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Plain Language Summary: New precipitation rate retrieval algorithms (version 06A) for the GPM Dual-frequency Precipitation Radar are developed. Major changes from the previous algorithms (version 03B) include the introduction of the relation between precipitation rate and mass-weighted mean diameter (R–D_m relation), non-uniform beam filling correction, DSD database (single-frequency algorithms only), and the ZfKa method (dual-frequency algorithm only).

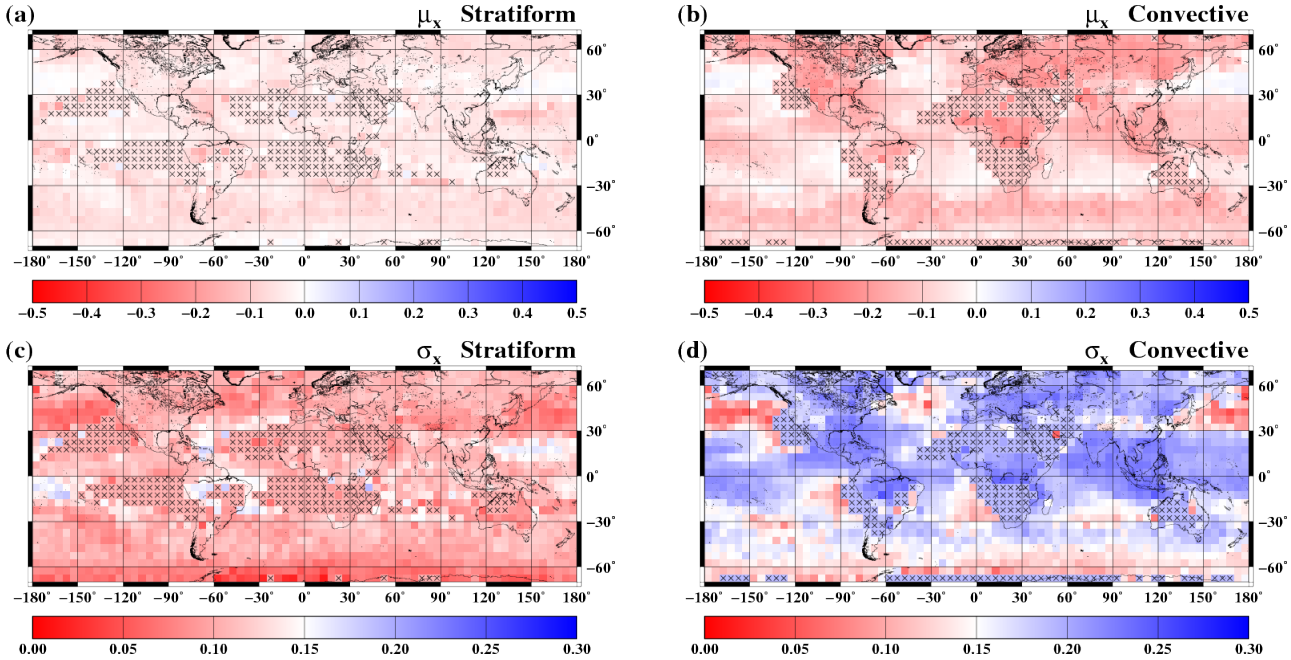

Figure 1. Sample DSD database. All surface types for June. (a) and (b) show the average of $\log_{10}\varepsilon$ (μ_x) and (c) and (d) show the standard deviation of $\log_{10}\varepsilon$ (σ_x). (a) and (c) represent stratiform precipitation and (b) and (d) represent convective precipitation. If there are fewer than 100 samples (shown by cross symbols), the values are replaced by the global value.

- The R–D_m relation is used instead of the k–Z_e relation for KuPR algorithm and also for the KaPR algorithm and the dual-frequency algorithm, meaning that the three algorithms share a common constraint on the DSD.
- The DSD database includes the statistics of the adjustment factor for the R–D_m relation (ε) and has been introduced to convert information obtained from the dual-frequency algorithm for application to the single-frequency algorithms.
- The dual-frequency algorithm has the advantages that it can select KuPR or KaPR for the precipitation echoes and use additional evaluation criteria such as the ZfKa method and Dual-frequency Surface Reference Technique (DSRT). For more than 90% of the precipitation pixels, either the ZfKa method or DSRT is used.