Version 2.3

In Update 2.3, extensions have been implemented that significantly increase the scope of application of LASPORT and the depth of detail of the modelling.

Particulate matter (mass and number)

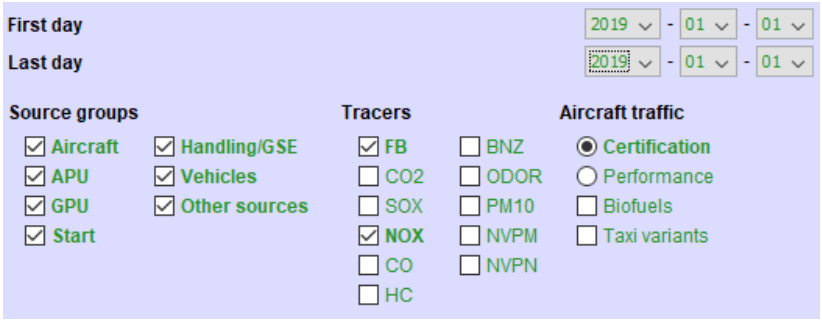
Aircraft engines emit non-volatile ultrafine particles and represent the largest emitter of this substance group at an airport. The standard database of LASPORT and the model have been extended to allow emission and dispersion calculations for both mass and number of non-volatile ultrafine particles (substances `NVPM` and `NVPN`).

Odor

For the new substance `ODOR` the frequency of odor hours can be calculated according to the German regulation GIRL. The LASPORT default database contains odor emission estimates for aircraft engines and APU.

Deposition

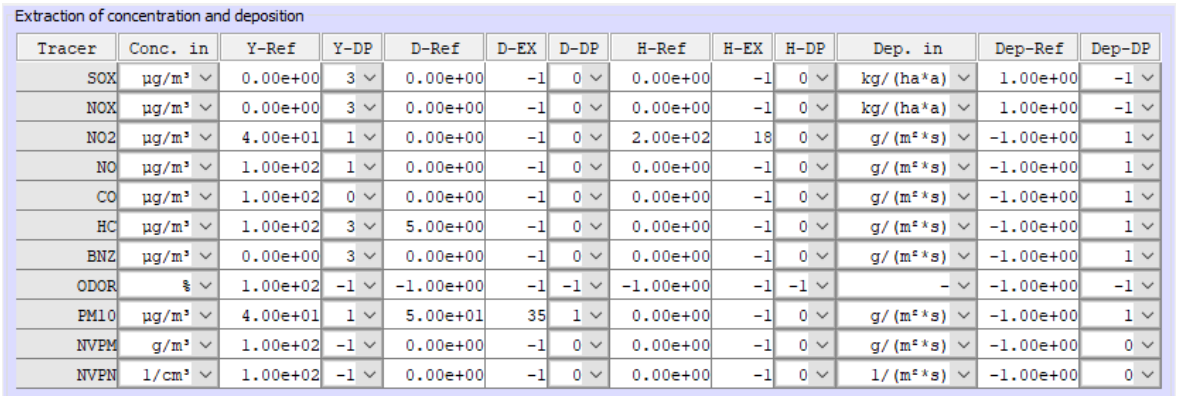
Dry deposition and, as far as the meteorological time series includes precipitation, wet deposition is considered in the dispersion calculation and subsequently evaluated. Since up to now the dispersion calculation was carried out without deposition and the resulting depletion from the air (a conservative approach with respect to the concentration), the now more realistic description yields slightly lower concentrations, especially at greater source distances.



Selection of source groups, substances and details on flight operations.

Air traffic specials

In corresponding menu items, de-icing processes, taxi variants, waiting times on taxiways and the influence of biofuels can now be taken into account.



Extraction of concentration and deposition

Tracer	Conc. in	Y-Ref	Y-DP	D-Ref	D-EX	D-DP	H-Ref	H-EX	H-DP	Dep. in	Dep-Ref	Dep-DP
SOX	µg/m³	0.00e+00	3	0.00e+00	-1	0	0.00e+00	-1	0	kg/(ha*a)	1.00e+00	-1
NOX	µg/m³	0.00e+00	3	0.00e+00	-1	0	0.00e+00	-1	0	kg/(ha*a)	1.00e+00	-1
NO2	µg/m³	4.00e+01	1	0.00e+00	-1	0	2.00e+02	18	0	g/(m²*s)	-1.00e+00	1
NO	µg/m³	1.00e+02	1	0.00e+00	-1	0	0.00e+00	-1	0	g/(m²*s)	-1.00e+00	1
CO	µg/m³	1.00e+02	0	0.00e+00	-1	0	0.00e+00	-1	0	g/(m²*s)	-1.00e+00	1
HC	µg/m³	1.00e+02	3	5.00e+00	-1	0	0.00e+00	-1	0	g/(m²*s)	-1.00e+00	1
BNZ	µg/m³	0.00e+00	3	0.00e+00	-1	0	0.00e+00	-1	0	g/(m²*s)	-1.00e+00	1
ODOR	%	1.00e+02	-1	-1.00e+00	-1	-1	-1.00e+00	-1	-1	-	-1.00e+00	-1
PM10	µg/m³	4.00e+01	1	5.00e+01	35	1	0.00e+00	-1	0	g/(m²*s)	-1.00e+00	1
NVPM	g/m³	1.00e+02	-1	0.00e+00	-1	0	0.00e+00	-1	0	g/(m²*s)	-1.00e+00	0
NVPN	1/cm³	1.00e+02	-1	0.00e+00	-1	0	0.00e+00	-1	0	1/(m²*s)	-1.00e+00	0

Selection of output quantities and units for the various substances. With the new substance spectrum different base units (g, 1, OU, %) are required.

Updates

The LASPORT database has been updated and components of the current LASAT distribution 3.4 have been incorporated into the program system.

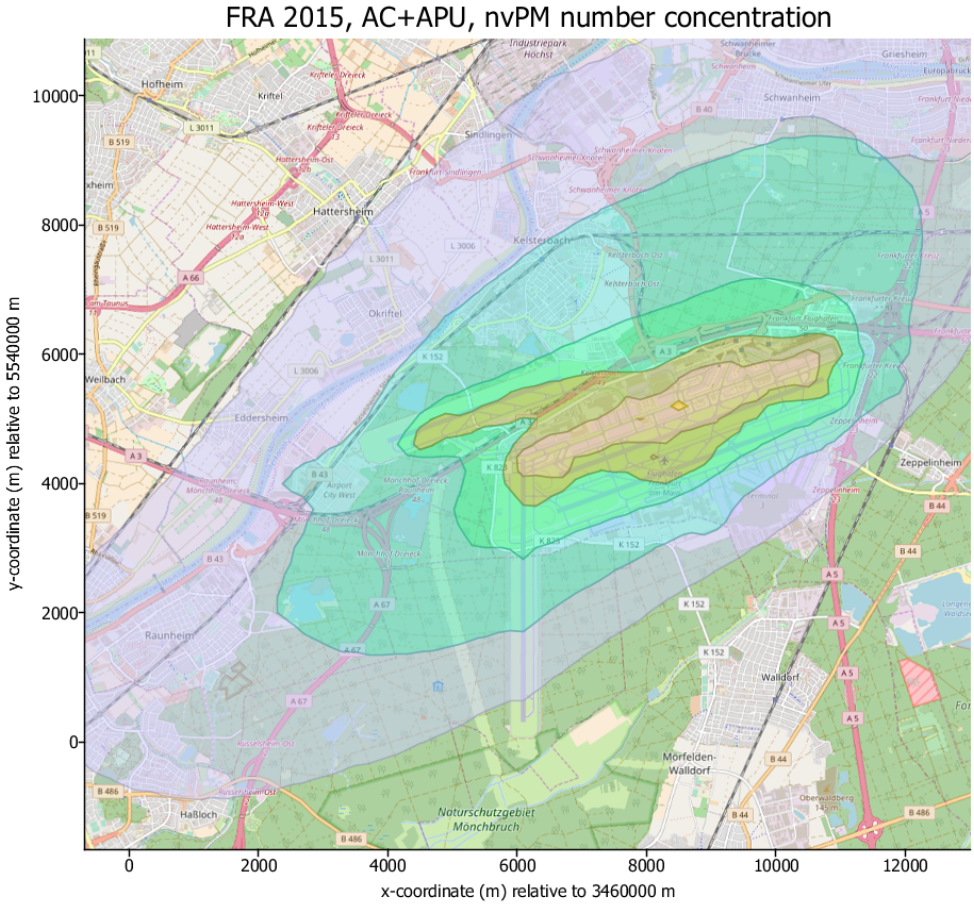
Important notes

For easier distribution, the update is provided as a ZIP archive. After unpacking, the installation is carried out with the help of an installation program as before. On demand, the update can be sent on DVD. Please note that only Windows 64-bit is supported (Windows 10 is preferred).

The LASPORT manual (in subfolder doc) contains a list of changes together with references to the corresponding sections in the manual.

When reading a project from LASPORT 2.2 with LASPORT 2.3 for the first time, the program tries to make all necessary parameter and setting updates automatically. The project must then be saved. It is recommended to check these extensions carefully, especially with regard to emissions, and in case of doubt to use the updated default values (menu *Project/Emission settings*).

The update 2.3 is backwards compatible with respect to emissions, i.e. a project read in with LASPORT 2.3 yields the same emissions as with LASPORT 2.2 (except for the waiting times before start in menu *Project/Traffic settings*, which are no longer applied since waiting times can now be set explicitly on the taxiways). There is a change with respect to concentrations since the depletion from the air by deposition is now taken into account, which for the same amount of emission leads to somewhat lower concentrations.



Graphical representation of the calculated number concentration of non-volatile ultrafine particles from engines and APU. The background map was created with the LASAT tool *GeoMapper* from *OpenStreetMap*.

Changes in detail

(extract from the program manual, Annex D)

LASPORT Update 2.3

- **Additional substances NVPM and NVPN:** Estimates of non-volatile particulate matter were implemented using the new substances NVPM (mass) and NVPN (number). For aircraft engines, these substances represent almost exclusively UFP.
- **Additional substance ODOR:** For this odorant, emission estimates (in odor units, OU) are provided and as a result the frequency of odor hours is calculated according to the German Regulation GIRL.
- **Generalized unit handling:** The new substances require a more generalized handling of units. For the usual substances g (gram) is the base unit, for ODOR it is OU, and for NVPN it is 1 (for number).
- **Calculation of deposition:** Dry and wet deposition and the sum of both are calculated using protected parameter values for the deposition velocity and washout rate

for each substance. Depletion of the atmospheric concentration due to deposition is accounted for. Default deposition parameters were set up based on standard VDI 3783 Part 5.

- **Specification of precipitation:** Calculation of wet deposition requires information on the hourly precipitation rate which can be specified within the provided time series.

- **Waiting times:** For each taxiway, waiting times between two points of the taxiway can be specified. The waiting times do not modify the total emission on the taxiway but rather the distribution of the emission across its segments. This allows to account for queueing before departure, stop-and-go at runway intersections etc. in the dispersion calculation.

  Queuing times are deprecated with this advanced methodology and have been removed. Taxiing times provided for scenario calculation now refer to the total taxiing time, including waiting times.

- **De-icing:** De-icing pads can be defined as position areas of the new type `de-icing`. These pads do not require definition of taxiways. The total number of de-icing events is specified for each month and each de-icing pad, together with the emission per handled aircraft for each aircraft group.

- **Taxi variants:** Use of SET and EGT taxi variants can be specified for each aircraft group and accordingly reduced emissions are accounted for in emission and dispersion calculations.

- **Biofuels:** A biofuel share in aircraft engine fuel can be specified together with substance-specific correction factors for the emission indices. The correction is accounted for in emission and dispersion calculations.

- **New vehicle groups PBUS and TBUS:** The vehicle group `BUS` has been split into `PBUS` (passenger buses) and `TBUS` (transport buses) with according emission factors available in the LASPORT emission database. When importing an old project, vehicle movements of group `BUS` are converted to `PBUS`.

- **Updated data base:** The LASPORT data base with default emission values has been updated based on the ICAO EEDB Issue 25a, HBEFA 3.3 and other.

- **Updated LASAT:** The required parts of the current program system LASAT 3.4 have been implemented. Among other, it contains the new and advanced boundary layer model version 5.3.

- **Updated JRE:** The current Java Runtime Environment Version 1.8.0_192 has been integrated.

- **Stop and continue:** The LASAT dispersion calculation can be interrupted and continued at a later time.

- **Automatic map scaling:** The LASAT tool *GeoMapper* allows to create automatically scaled map from Open Street Map.

- **Adding files:** A separate menu item allows to add concentration and deposition files with user-defined weight factors.
- **Advanced result analysis:** It takes into account the different base units and deposition.
- **Local time:** A time zone can be provided in the time specifications of a movement journal. This facilitates handling of local time information in the pre-processing of a journal.
- **ATL:** Possibility to specify in a movement journal the actual time of lift-off (ATL) instead of the actual time of departure.
- **Menu labels:** Some of menu names have been updated to provide more clarity.
- **Memory management:** By default, calling LASPORT with program `Lasport.exe` tries to access at maximum 3 GB RAM memory. This should be sufficient for most practical purposes, provided that this RAM is physically available. The accessed maximum RAM can be further increased by a command line call.

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