

*High altitude measurement of atmospheric aerosols using image analysis*

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Weber State University's High Altitude Reconnaissance Balloon for Outreach and Research (HARBOR) team flies several high altitude balloons throughout the year to gather atmospheric information at altitudes as high as 100,000 feet. One of the payloads flown is an array of commercially available cameras. In the past, the images taken during flights have been used for aesthetic and outreach purposes, our goal is to repurpose these high altitude images for use in atmospheric measurements such as turbidity and particle distribution. Several images are chosen to be analyzed based on altitude, clarity of the photograph, and the inclusion of some high contrast ground targets, such as a dark field next to a light dirt parking lot. The high contrast targets in the images are then analyzed to obtain a visual contrast value. The visual contrast is related by a version of Beer-Lambert's law yielding an exponential relationship between the altitude and the visual contrast. By cross-referencing this data with humidity data, particle count, and location data from our other payloads, we have developed a unique method of quantifying atmospheric turbidity. These measurements have been compared to laboratory testing of image resolution using a custom aerosol chamber.