(78-240418-B) **NOAA Global Monitoring Laboratory's Measurement Network and Data Products Supporting PBL Research**

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Measurements supporting atmospheric boundary layer research are a timely focus area across many NOAA laboratories. Within the NOAA Global Monitoring Laboratory (GML), the Radiation, Aerosol and Cloud Division (G-RAD) has been active over the past five years to supplement our SURFRAD observatories with additional instrumentation capable of providing boundary layer measurements and retrievals. Since 2019, all seven SURFRAD observatories and two Mobile SURFRAD systems now operate Vaisala CL51 ceilometers, producing measurements of cloud fractional occurrence, cloud base height, and aerosol attenuated backscatter profiling. Combined with a suite of the highest-quality surface radiation and value-added radiative flux analysis processing (RadFlux), our team is working on developing improved retrievals of a variety of value-added data products that can be used for boundary layer science and evaluation. This poster will introduce the main measurements and value-added processing from G-RAD's SURFRAD observatories. We will highlight two applications of machine learning to advance the retrievals of 1) daytime boundary layer height; and 2) cloud regimes using measurements and advanced data products all contained within the SURFRAD observatory framework. Examples of boundary layer science applications related to boundary layer height, SEB, and different cloud regimes will be introduced.

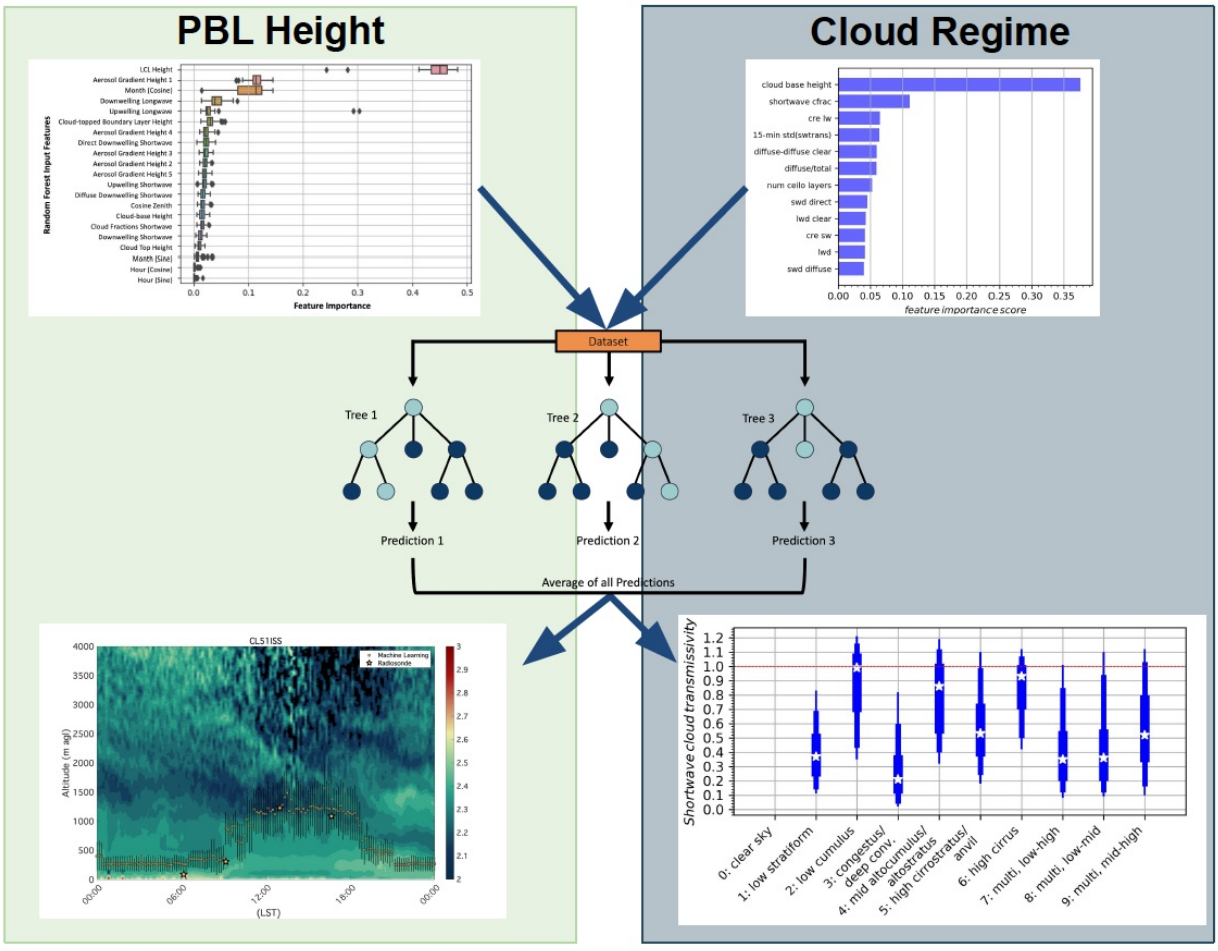

Figure 1. Cartoon representation of the random forest machine learning models developed to retrieve Planetary Boundary Layer Height (left) and Cloud Regimes/Types (right). Optimized sets of input features (observations) are fed into the hypertuned random forest decision trees, resulting in regression and classification determination of PBL Height and Cloud Regime/Type.