Comments on a national lidar network for PBL Profiling: Motivation, Progress, Challenges, and Prospects

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For more than thirty years, the US weather community has recognized and have been recommending a creation of a national boundary layer profiling network. In the decade following the year 2000 – active NAS recommendations and major regional experiment have been made including the 2009 National Academy Committee report "Observing the Weather and Climate from the Ground Up: A Nationwide Network of Networks" and the subsequent Thermodynamic Profiling Technologies workshop (TPT) in 2011. These reports made a set of recommendations for operational lidar network in the US. These reports encouraged investment in the NCAR DIAL instrumentation and nudged NOAA in testing the viability of the existing operational national Automated Surface Observing System (ASOS) operated by National Weather Service (NWS) and Federal Aviation Authority (FAA). The latter work is still painfully being debated and limping to be an active operational lidar profiling network. Since 2011, however, several agencies in the US, including NASA, have been actively researching the PBL profiling network viability. However, each agency is focused and/or starting from their agency's "mandate" and the physics of PBL profiling seems to be secondary. I will argue that the only way a meaningful advance in addressing this problem is when the policy is guided by the PBL physical processes to be studied. I will present examples of cases that capture the physical processes in the PBL and the instrument(s) that are capable in sampling these cases. I argue that what is needed is for the different agencies to put as secondary "the agency mandate" and start from what the physics of the problem demands in terms of sampling. I demonstrate that a joint multi-agency based network and effort is needed if the last frontier of observation – PBL profiling network. Lidars profiling and instrumentation are central to the planning and sampling.