The purpose for taking this image was to visually show a contrail that has been in the atmosphere for a significant amount of time without breaking up or dissipating. Also the goal of the image was to show how the paired vortices coming off of the wings of the aircraft affect the contrail. This was the only image taken to show this phenomenon. There were no "false starts" for this visualization. This is the 1st cloud image assignment and was an individual assignment.

The image was taken at 9:52 A.M. on January 30th, 2010 at the top of the Game Creek Express lift at Vail Mountain. The altitude that the picture was taken from was 10,981 ft above sea level. The location is marked with a red star in Figure 1.

Figure 1: Location of Image[1]

The camera was pointing in the southwest direction and was approximately pointed 60 degrees above the horizon.

At the time of the captured image, there were no other clouds immediately surrounding the area. The cloud in the picture is a contrail, which is shorthand for condensation trail. A contrail is technically a cirrus aviaticus cloud, which is an unnaturally created cirrus clouds. The cirrus aviaticus is composed of ice crystals that are formed from the exhaust gasses of the engine of the aircraft. The winds were extremely low (gusting to 2 mph from the West) on the morning of the captured image. The temperature was 20 degrees F at the time of the image[2]. Since I was only in Vail for the morning of the captured image, I have no knowledge if the weather pattern was the same. According to the skew-T plots, the atmosphere was stable. The skew-T plots are represented in Figure 2. Due to the stability of the atmosphere and given conditions at the time, the only clouds that were expected to be seen at the time were contrails. This was the case as

[1] 2009-2010 Vail Trail Map, http://www.vail.com/mountain/mountain-tours/~/media/Vail/Files/Winter_TrailMap_0910/Winter_TrailMap_0910.ashx

[2] Bachelor Gulch Weather History, http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KCOEDWAR2&month=1&day=30&year=2010

well. According to the skew-T plot, the clouds are estimated to be around 26,000 ft (corresponds to around 350 milibar) the winds were in the range of 28-32 knots from the northwest[3].

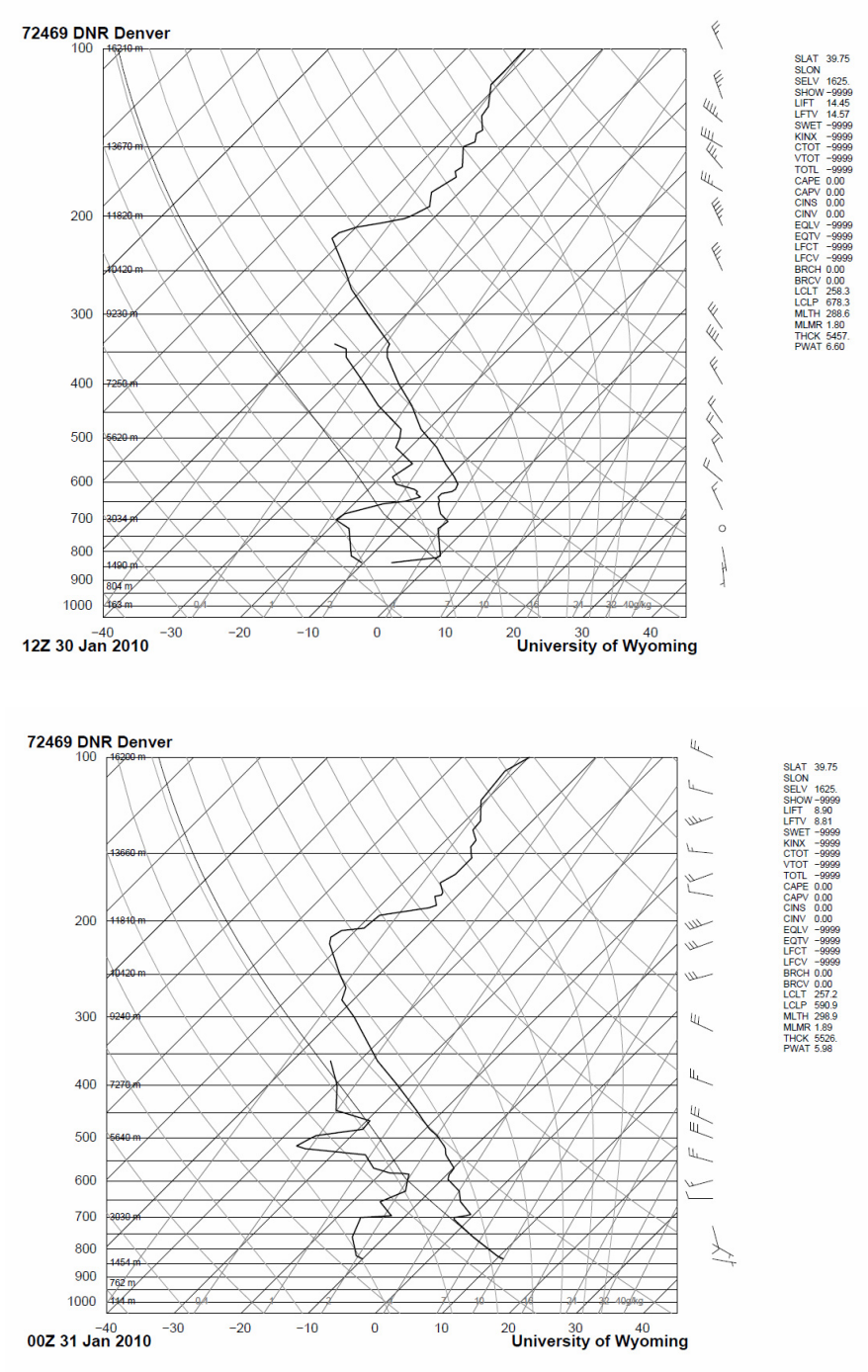

Figure 2: Skew-T Plots[4]

[3] http://weather.unisys.com/upper_air/skew/details.html

Due to the atmospheric conditions at the time, the contrails in the air were not dissipating at all and were staying present for hours. This led to the contrails growing in size, becoming much wider. The imaged contrail is a cloud that is being pushed down slowly by the paired vortices off the wing tip. As it is moving downwards, there were winds interacting with the contrail. The combination of the vortices, the winds aloft, and the motion of the contrail due to the vortices caused the "wispy fingers" to come off of one side of the contrail.

The field of view for the captured contrail is 36.299 degrees by 24.576 degrees[5]. I am estimating the contrail to be around 26,000 feet in altitude which would mean the contrails are at least 15,019 feet away. The exposure specs are as follows:

- Exposure: 1/320
- Aperture: f/8
- ISO: 200
- Focal Length: 36mm

The camera used was a Nikon D90 DSLR and the lens used was a Nikkor 18-200mm f/3.5-f/5.6. The image is 4288 pixels by 2848 pixels. The image was edited in Adobe Photoshop Lightroom 2. The image was altered by reducing the exposure by 0.83 and by changing the contrast and saturation by +27 and -23 respectively. No cropping of the original image was done.

The image shows a contrail that has stuck around for a significant amount of time. By the time I had imaged it, I know it had been around for at least 50 minutes and I did not see the original aircraft that created the contrail. It shows how the contrail interacts with the vortices as well as winds aloft. I like how the image turned out and has the wisps of ice particles coming off of the one side. I think the physics are represented as well as they could be for a contrail. The wind was very steady and not changing directions and the atmospheric conditions allowed the flow to develop over a significant amount of time. I wish I would have had more contrast in the picture to make the colors within cloud kind of "pop". I also wish I wouldn't have lowered the saturation in the image; it kind of makes the blue look bland and not really standout. The one thing I could have done to show this interaction a little better would have been to take a time lapse of this or a video, I think that would have been a far greater demonstration of what was happening.

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[4] http://weather.uwyo.edu/cgi-bin/sounding?region=naconf&TYPE=PDF%3ASKEWT&YEAR=2010&MONTH=01&FROM=3012&TO=3100&STNM=72469

[5] http://www.howardedin.com/articles/fov.html