ULITMATE-Subaru : GLAO system overview and its performance analysis

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Abstract

ULTIMATE-Subaru is a next facility instrumentation program at the Subaru Telescope. The goal of this project is to enhance the wide-field capability of the Subaru Telescope at the near infrared (NIR) wavelength using the wide-filed NIR instruments supported by the ground layer adaptive optics (GLAO). The GLAO system will uniformly improve the seeing size down to 0.2" at K-band in FWHM over the 20-arcmin field of view. The preliminary design of the GLAO system has been successfully completed in November 2022. In the preliminary design, we perform the detailed performance analysis using an analytical approach to understand the behavior of the GLAO system and then to specify the requirements of the GLAO sub-systems for their preliminary design. In this presentation, we will briefly introduce the GLAO preliminary design first, then present the basis of our analytical approach, and finally show the result of the GLAO performance analysis, including the GLAO performance and its uniformity over the field-of-view as function of several observation parameters, wavefront error budget, its sensitivity to the Cn2 and wind profile, and sky coverage analysis.

Keywords: GLAO, simulation, analytical approach

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