**A lifetime effort at Cimone to understand the black carbon climatology though observations and modelling**

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Black carbon (BC) is a key short-lived climate forcer, with atmospheric concentrations influenced by both emissions and meteorological processes. In the Mediterranean—where climate change and air quality challenges intersect—understanding the drivers of BC trends is critical. This study investigates whether *observed BC reductions are solely due to air pollution control policies or if emerging climate-related feedback are influencing its variability*.

We analyze 17 years (2007–2024) of equivalent BC (eBC) observations from the Monte Cimone global GAW station (2165 m a.s.l.), within the ACTRIS framework. Over 4478 days of valid measurements were used to quantify long-term trends and seasonal patterns. FLEXPART simulations were employed to assess emission sources and transport regimes, while ERA5 reanalysis data provided insight into meteorological drivers at synoptic and climatological scales.

Results show a clear seasonal cycle, with higher summer eBC linked to increased boundary layer influence and biomass burning. A general long-term decrease (~ –0.09 µg m⁻³ per decade) was observed, though multiple and short tendencies raise the question of whether climate change is enhancing BC transport or reducing removal efficiency.

This study combines long-term observations, atmospheric transport modelling, and reanalysis data to explore the evolving balance between policy-driven reductions and climate feedback affecting BC.