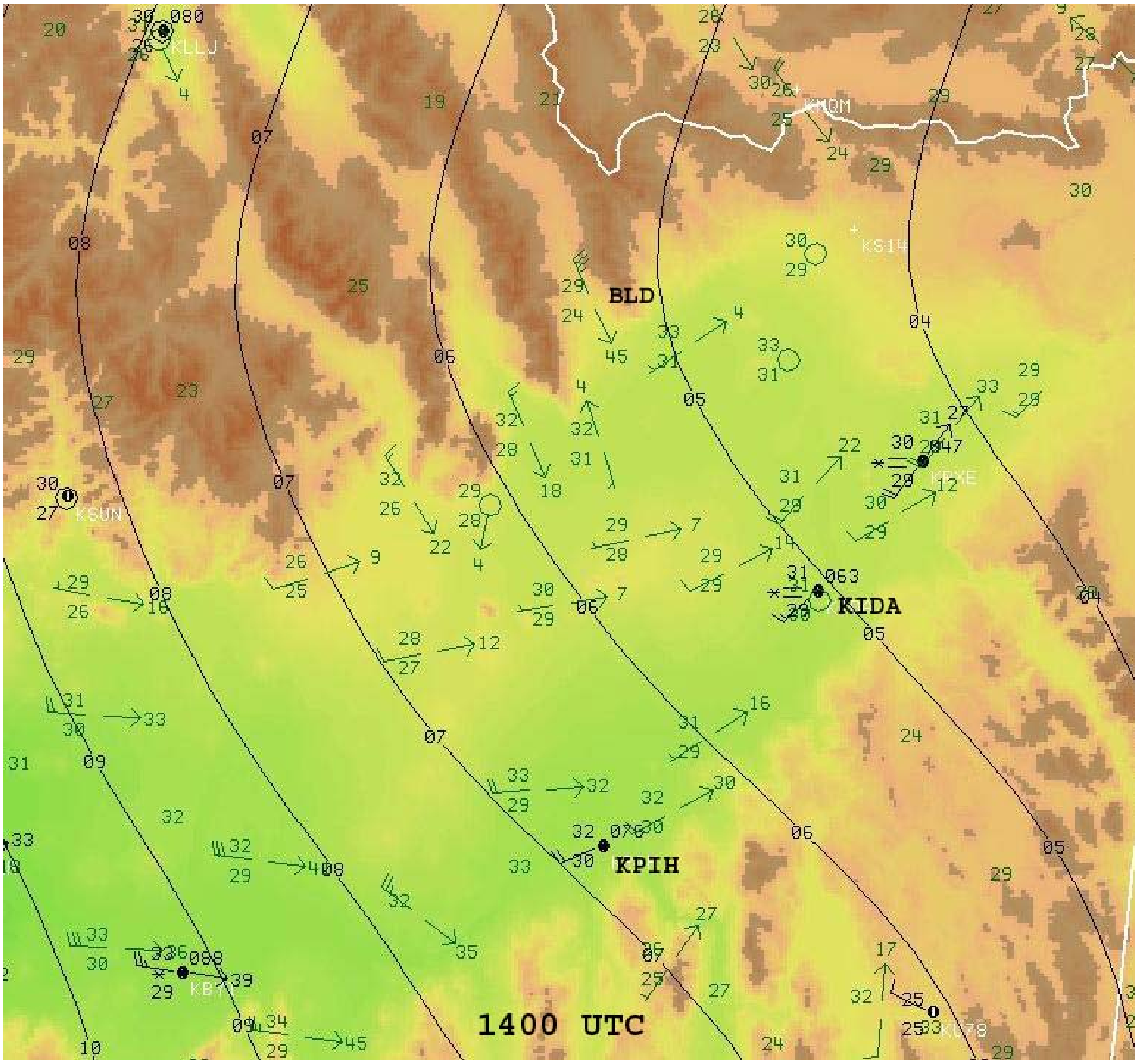

Figure 1. 1400 UTC 26 November 2005 Surface Observations.

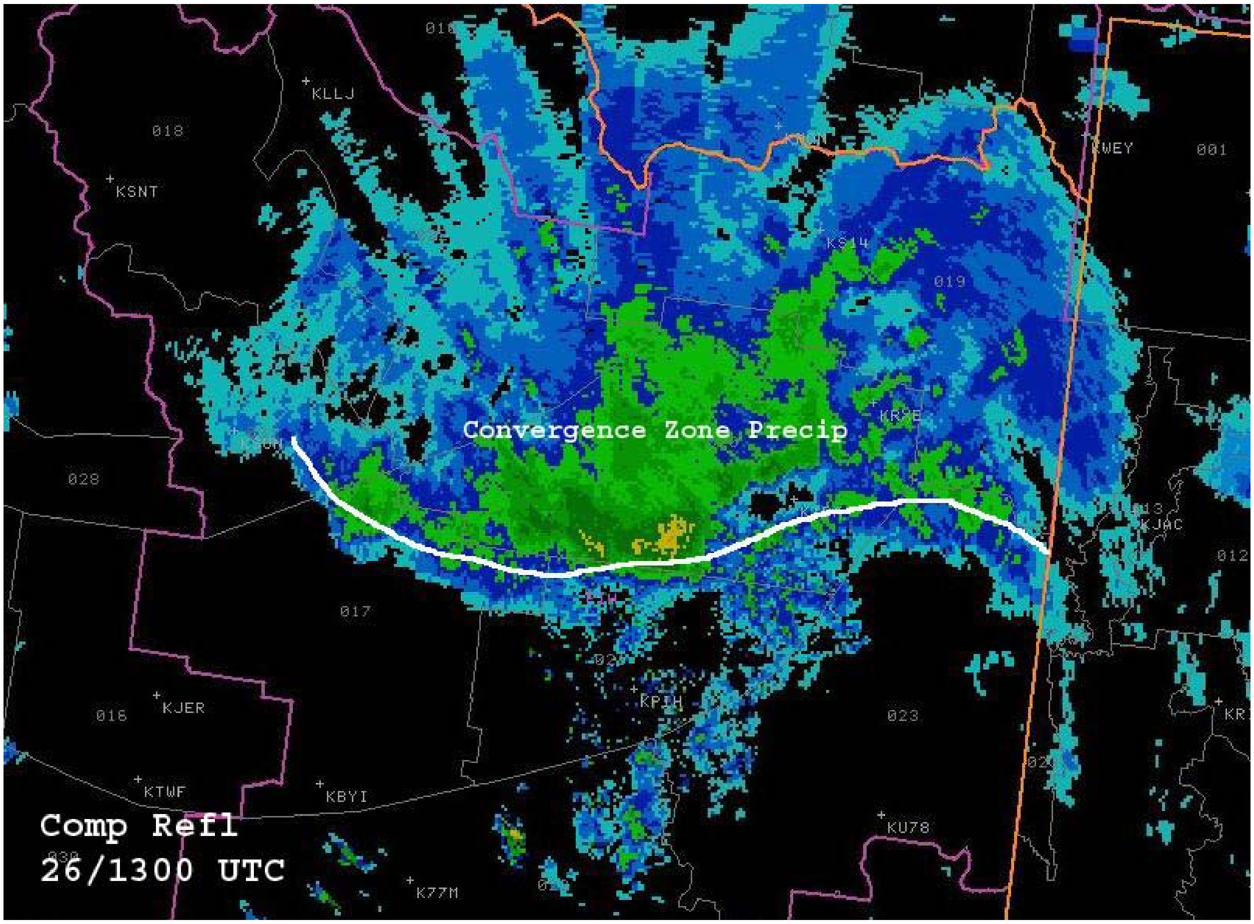

Figure 2. 13 UTC 26 November 2005 Composite Reflectivity

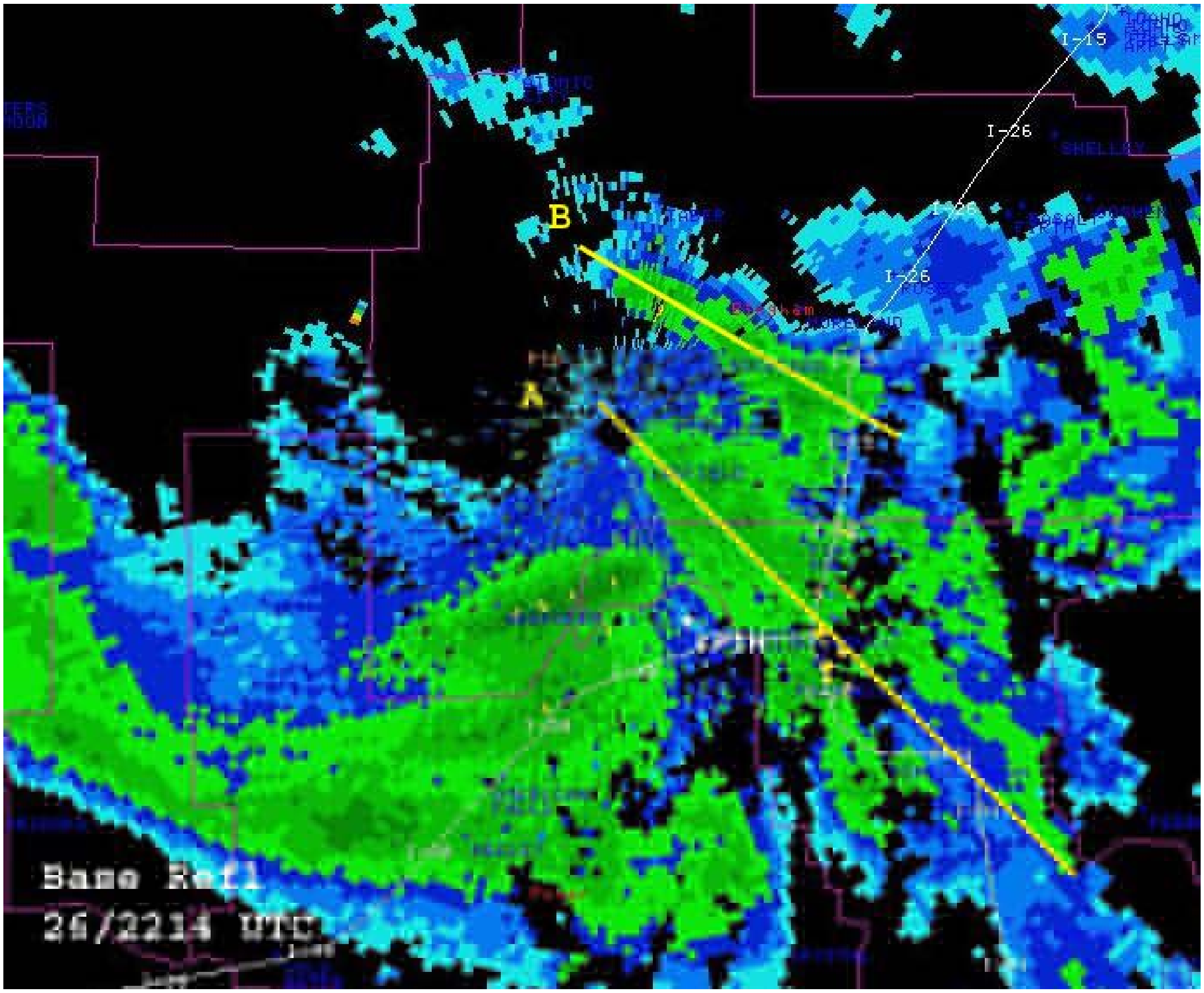

Figure 3. 2214 UTC 26 November 2005 showing convective axes.

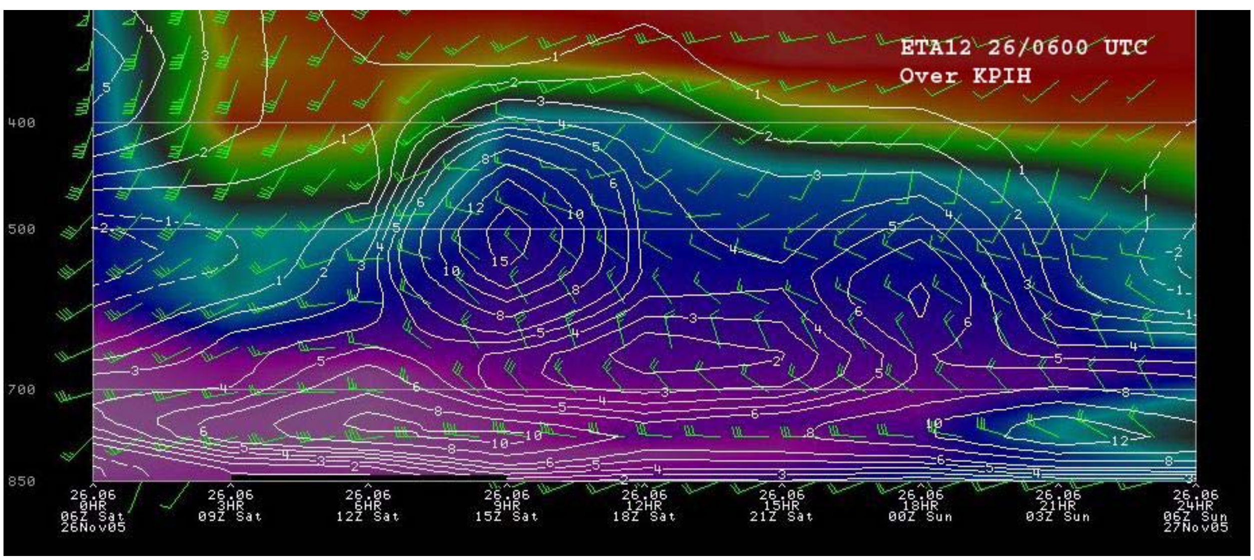

Figure 4. 26 November 2005 0600 UTC ETA12

References

Andretta, T. A. and Hazen, D. S., 1997: Doppler Radar Analysis of a Snake River Convergence Event. *Weather and Forecasting*, Vol. 13, 482-491.

Andretta, T. A., 2002: Climatology of the Snake River Plain Convergence Zone. *Natl. Wea. Dig.*, **26:3, 4,** 37-51.