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ANNEX -1 TEMPLATE FOR PAPER SUBMISSIONS (PAPERS TO BE PROVIDED IN MS WORD)

Image-derived MTF method and MTF compensation

for

CBERS-02B WFI imager

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Abstract: In this paper, a method to evaluate the in-flight MTF (Modulate Transfer Function) of the WFI (Wide Field Imager) on CBERS-02B is presented and the WFI images are restored. The CCD is another payload on CBERS-02B with high spatial resolution. Using the CCD images as high resolution images, the two-image comparison approach is applied to determine the MTF of the WFI with a pair of images acquired over Beijing on Nov. 10, 2007. As the results, MTF values in three directions are derived. The MTF values at Nyquist frequency in cross-track, in-track and 45° directions were respectively about 0.43, 0.52 and 0.35 for red band and 0.30, 0.46 and 0.36 for near-infrared band. Image-derived MTF values are applied to calculate the half bandwidths of the WFI. The results indicate that the instant fields of view of the WFI in the cross-track, in-track and 45°-track directions were respectively 1.188 pixels, 1.165 pixels and 1.281 pixels for red band, and respectively 1.258 pixels, 1.195 pixels and 1.326 pixels for near-infrared band. Weiner filter model is used to perform the MTF compensation for WFI images. The results show that the restored image seemed clearer and contained more detailed information.

Key words: CBERS-02B, CCD, MTF, the two-image comparison approach

Commented [*1]: Title: no more than 12 words;

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Commented [*3]: key words: 5—8 keywords

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1 INTRODUCTION

The MTF is a fundamental imaging system design specification and system quality metric often used in remote sensing. The MTF is acquired by performing FFT (fast fourier transform) on PSF (point spread function) and normalizing its modulation. It results from the cumulative effects of the instrumental optics (diffraction, aberrations, focusing error), integration on a photosensitive surface, charge diffusion along the array and image motion induced by the movement of the satellite during imaging (Leger ,et al., 2003). The MTF can be tested accurately in the lab, but it will change due to the refocus of the sensor and the MTF of the atmosphere. Thus, in-flight MTF determining and compensation is a vital step for the comprehensive applications of WFI images.

...The spectral band response functions of two corresponding spectral bands of CCD and WFI were similar, which were shown in Fig.1 and Table 1....



Fig. 1 Spectral band response functions of CCD and WFI

Table 1 The red and near-infrared bands of CCD and WFI

CCD bands	CCD /nm	Centre wavelength /nm	Spatial resolution /m	WFI bands	WFI /nm	Centre wavelength /nm	Spatial resolution /m
3	630—690	671.96	19.5	1	630—690	657.74	258
4	770—890	843.1	19.5	2	770—890	831.98	258

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