

## Auroral Imaging with Commercial DSLR Cameras near Athabasca, Canada

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Commercial DSLR Cameras have permitted a revolution in auroral imaging, due to their digital nature, low cost, high sensitivity, and other advantages. Athabasca University Geophysical Observatory is in the subauroral zone, but due to the high altitude of auroras, usually has optical auroral activity visible on its northern horizon. We have operated mostly northward-pointing DSLR cameras, either with a field of view of about 50 degrees, or nearly allsky coverage. Since the “allsky” cameras we have used in fact do not cover the whole sky, we have tilted them northward to cover that horizon preferentially. We have livestreamed images to <http://autumn.athabascau.ca/auroracamhd.htm>. Ironically, the northward orientation of cameras at the observatory has precluded us capturing images of the newly-recognized STEVE phenomenon, which is normally located south of our location. However, STEVE events found on auroral imaging campaigns in the Edmonton area can often be identified on EMCCD images from our Keo Scientific intensified allsky camera. Then we can combine the images, showing for example, that STEVE is roughly 200 km above the surface. The auroral imaging campaigns have used three fullframe DSLRs to produce partial sky images that are then stitched together using software to produce approximately 10k-pixel color auroral movies, suited for use with modern planetarium projector systems as impressive high resolution sky shows. Most recently we have used a Sony Alpha 7000 camera, taking advantage of the fiber optic internet link to the Athabasca site, to make livecasting of auroras to Japan possible. Since reliability of cameras with moving parts has been a problem, we hope that the direct imaging Sony Alpha camera will be more reliable than the “reflex” cameras previously used. To get around the problem of moving parts wearing out under the very high frame rate, we also tested inexpensive CMOS-type sensors controlled by single-board computers, and sending a digital image stream, but so far with different, but still present, reliability problems. Another issue faced is that in continuous operation, a large amount of data is produced due to the high pixel count of the cameras. We will discuss technical issues and challenges, but also show some results of DSLR operation over the years, including auroral movies and high resolution still frames.

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