

Separation of Aircraft and Diesel-Truck Particle Emissions, a Contribution to Airport Air Quality Measurements

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Online Particle measurements are done at the airport Bern Belp. The time resolution of the used Engine Exhaust Particle Sizer- System (EEPS) is 10 Hz. Therefore transient events can be measured easily. The measurement range of that instrument is 5.6 - 560 nm.

The international Airport of Bern-Belp is a small airport with one concrete runway and low traffic frequency. On one side the airport is surrounded by a nature reserve area called Belpmoos. With the winds blowing from that nature reserve area the particle background concentration at this airport is very low (1E3 to 1E4 particles /ccm).

At 15 meters distance from the taxi way, Particle Size Distributions (PSD) and number concentrations are measured online with a time resolution of 10 Hz. Passing aircrafts, taxiing along the taxi way, increase particle number concentration up to 1E7 particles per ccm. Departing and landing aircrafts are measured at a minimum distance of 100 meters. Due to the low particle background and low traffic frequency, the emissions can be clearly assigned to the passing aircraft or truck.

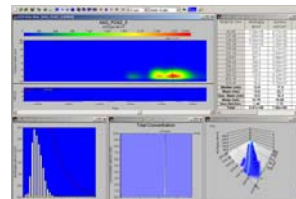
Aircraft gas turbines powered by JET-A1 (Kerosene), and piston engines of small aircrafts powered by AVGAS (aviation gasoline), emit PSD's with mean particle diameters < 30 nm. Mean particle diameter of diesel trucks normally is > 80 nm.

Therefore, fast online measurement of particle size distribution of the ambient air can distinguish between aircraft and truck emissions!

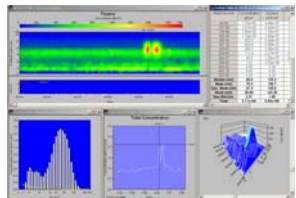
DO 328 (2x PW119B) passing on taxiway



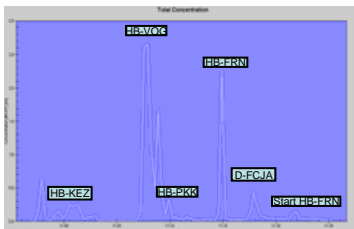
HB-AES taxi DO 328 - 100 2x PW119B Turboprop



Diesel Truck passing



Aircrafts passing on taxiway



HB-KEZ taxi	d = 11.3 nm	6.35E5 #/ccm	Piston Engine	AVGAS
HB-VOG taxi	d = 13.2 nm	2.65E6 #/ccm	JET Engine	JET - FUEL
HB-PKK taxi	d = 11.1 nm	3.35E5 #/ccm	Piston Engine	AVGAS
HB-FRN taxi	d = 12.5 nm	2.25E6 #/ccm	TURBOPROP	JET - FUEL
D-FCJA taxi 100%	d = 14.8 nm	4.23E5 #/ccm	TURBOPROP	JET - FUEL
HB-FRN taxi off	d = 14.5 nm	1.46E5 #/ccm	TURBOPROP	JET - FUEL

Engine Emission Tests, Citation PW545A

