Supplemental Material for Denoising-Aware Adaptive Sampling for Monte Carlo Ray Tracing

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ABSTRACT

In this supplementary document we include detailed results of the four experiments from the main paper as error plots for each of the 20 scenes, along with bar plots for the ground-truth comparisons.

CCS CONCEPTS

• **Computing methodologies** → **Ray tracing**.

KEYWORDS

adaptive sampling, denoising, neural network, progressive rendering, variance

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1 DETAILED EXPERIMENT RESULTS

Detailed results, as individual plots for each of the 20 scenes, for the *Path Tracing with Denoising*, *Post-Correction Denoising*, and *Tone Mapping*, *Comparison to Ground-Truth Sampling* experiments are shown in Figures 3, 4, 5, 6, and 7. Figures 1 and 2 also detail the results of the *Comparison to Ground-Truth Sampling* experiment as bar plots. Experiments performed on scenes from Bitterli [2016].

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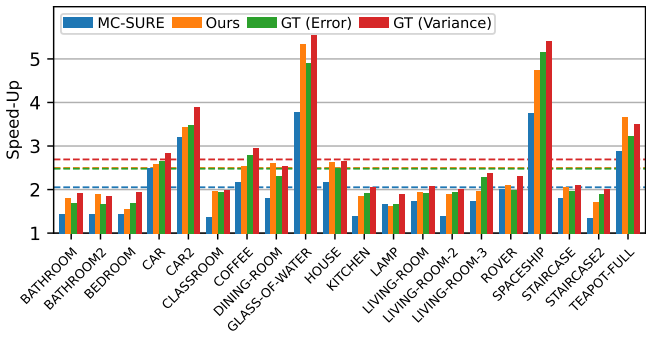

Figure 1: Speed-up (in terms of average sample count) over uniform sampling in equal-error terms using relMSE, after mean 256 samples per pixels. Our proposed methods compared to adaptive sampling using ground-truth error and variance (which are costly to obtain in practice).

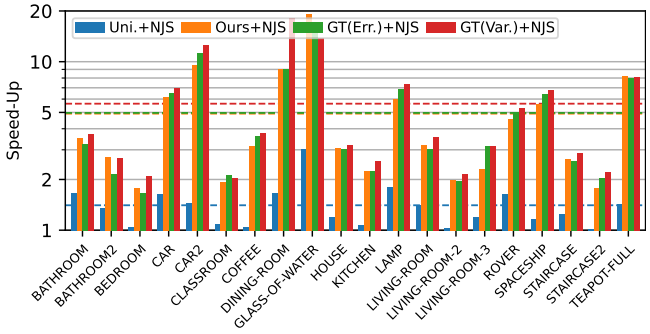

Figure 2: Speed-up (in terms of average sample count) over uniform sampling in equal-error terms using relMSE, after mean 256 samples per pixels, of our proposed method compared to adaptive sampling with ground-truth error and variance (which are costly to obtain in practice), when combined with the post-correction technique of Gu et al. [2022].

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Alexandr Kuznetsov, Nima Khademi Kalantari, and Ravi Ramamoorthi. 2018. Deep adaptive sampling for low sample count rendering. *Computer Graphics Forum* 37, 4 (July 2018), 35–44. https://doi.org/10.1111/cgf.13473

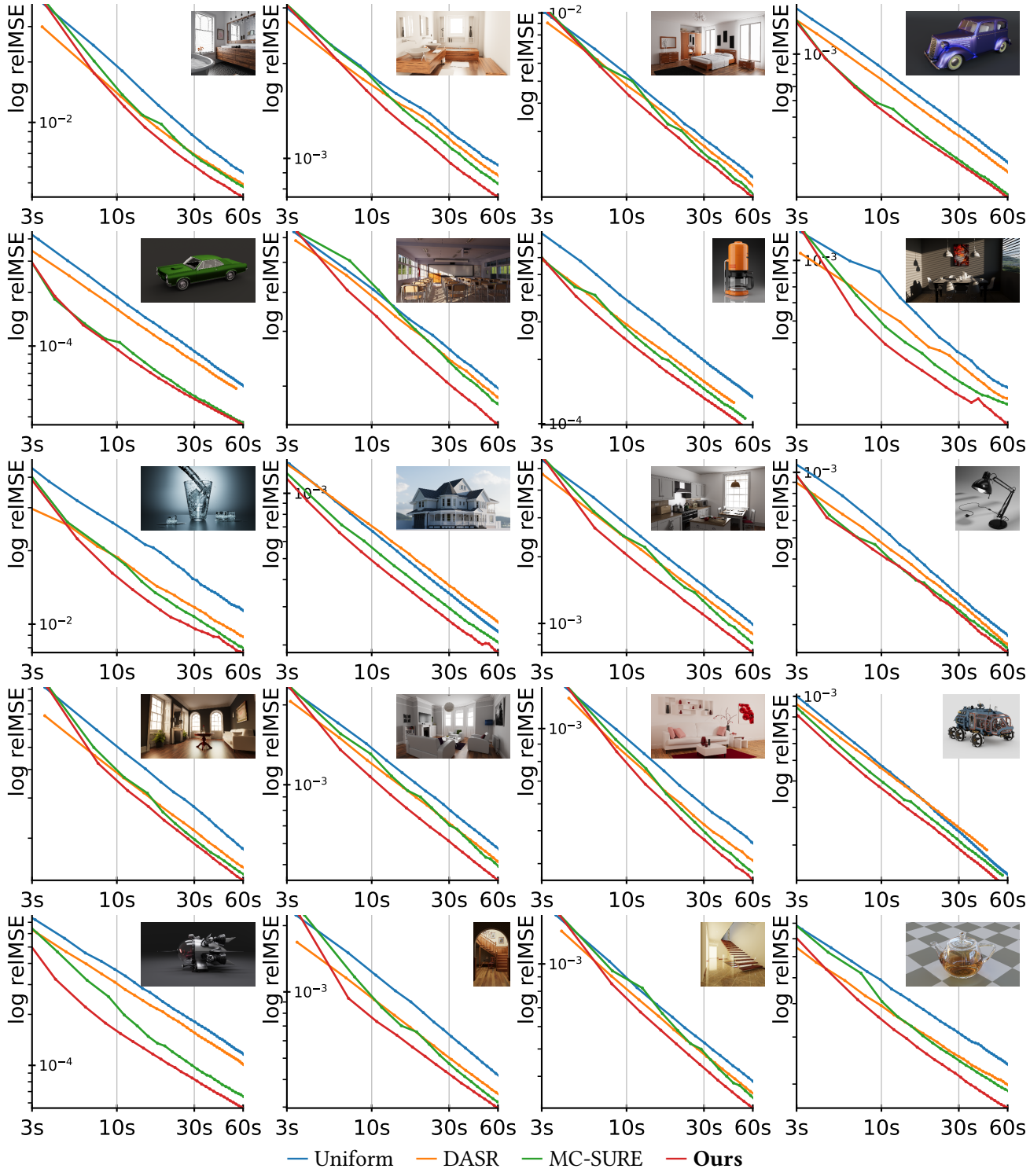

Figure 3: Complete results from our experiment comparing different adaptive sampling methods on 20 path traced scenes.

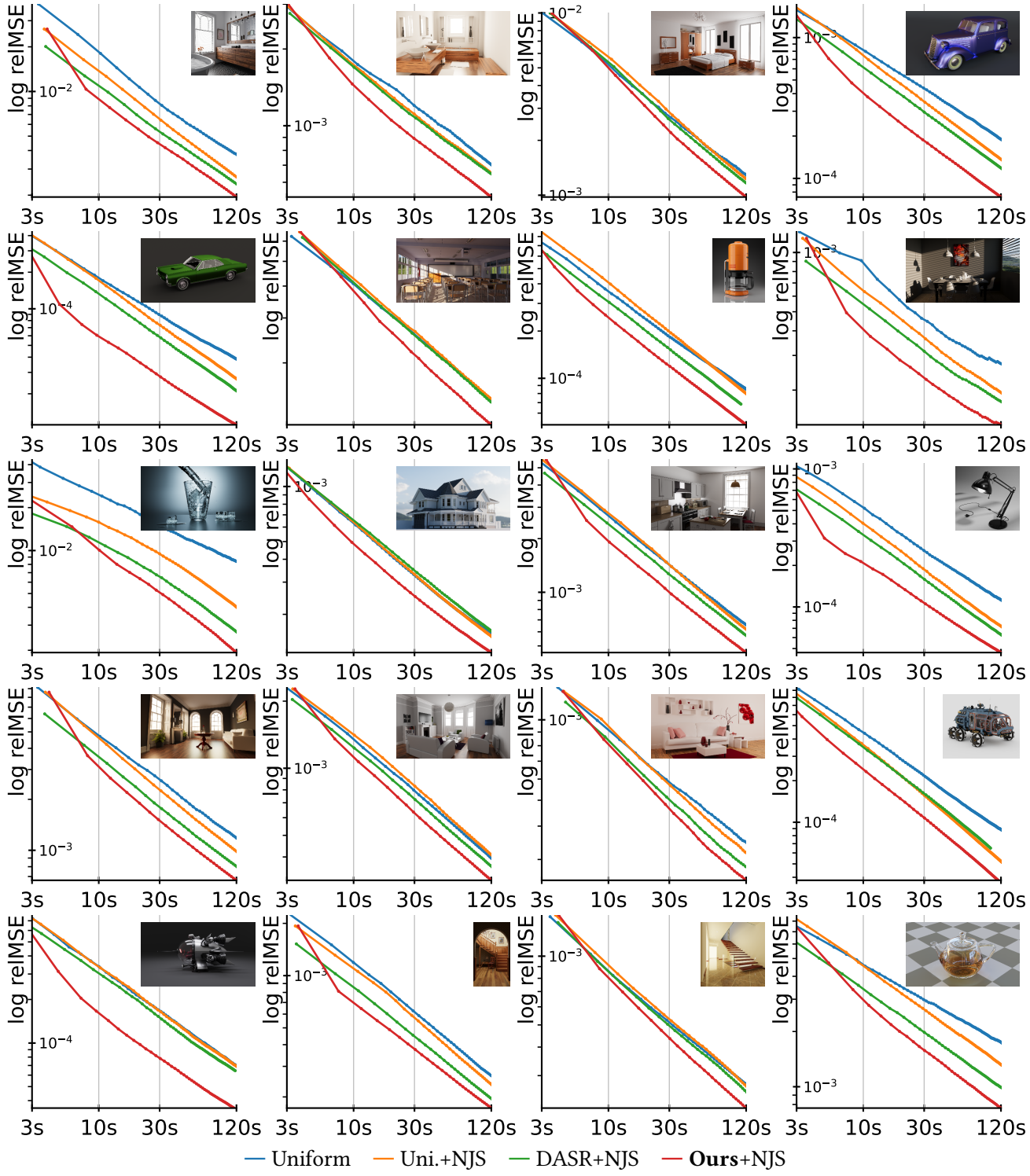

Figure 4: Complete results from our experiments combining two different adaptive sampling techniques, DASR [Kuznetsov et al. 2018] and our DNNV-based method, with a denoising post-correction method [Gu et al. 2022].

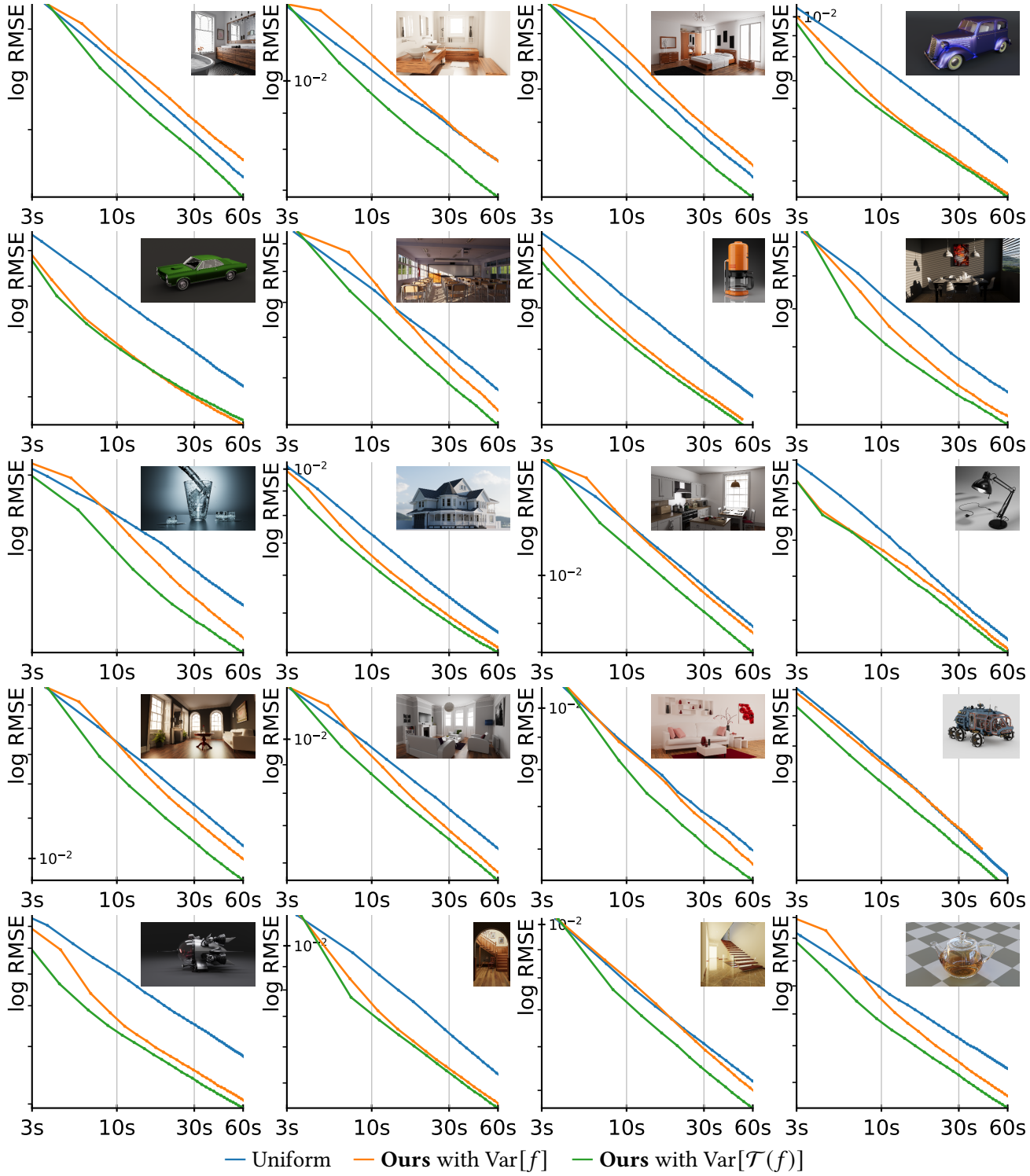

Figure 5: Complete results from our experiment investigating the impact of including the tone map operator $\mathcal{T}$ in the variance estimate used for adaptive sampling. In this experiment we use root mean square error (RMSE) on tone mapped images.

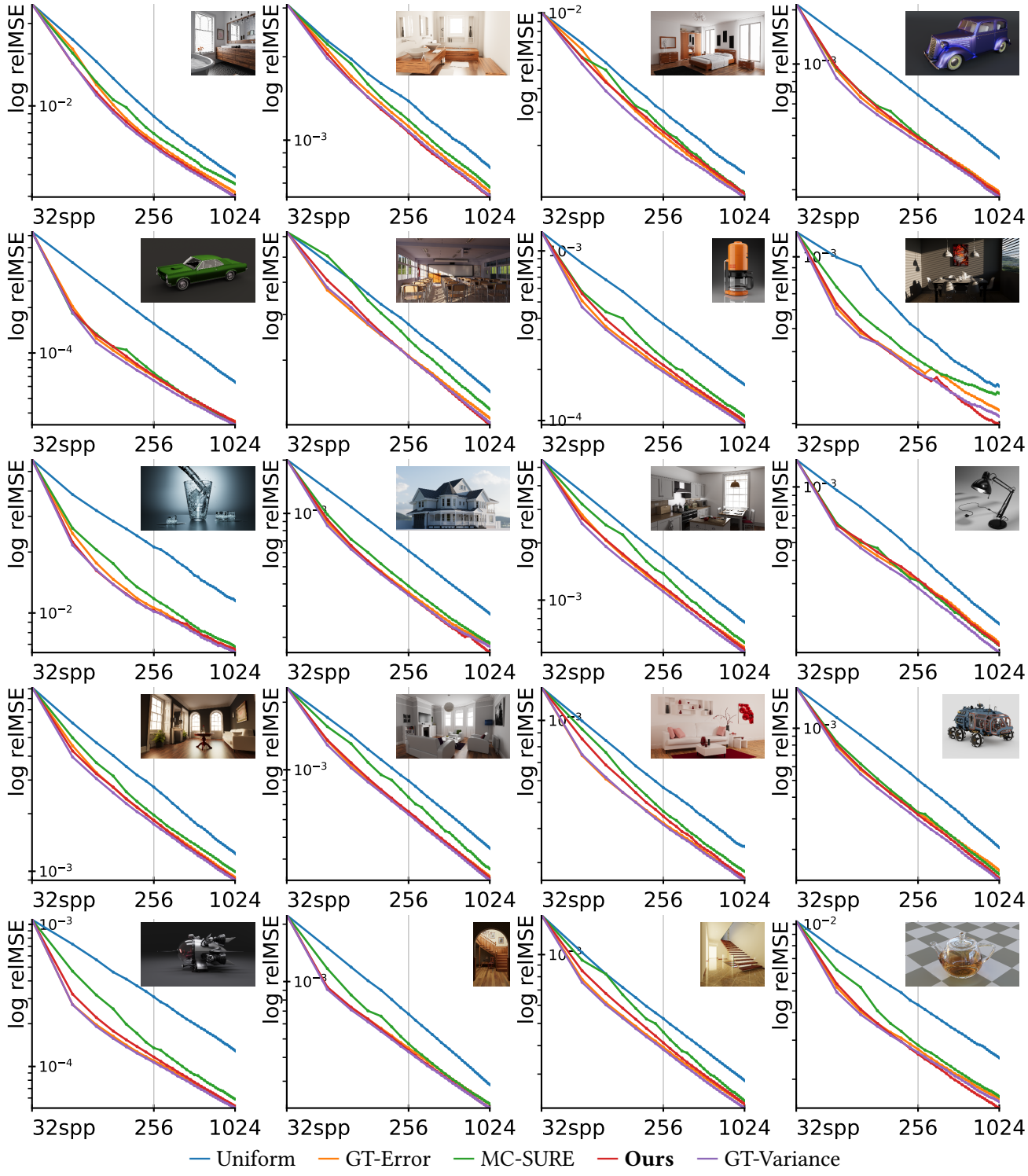

Figure 6: Complete results from our comparisons to adaptive sampling using ground-truth error and variance. Note that obtaining the ground-truth estimates in this case involves computing 32 independently rendered images, and that this would not make for a practical adaptive sampling method.

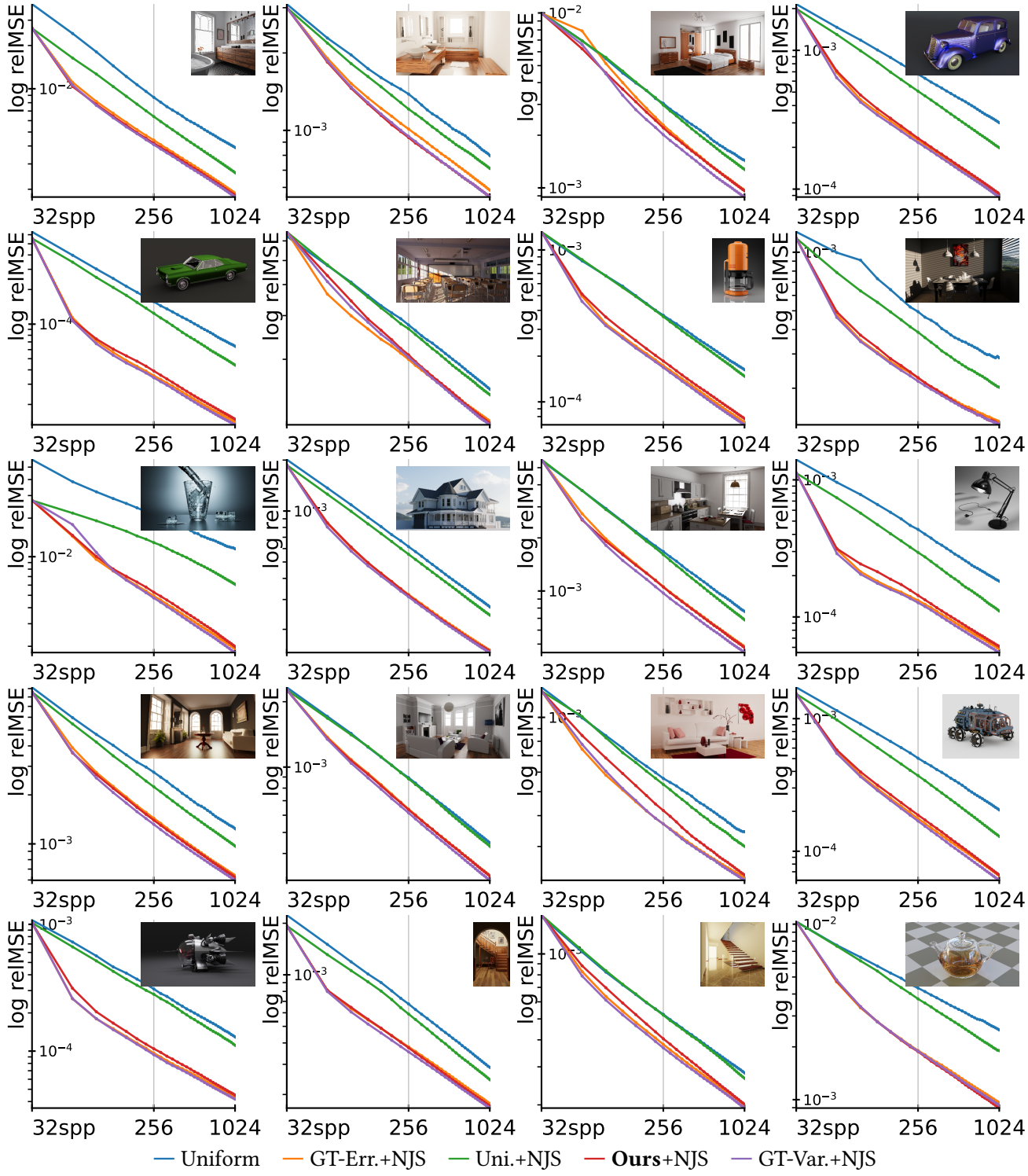

Figure 7: Complete results from our comparisons to adaptive sampling using ground-truth error and variance, when combined with the post-correction technique of Gu et al. [2022]. Note that obtaining the ground-truth estimates in this case involves computing 32 independently rendered images, and that this would not make for a practical adaptive sampling method.