

Figure S1. Meteorology (a), Time series of gases and particles measured at Madrid–Barajas airport during autumn campaign (WP4) of AVIATOR (b) & (c)

Unit	Species	Mean	SD	Min	Max
$\mu\text{gm-3}$	eBC	1.07	0.7	0.11	2.9
	NO _x	22.7	15.3	<DL	64.3
	SO ₂	4.1	1.3	0.5	7.5
	O ₃	53.9	30.3	0.15	118
	PM _{2.5}	9.35	3.4	4	18.4
	PM ₁₀	16.43	5.6	7	29.4
	SV-OOA	1.6	1.02	0.03	4.3
	AlkOA	0.64	0.27	0.009	1.19
	MO-OOA	2.35	1.09	0.22	4.5
mgm-3	CO	0.23	0.04	0.13	0.36
	THC	2.3	0.09	2.1	2.5
$^{\circ}\text{C}$	Temperature	19.4	2.4	12	24.8
m/s	WS	1.5	1	0.48	5.4

Table S1. statistical details of meteorology, gases, particles and obtained factors concentrations for the entire campaign.

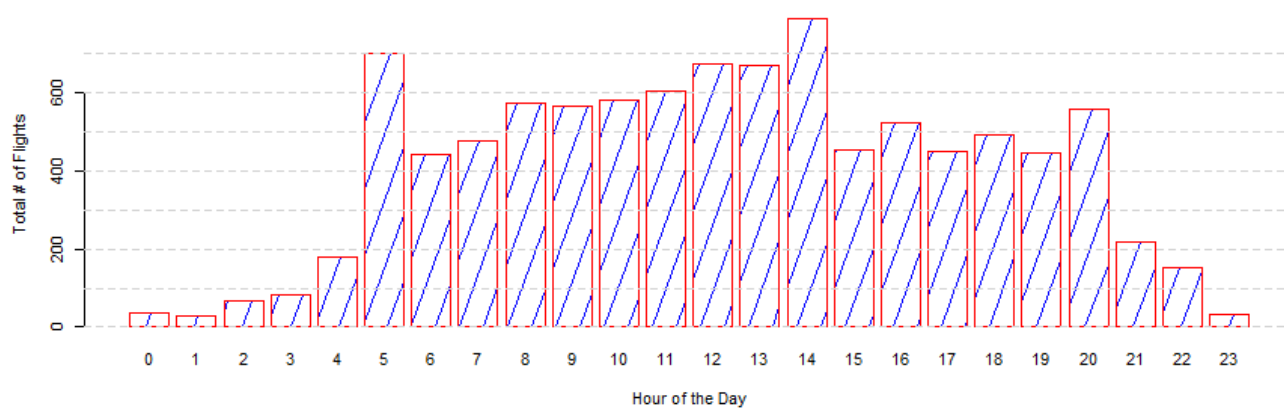


Figure S2. Total number of flights per hour counted at Madrid-Barajas airport during autumn campaign (WP4) of AVIATOR

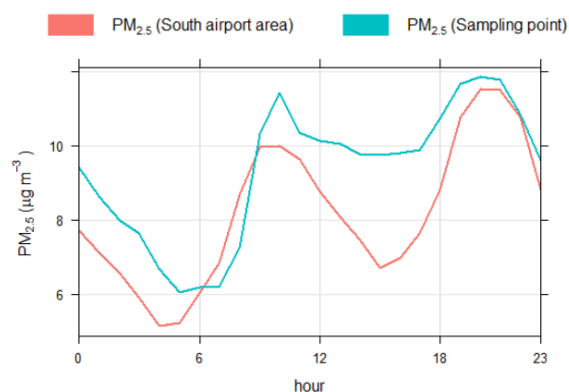


Figure S3. The diurnal pattern of PM_{2.5} concentrations, measured in micrograms per cubic meter, shows variations between a sampling point and the southern area of the airport, which are approximately 6km apart during autumn campaign (WP4) of AVIATOR.

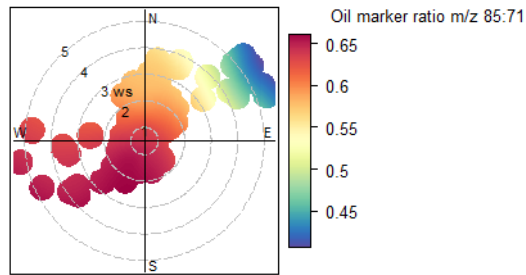


Figure S4. Bivariate polar plots of lubrication oil ratio measured by AMS ratios at the Madrid-Barajas International Airport during autumn campaign (WP4) of AVIATOR.

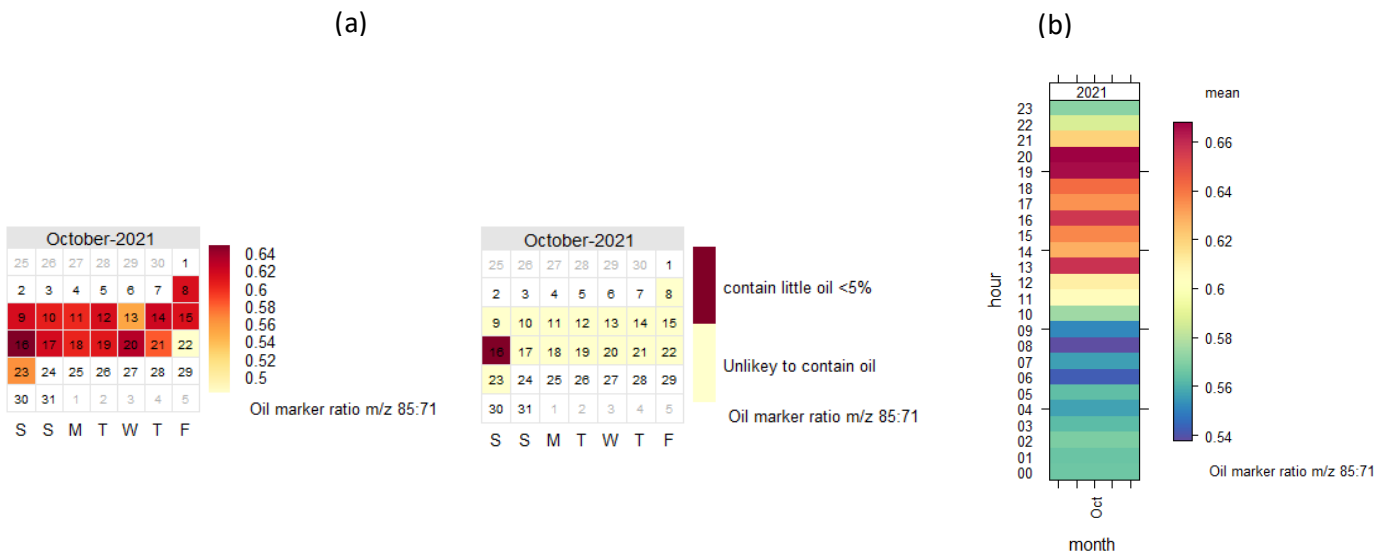


Figure S5. Calendar plots for lubrication oil ratio with annotations highlighting those days where the ratio of lubrication oil > 0.66 (a), Hour of the day analysis for the lubrication oil ratio during autumn campaign (WP4) of AVIATOR (b)