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| **Type the title of your abstract**Nexus of Certain Model-Based Estimators in Remote Sensing Forest Inventory |
| Remote sensing (RS) facilitates forest inventory across a wide range of variables required by the UNFCCC as well as by other agreements and processes. The Conventional model-based (CMB) estimator supports wall-to-wall RS data, while Hybrid estimators support surveys where RS data are available as a sample. However, the connection between these two types of monitoring procedures has been unclear, hindering the reconciliation of wall-to-wall and non-wall-to-wall use of RS data in practical applications and thus potentially impeding cost-efficient deployment of high-end sensing instruments for large area monitoring. Consequently, our objectives are to (1) shed further light on the connections between different types of Hybrid estimators, and between CMB and Hybrid estimators, through mathematical analyses and Monte Carlo simulations; and (2) compare the effects and explore the tradeoffs related to the RS sampling design, coverage rate, and cluster size on estimation precision. Primary findings are threefold: (1) the CMB estimator represents a special case of Hybrid estimators, signifying that wall-to-wall RS data is a particular instance of sample-based RS data; (2) the precision of estimators in forest inventory can be greater for non-wall-to-wall RS data compared to wall-to-wall RS data; (3) otherwise cost-prohibitive sensing, such as LiDAR and UAV, can support large scale monitoring through collecting RS data as a sample. These conclusions may reconcile different perspectives regarding choice of RS instruments, data acquisition, and cost for continuous observations, particularly in the context of surveys aiming at providing data for mitigating climate change. |

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