

# On-orbit calibration and performance assessment of Chinese high resolution satellites based on the Baotou site

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## Abstract

Currently there are multiple series (like ZY, GF, SV, etc.) of high resolution Chinese satellites on-orbit, which play more and more important roles in remote sensing applications such as precision agriculture, urban management, object identification and large-scale surveying. To promote quantitative application level of Chinese high resolution satellite data, on-orbit calibration and imaging performance assessment of the onboard sensor are most valuable and necessary work to be carried out. However, finer spatial resolution will bring about the problem of increasing heterogeneity among adjacent pixels, which causes that most natural scene sites used to calibrate low or medium resolution sensors will be unsuitable for high resolution satellite calibration. On the other hand, the high resolution feature of the sensor makes it possible to put many test targets (undertaking different performance assessment tasks) in one site. Accordingly, to meet requirements of high resolution sensor calibration & performance assessment, the National Calibration and Validation Site for High Resolution Remote Sensors (the Baotou site, for short) was built up, and a variety of multi-functional targets are integrated in this site, including: the greyscale/knife-edge dual functional target, the fanshaped target, the microwave/optical dual functional bar-shaped target, the artificial GCP array, multi-type natural objects, etc. Furthermore, the automatic radiometric calibration system was developed to raise calibration frequency, which can produce sensor-independent TOA spectral radiance at 1nm spectral resolution and 30-minute interval. Using these test targets and the automatic radiometric calibration system, on-orbit calibration & performance assessment were carried out for a variety of Chinese high resolution satellites, and several typical cases were presented. More high resolution satellites are planned to be continuously launched in future. The effort of on-orbit calibration and performance assessment based on targets in the Baotou site will effectively improve data quality consistency between Chinese high resolution satellites, and between Chinese satellites and international satellites.

**Keywords** - Calibration targets and sites