



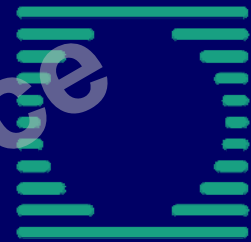
H11-072

**LAGRANGIAN PARTICLE MODELLING FOR
REGULATORY PURPOSES –**

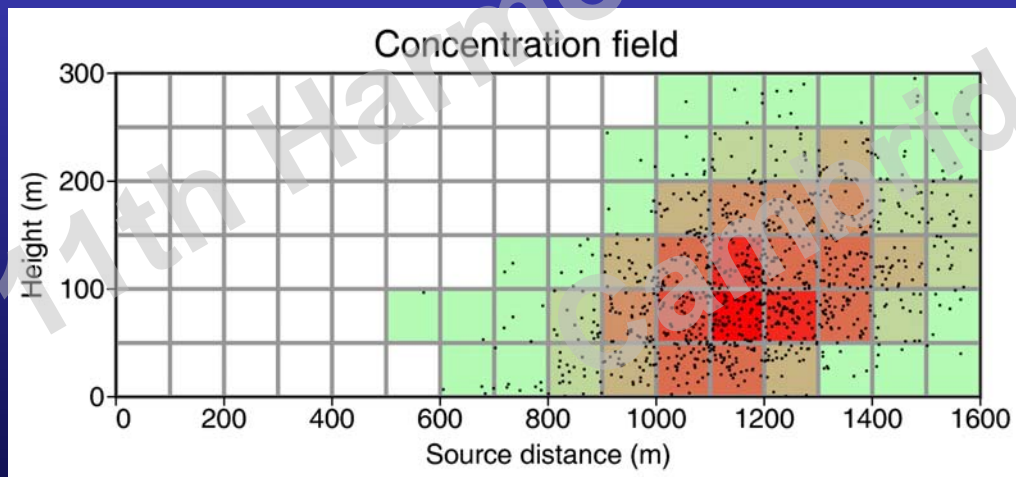
**A SURVEY OF RECENT DEVELOPMENTS IN
GERMANY**

Ulf Janicke, Lutz Janicke

Lagrange in a nutshell, 1st half

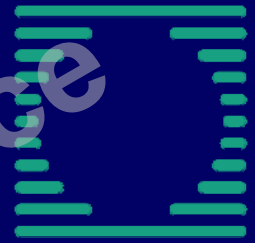


Lagrangian particle model:
Simulation of the atmospheric transport of individual particles by a stochastic process on the computer



Time-dependent concentration is derived from the mass of all particles present in a given grid cell and time interval

Lagrange in a nutshell, 2nd half



Some advantages over other modelling techniques:

- Independent of calibration parameters
- Time-dependent description of the dispersion process
(important e.g. in the far field)
- Realistic description of the turbulent diffusion
(important e.g. in the near field)
- Source shapes are accounted for in their exact form
(important for complex configurations)
- No averaging in the vertical over meteorological profiles
(important e.g. at the ground)
- Three-dimensional wind and turbulence fields can be directly applied (important in complex terrain)

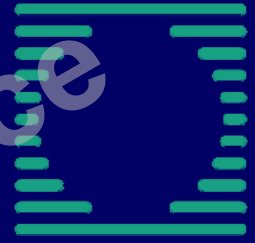
Lagrange



*... very nice, but what about
every-day practice?*

11th Harmonisation Conference
Cambridge 2007

Lagrange in practice

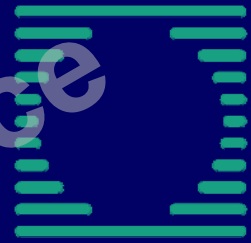


In Germany, since 1990 applied in regulatory practice (LASAT, Janicke Consulting)

Since 2002 implemented in the German regulatory model AUSTAL2000 (Federal Environmental Agency, UBA, freely available incl. source code at www.austal2000.de)

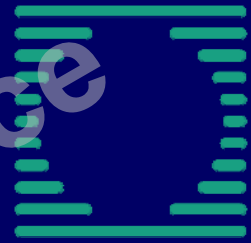
Model standardized by guideline VDI 3945/3 (www.vdi.de)

Recent developments in Germany



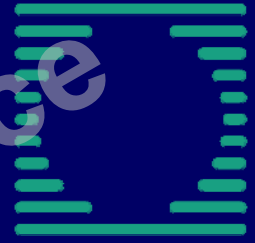
- AUSTAL2000 application in EU twinning projects
- AUSTAL2000G calculation of odour hours
- ESOFIN estimation of odour emissions
- LASAIR decision support for nuclear hazards
- ARTM radio nuclide transport
- LASPORT airport-related sources

AUSTAL2000



- Application in EU twinning projects (Poland, Turkey, Romania, Bulgaria)
- Usage of the software straightforward (source code free, language-specific text strings separated, example calculations and documentation provided)
- Main problems concerned with the requisition of meteorological data and personal training; guideline on quality assurance in preparation (VDI 3783/13)
- For more details, see H11-085 (poster session 3)

AUSTAL2000G



- In Germany, odour assessment is based on the concept of odour hour (odour perception in 10% of the time)
- Typical sources of odorants are low or diffusive sources, often located in the vicinity of buildings
- Calculation of the frequency of odour hours using AUSTAL2000 (since 2004)
- Applied in regulatory practice (regulation GIRL)

ESOFIN



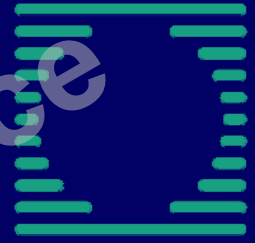
- For odour dispersion calculations, emission strengths are often not accessible by measurement
- ESOFIN: Estimation of odour emissions from field inspections using AUSTAL2000 (developed 2007 on behalf of the federal state Nordrhein-Westfalen)
- Validation against olfactometrically determined emission strengths
- For more details, see H11-074 (this morning)

LASAIR



- Decision support system in the context of the defence against nuclear hazards (developed 2001 on behalf of the German Federal Office for Radiation Protection, BfS)
- Interactive graphical user interface, LASAT as dispersion module
- Calculation of the near-ground concentration of activity, the deposition, and the inhalation dose; iterative procedure (from quick-and-dirty to detailed)
- Received particular attention in course of the Soccer World Championships 2006 in Germany

ARTM



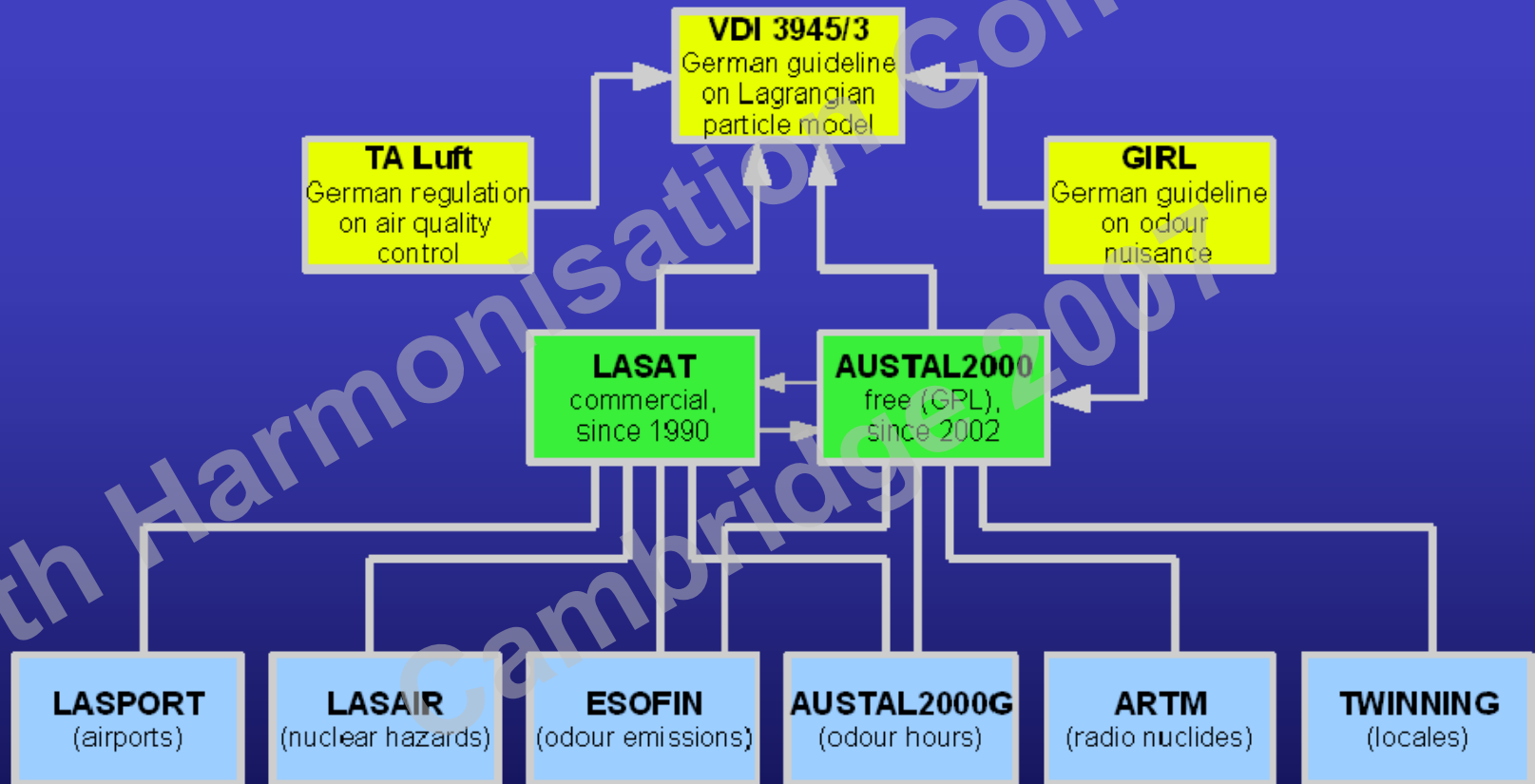
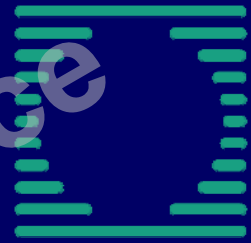
- ARTM: Extension of AUSTAL2000 to radio nuclides (developed 2007 on behalf of the German Federal Office for Radiation Protection, BfS)
- Implementation of algorithms regarding radioactive decay, cloud radiation, and wet deposition processes
- Test phase currently running
- More information will be provided by GRS (www.grs.de)

LASPORT



- Standard tool for emission and dispersion calculations with airport-related sources (developed 2002 on behalf of the German Airport Association, ADV)
- Interactive graphical user interface, LASAT as dispersion module
- One of the three European candidate models addressing local air quality at airports submitted to CAEP
- For more details, see H11-076 (4 July, 0830-1030)

Summary



(references are provided in the extended abstract)