Research Papers

Destriping of hyperspectral image data: an evaluation of different algorithms using EO-1 Hyperion data

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Abstract

Abstract. Data from the Earth Observing-1 Hyperion instrument were used. Apart from atmospheric influences or topographic effects, the data represent a good choice in order to show different steps of the preprocessing process targeting sensor-internal sources of errors. These include diffuse sensor noise, striping, smile-effect, keystone effect, and spatial misalignments between the detector arrays. For this research paper, the authors focus on the striping effect by comparing and evaluating different algorithms, methods, and configurations to correct striping errors. The correction of striping effects becomes necessary due to imprecise calibration of the detector array. This inaccuracy affects, especially, the first 12 visual and near-infrared bands and also a large number of bands in the short-wave infrared array. Altogether six destriping techniques were tested on the basis of a Hyperion dataset covering a test site in Central Europe. For the final evaluation, various analyses across all Hyperion channels were performed. The results show that some correction methods have almost no effect on the striping in the images. Other methods may eliminate the striping, but analyses show that these algorithms also alter pixel values in adjacent areas, which originally had not been disturbed by the striping effect. Being the first comprehensive comparison study of different destriping algorithms, this paper gives valuable recommendations on how to reach reliable results in further analyses of hyperspectral data.

Figures in this Article

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