

Fine-scale visualization of aurora in a wide area using color digital camera images from the International Space Station

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Various ground-based and space-based imagers have been used to observe aurora borealis and australis. So far, however, it has been difficult to observe the detailed spatial structure of auroras in a wide area with sufficient spatial and temporal resolution. Since the photographs taken from the International Space Station (ISS) have sufficient spatial and temporal resolution, it is possible to visualize the fine-scale structures of aurora in a wide area. A calibration of imaging parameters of the photographs using star lights was proposed by a previous research. The accuracy in the timestamp was not guaranteed by the method based on the star lights because the position of the star lights in the image did not change with elapsed time. Thus, it is still difficult to use the mapped data for studying fast variations of aurora, for example pulsating aurora (PsA). Therefore, in this study, we calibrated the images from the ISS using city lights which change their apparent positions with elapsed time. In order to validate the calibration method using city light positions, we mapped two PsA events in the photographs to the geographical coordinate, and compared with those from ground-based all-sky imagers in Alaska and Canada. We found that the approximate shape of discrete aurora and the temporal variation of PsA derived from the ISS images are consistent with those from the ground-based observation. The accuracy in the timestamp is less than 0.5 sec and that in space in the direction perpendicular to the line of sight of the camera is within 5 km. In the presentation, we will also address how the mapped full-color images can be used for studies of PsA in the future work.

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