The effect of noise in AHS thermal bands in the retrieval of pixel temperature

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The AHS is an 80-bands airborne imaging radiometer, operated by INTA in different remote sensing projects. It has 63 bands in the reflective part of the electromagnetic spectrum, 7 bands in the 3 to 5 microns range and 10 bands in the 8 to 13 microns region. The noise in these thermal channels is in a first approach estimated by the standard deviation of values recorded on two thermally controlled blackbodies, a typical value being 0.25 degrees. However, a deeper knowledge of the noise is required for specific projects which require increased radiometric resolution.
In the framework of a project to detect hydric stress in olive trees, we have attempted to measure crown temperature with the maximum resolution and accuracy. Therefore, we have made a complete characterization of the noise, computing different figures to look for spectral, spatial or temporal correlation or systematic patterns that could help in the image restoration. The result of this effort is presented in this work. The main outcome of the study is that spectral averaging using a priori emissivity values could reduce the noise in some extent while preserving spatial and radiometric resolution. In addition, it is discussed if image restoration should account not only for noise but for radiometric artifacts like the subtle ringing caused by the instrument electronics, and also the role of spatial sampling issues.