

Snow Transport Through Wind

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I will start by saying that I could not make the times that team Zeta met for the final project. So I bought a fish tank, and got some sub par fluids images. Now I have an empty fish tank. So I decided to use the natural apparatus of the atmosphere and capture, document snow transport. This is something that I pay attention to regularly for it determines the snowpack. This is vital information for journeying into the backcountry of Colorado to earn some turns. Avalanches obey the laws of physics, so knowledge is key in not getting oneself buried. Colorado has the most fatal avalanche records in the US, this is because of the high altitude, light dry snow, population density of outdoorsy folk, and most important; wind. High wind speeds are due to the high elevation which transport snow, refine it, load it, and creates slabs that cause avalanches. The human factor is needed to trigger these most of the time but often can happen naturally. There is an angle of repose at being 32-25(grey area-conditions dependent) degrees. 37.5 is the magic number where most slides happen, and above 50 degrees is too steep for slabs to form. So if you keep it under 30 degrees and pay attention to what is above you, you are always safe. But to ski steeps, one needs to pay attention to detail. So my point is that I pay a lot of attention total snow accumulation, and the high winds that follow a storm. Paying attention to the underlying layers is also vital, but I won't get that far off topic. So I documented snow transport of the wind with a mini DV camera and a digital still camera. Fluid mechanics is revealed in the movement, turbulence of the snow suspended in the air.

The flow visualization used simply documenting a natural occurrence. The suspended snow traced streamlines in the air. The snowflakes have a small enough mass that the advection due to the wind is more significant than the downward acceleration of gravity. The streamlines both describe laminar and turbulent flows.

There was good natural lighting for it was early in the morning with the sun shining from the East up the valley. Different flow velocities are seen as the trees slow the flow that it touches. It gives the affect as if you are looking through water. The picture taken is of snow contrails off of the continental divide. The winds were blowing at around a steady 40 with gust of 75. What is happening with the snow in this photo is the winds from the West are picking up the snow and transporting to leeward slope(eastern slope of the divide, ones we like to ski). It snowed a foot the day prior, but with the intense wind loading that foot becomes a couple of feet in certain areas. This loading causes convexities much like in a sand dune, but snow is much more cohesive than sand. It will eventually avalanche if it is a steep slope(35-45 degrees). At the top of the ridge cornices and wind slabs are forming. These firm consolidated layers of snow are formed from snowflakes that are grinded and compacted by the strong winds.

The field of view, for the short video, is framed by two trees probably twenty five feet apart. I used a Sony Mini DV camera to record the footage. It uses 340k pixels and completely automatic settings. The image when downloaded was having issues with contrast. You could not see the volume of the blowing snow well, so I darkened the image a bit and upped the contrast in Imovie. The still camera is a Sony Cyber Shot dsc-h5 7.2 mega pixel digital camera. It shoots 3072 pixels by 2304 pixels which amounts to 7077888 pixels. The camera does not have a RAW function, with the FINE setting being the highest and the one that I used. I shot it at 80 ISO, shutter at 1/1000 at F8. I did no altercations in Photoshop and the field of view is about 3 miles.

My only regret is that I had nicer equipment to document with. Thinking about flow visualization made me look up at the snow on the ridges, I began to notice more. I have included some stills that I think represent this snow transport and have compiled a movie that shows it as well. I think a neat project would be to time elapse a cornice growth. Snow loads with wind 10 times as fast than it can precipitate, so I think the growth of cornices or drifts would be very curious to watch. Nature can sculpt landscapes with all of its power, and these sculptures interest me. Not only do I enjoy it from a recreational standpoint but as a painter. I can't help but try to capture these beautifully sculpted landscapes with a paint brush. It is enlightening to try to capture the fluidity of nature through painting, photography. All landscapes are formed by fluid mechanics, brushed and polished to its immense beauty.

