

Hybrid DWL.: Simulations of Expected Data Products for Use in OSSEs

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Dave Emmitt (Simpson Weather Associates) spoke on the simulation of expected data products from a hybrid DWL. Support has come from the IPO for hybrid DWL studies. Dave emphasized that this is largely an end game study, geared toward meeting the objective wind data requirements (for this reason, cross-track sounding is required.) A convenient starting point are the reference systems developed with IPO and GTWS support, since these provided an idea of what would be needed to meet threshold requirements using the direct detection (DD) and coherent lidars. Choosing a nominal altitude for the hybrid sensor at 400 km, Dave pointed out that only certain requirements are relaxed when going from coherent DWL to hybrid - but these are important: reduced optics, scanner, and associated power. Similarly, for a nominal DD (i.e., double edge filter at 355 nm), the power and optical diameter are reduced when designing for molecular but not aerosol. Since pleasant surprises sometimes occur in the form of enhanced aerosols but not in molecular density, the DD portion is not driven to cover the lower troposphere. The concept instrument has (rough) requirements of 0.5 J and 0.5 m optics. The assembled hybrid would be ten times smaller than the stand-alone DD and 70 times smaller than the corresponding CD. It would have one vertical coverage hole at ~ 4 km, which Dave argues might be addressed using an enhanced CD mode, or use of an advanced DD approach, e.g., photon recycling. The next planned activities include conducting the JPL hybrid cost study, working to develop a hybrid technology roadmap with LaRC and GSFC, and performing scaling analysis of TODWL results to help clarify (in part) what the hybrid capabilities might be.

Notes

Bruce Gentry commented that while the DD portion focuses on molecular signal, it does not preclude aerosol. He also cautioned that the Dave's efficiency figures might be a catchall to account for several factors including light recycling.