“Clouds the Second”

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The final independent flow visualization project illustrates the uncontrollable flow of the clouds. The intent of the image was to capture cumulus clouds on a typical day.

The picture setup is shown in figure 1 below. The lighting was provided curtsey of the sun. The picture was taken at about 2:15. Cumulus clouds form extremely low (usually below 6,000 feet) and are the lowest clouds besides fog with a lifetime of five to forty minutes. These clouds can be distinguished by their flat bases and big, white, puffy, marshmallow like top appearance. Cumulus clouds indicate fair weather; however, it is easy for these clouds to develop into cumulonimbus which are the clouds indicative of thunderstorms. Cumulus clouds are formed by convection or thermals (buoyant bubbles of air) that rise from the earth’s surface. As the air rises, it cools and the water vapor inside the air condenses forming cloud droplets. These clouds initially have sharp edges but over time they become less defined due to cloud erosion. Cloud erosion is the cooling of neighboring air due to evaporation along the cloud’s edges. When this air is cooled it sinks, inhibiting convention around the cloud and making expansion of the cloud impossible. This explains why there is plenty of blue sky between these clouds and also, why their lives are so short. Also notice the wispy clouds in the background. These are cirrus clouds made from ice high in the atmosphere. These clouds indicate that a cold front is on the way. The spatial resolution is the minimum distance for two distinct objects to be recognized. When photographing clouds the spatial resolution is not only going to be poor because the clouds are so far away and the smallest features are not visible but also because the spatial resolution is degraded by bad focus and it is very hard to focus on clouds. The photograph of the cloud has excellent temporal resolution because from the camera’s point of view the cloud is moving so slowly that it is standing still.

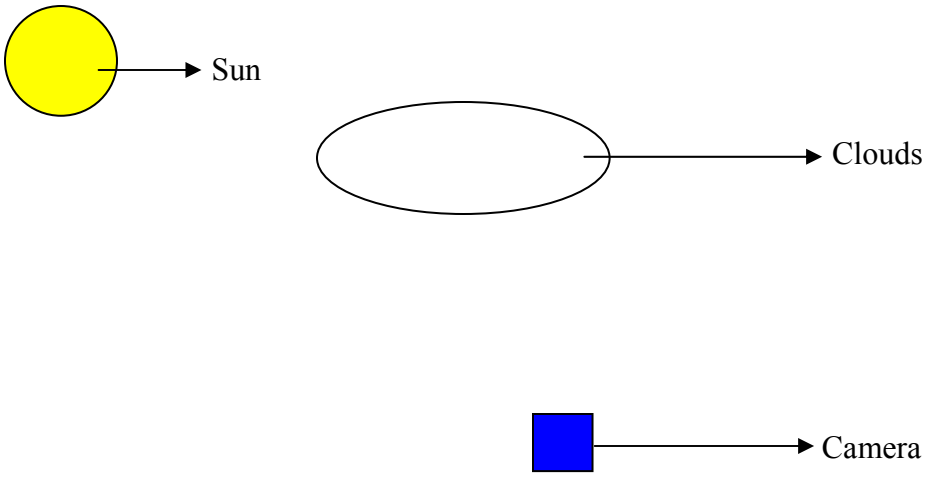

Figure 1: Picture setup

The instability of the atmosphere allowing the formation of clouds provided the visualization technique for this photograph. As mentioned previously, the clouds in this picture are made up of water vapor. The bright sunshine provided the necessary light and made the use of a flash unnecessary.

The width of the picture is about 800 meters at a distance of about 5,500 feet away. The camera used is a Fujifilm FinePix digital camera 2600 zoom with 7.5 zoom (3x optical and 2.5 x digital), which is equivalent to 38-114 mm on a 35 mm camera. It has a resolution of 2.0 megapixels, a focal distance of approximately .8 m to infinity and an aperture of 3.5/F8.7. The sensitivity is equivalent to ISO 100 and the shutter speed is in automatic is ½ to 1/1000 seconds. The camera is made for an amateur so the manual settings are limited. The cloud picture was taken in the manual mode and the settings were as follows: flash-off, exposure compensation-0, white balance-shooting outdoors in fine weather or sunshine and quality-normal.

I chose this photograph because of the light in it. I love how some of the clouds are dark and some are bright. I also like the wispy cirrus clouds in the background juxtaposing the central, puffy cumulus clouds. The only thing that I would change is the quality of the photo. With more resolution and better focus, the photo may have revealed more detail. Also, a better camera with more manual settings would have created a better picture. I am interested in a further study of the sky. I would like to have a group take

pictures of different parts of the sky at the same time and then classify all the clouds. From this we could see how well we could predict the weather.

References:

1. http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/cld/cldtyp/vrt/frcu.rxml
2. http://www.usatoday.com/weather/wcumulus.htm
3. http://www.ucar.edu/educ_outreach/webweather/cloudpic5.html
4. http://www.informationsphere.com/html/2330.htm
5. http://www.met.tamu.edu/class/Metr304/Exer10dir/midclouds.html
6. http://www.ems.psu.edu/Courses/Meteo200/lesson1/clouds.htm
7. http://www.dcresource.com/reviews/fuji/finepix2600-review/
8. http://www.fujifilm.com/JSP/fuji/epartners/bin/FinePix_2600_Zoom_Brobure.pdf