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How ground-based observations can support satellite greenhouse gas retrievals

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Global society will eventually accelerate efforts to reduce greenhouse gas emissions in a variety of ways. These would likely involve international treaties, national policies, and regional strategies that will affect a number of economic, social, and environmental sectors. Some strategies will work better than others and some will not work at all. Because trillions of dollars will be involved in pursuing greenhouse gas emission reductions – through realignment of energy production, improvement of efficiencies, institution of taxes, implementation of carbon trading markets, and use of offsets – it is imperative that society be given all the tools at its disposal to ensure the ultimate success of these efforts. Providing independent, globally coherent information on the success of these efforts will give considerable strength to treaties, policies, and strategies.

Doing this will require greenhouse gas observations greatly expanded from what we have today. Satellite measurements may ultimately be indispensable in achieving global coverage, but the requirements for accuracy and continuity of measurements over time are demanding if the data are to be relevant. Issues such as those associated with sensor drift, aging electronics, and retrieval artifacts present challenges that can be addressed in part by close coordination with ground-based and in situ systems. This presentation identifies the information that ground-based systems provide very well, but it also looks at what would be deficient even in a greatly expanded surface system, where satellites can fill these gaps, and how on-going, ground and in situ measurements can aid in addressing issues associated with accuracy, long-term continuity, and retrieval artifacts.