Eric Larson

Flow Visualization

10/4/04

Photography of Clouds Report

Purpose

The purpose of the Photography of Clouds assignment is to observe the atmosphere and capture an image of a cloud that has formed due to atmospheric instability. The main goal is to visually document a cloud formation that is the result of certain atmospheric phenomena. The cloud will be classified and its general formation behavior will be examined to get a better understanding of the how the cloud came to be. Visually, a cloud can best be viewed when it is surrounded by a dark background. So characteristics of the original image (i.e. contrast, brightness, color balance) will be varied in order to produce a more dramatic image.

Cloud Classification

Given in **Figure 1** is the original image of the cloud that is the main subject of this report:

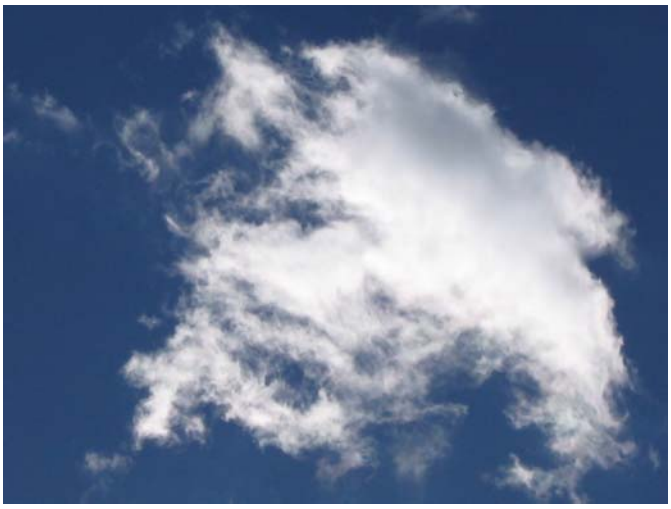

Figure 1

After comparing the cloud in **Figure 1** with other documented clouds, it can be classified as a Stratocumulus Cloud. Stratocumulus clouds are formed in wind streams moving in the same general direction as the wind. Since these wind streams are close to the Earth's surface there is a friction or drag that causes turbulence that takes the form of eddies. If there is sufficient moisture (i.e. very small water droplets or water vapor) in the air these low lying stratocumuli will form either in clusters or, occasionally, by themselves. Some important characteristics of stratocumulus clouds include little vertical development, a lack of defined edges, and the fact that they are not as full and rounded as normal cumulus clouds. Also, stratocumulus clouds are usually found in the lower atmosphere and move much quicker than normal cumulus clouds. It is clear that the cloud in **Figure 1** is a stratocumulus cloud because the edges are not defined and the cloud moved relatively quickly across the sky with respect to other cloud formations.

Photographic Technique

- The original picture was taken at about noon and the camera was at an angle of sixty degrees above the horizontal.
- Distance from object to lens – 20,000 ft
- Lens focal length and other lens specs –
    - 8x Digital Zoom
    - ISO Speed of 50
    - Unsure of focal length because of zoom setting
- Type of camera – Digital 4.0 Megapixel Canon A80 Powershot

- Exposure specs

  - Estimated cloud velocity – 5 m/s

  - Distance traveled by cloud in shot 5 m/s * .0005 = .0025 meters. Since the field view is large the picture is time resolved.

    i. Aperture – auto aperature between 4.5 and 8

    ii. Shutter speed – 1/2000 second

    iii. Film type – N/A for digital camera

- Photoshop processing – for final image "auto levels" and "sharpen" were used to bring out subtle shadows, contrast and create a more dramatic image overall (See **Figure 2**).

The image in **Figure** 2 is a clear representation of low level cloud formation in the atmosphere. It shows how the combination of turbulent flow and moisture content in the air can cause such interesting examples of condensation. The fluid physics involved with this image are turbulent flow of wind stream in the lower atmosphere. Another important factor is the buoyant force on warmer air and the condensation of the water vapor at a given elevation. I was able to document and examine a type of cloud in the atmosphere so I feel that I have fulfilled my initial intent of the image. I would like to improve the clarity of the image but overall it seems to work. I would really like to get a picture of a cumulonimbus or another type of cumulus cloud because they have such a defined form and are very interesting to look at.

“Final Image”

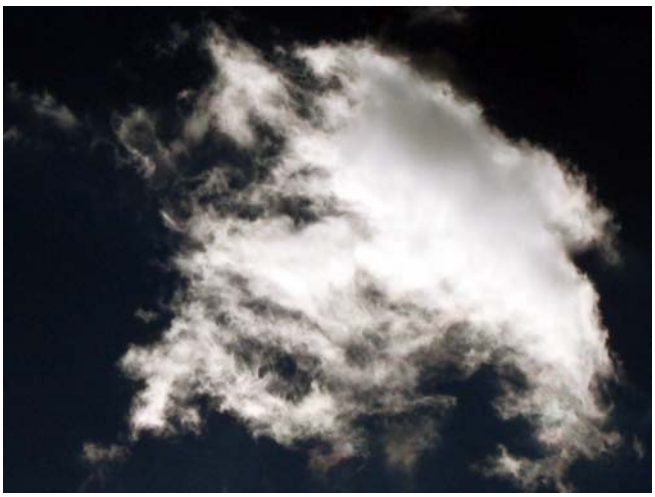

Figure 2