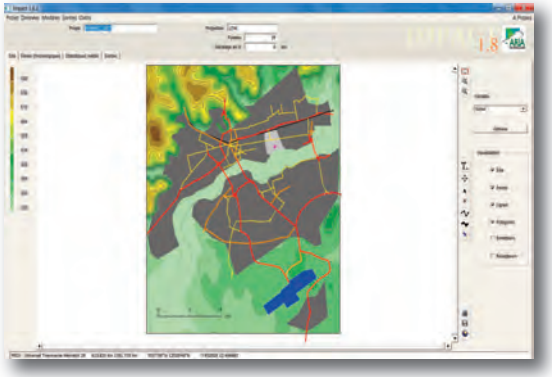
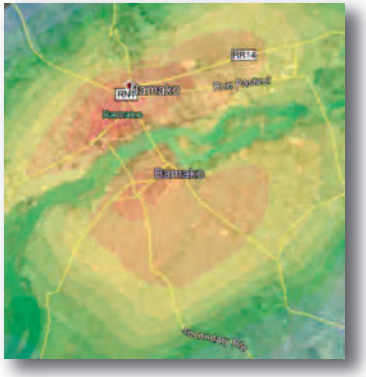
ARIA Impact

Software for studies on the impact of industries and vehicular traffic on air quality





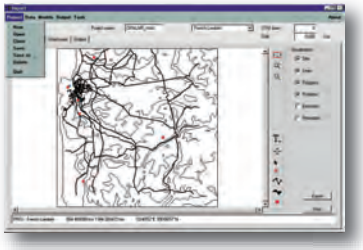
ARIA Impact™ is a user-friendly software customized to meet the requirements of consultancy firms, enterprises, local authorities, and air quality monitoring associations. It ensures compliance with air quality regulations and is used for complete assessments of, for example, health risks, olfactory pollution from an industrial site, the impact on air quality and health of a road project. With ARIA Impact™, users can simulate the long-term dispersion of air pollutants (gaseous or particulate) released from any type of emission source. They can calculate concentrations and deposition (dry and wet) expressed as an annual average or as percentiles. ARIA Impact™ now incorporates both the AIM Gaussian model (already available in the previous versions) and the AERMOD model from US-EPA (integrated through a partnership with CAIRN Développement).

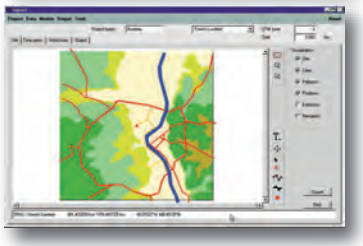
Selected references:

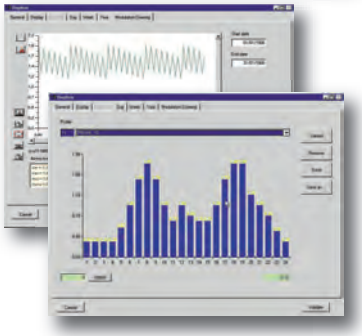
ABH Environnement, AENA, AFIRM, Air Breizh, ANDRA, ARKEMA, ASEZA, AXE, BDS Forage, Beture Environnement, Bureau Veritas, BURGEAP, Cabinet GREUZAT, Cabinet MERLIN, CEA DAM, CETIM , CTP, EDS, ENTIME, EOG, EVOLUTYS, GDF, GEOSAN, GES, GINGER Environnement, INGEROP, INGEVALORIS CONSEIL, IRSN, ISPE, ISSEP, JMB, KALIES, Mininstries of. Environment of Malta and Morocco, NEODYME, NOVALLIA, OLENTICA, Ouest Performance, ORAMIP, OTE Ingénierie, Pitesti, RATP, SAIPEM, SANOFI AVENTIS, SETIS Environnement, SOCOTEC, THERIUS, TOTAL Pétrochimie, Universities of Paris VII et XII - DESS QCBA, WLI Algeria, SGS MULTILAB, Ecole des Mines d'Alès, Mediaterre, Ecole des Mines de Rabat (ENIM), Europe Environnement, INSA Rouen, THEMA Environnement, AGMS, TEREA France, Environnement Air, SOLYME, TESCO (Tunisia), MECRO System (Romania), CIA-Acoustique

Key features

- Easy import of meteorological, terrain, and emission data (constant, cyclic, occasional) from Excel files
- Statistical processing of meteorological data (time series, wind roses)
- Simultaneous processing of different types of pollutants: gases, particles, odours, radioactive matter, as well as odour mixes (in odorimetric units)
- Unlimited number of point, area, volume, and line sources
- Conversion of NOx to NO/NO2 for vehicular traffic
- Consideration of constant or fluctuating background pollution
- Extensive range of outputs: concentration and deposition maps (annual average, percentiles, daily and hourly maximum, exceedance frequency)







Project management

All project components are automatically stored in corresponding folders: geographical context, terrain, mapping objects, land cover data, station coordinates, meteorological data, and emissions. Variants are created by loading a previous project.

Maps: import from/export to GIS

Geographical data can be imported directly from major GIS (Mapinfo, ArcInfo/ArcView), in DXF or shapefile formats. The dispersion calculations actually use terrain and land cover data.

Emissions management

For each source, time variation profiles (monthly, weekly, hourly) help define a realistic emission scenario that provides an accurate assessment of the long-term impact. The model can also account for technical breaks in industrial emissions. Existing emission data can be easily imported from Excel sheets into ARIA Impact™.

- Results for specific points (schools, hospitals, sensors, etc.) at ground level or at a given altitude
- The AIM model developed by ARIA Technologies is based on stability classes and can account for calm winds; pollutant dispersion can be modelled from a simple wind rose or a 1- or 3-hourly meteorological database
- The US-EPA AERMOD model, often described as a second generation model, is based on the computation of turbulence; pollutant dispersion can be modelled from a 1-hourly meteorological database. It accounts for the effect of buildings located near the emission sources
- Visualization of concentrations at any point by using the cursor
- Export of results to Google Earth and to GIS-enabled Mapinfo and ArcGIS
- Validated against measured or computed data; validation report available
- Software, detailed technical documentation, and tutorial in English and French

ARIA Impact3D

3D software for studies on the impact of industries and vehicular traffic on air quality

ARIA Impact3D ARIA Impact3D software is designed to assess the chronic impact of industrial plants or vehicular traffic on air quality through the simulation of actual or virtual emission scenarios. It simulates in 3D the air dispersion of pollutants (gaseous or particulate) from stacks and outlets, and fugitive sources based on a detailed account of terrain, building effects, and meteorological data measured or forecast simultaneously at multiple heights.

ARIA Impact3D is intended for enterprises, consulting firms, and local authorities of industrial zones that need a detailed assessment of chronic risks. It integrates a 3D Lagrangian dispersion module.

** CALMET-CALPUFF has been integrated into ARIA Impact3D through a partnership with CAIRN Développement*

Objectives

- Model air pollution around industrial sites
- Conduct studies (diagnostics, preparation, surveillance) for air quality improvement campaigns
- Plan and develop pollution monitoring strategies
- Model and map air pollutant emissions in a city district, city, or region
- Simulate air dispersion of all pollutants measured by air quality monitoring networks in the study area
- Determine the contribution of each emission source
- Analyse existing regulation strategies
- Simulate the meteorological conditions in 3D environment to study past episodes or forecast future episodes

Key features

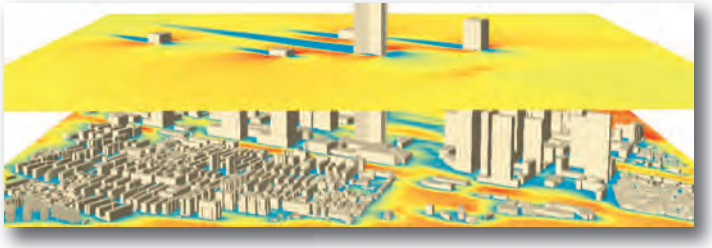
- Fully compatible with ARIA Impact™ (provided): allows to study significant episodes with 2D and 3D emission scenarios.
- Provided with MSS (Micro SWIFT SPRAY), the state-of-the-art lagrangian particle dispersion model developped by ARIA Technologies and its partners ARIANET and Mokili.
- Includes CALPUFF, a lagrangian puff dispersion model which uses CALMET meteorological fields or station data; CALMET and CALPUFF are US-EPA approved*.
- Simulation time period ranging from one hour to several years
- Can be inserted as an engine in the ARIA View™ system for producing a detailed real-time map of the impact of an industrial site.

Selected references:

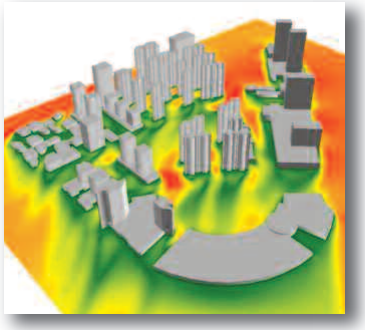
BV Lyon, Andra, Air Rhône-Alpes, Olentica

ARIA City

GIS-embedded software for modelling air quality in cities



Environment authorities of cities encounter particularly complex air dispersion problems arising from the diversity of the urban landscape and vehicular emissions. They need a 3D digital representation of the urban ecosystem (roads, terrain, 3D images of buildings) to visualize the confinement effects of different obstacles. Urban data are generally stored by city authorities in geographic information systems (GIS), the most common being ESRI's ArcGis Desktop.



A direct and simplified link makes **ARIA City™** fully compatible with the data storage standards and graphic tools of ArcGIS 9 and ArcGIS 10.

Selected references:

AIRPARIF, Ville de Paris, Lille Métropole, INERIS, INGEROP, SYCTOM, Tsinghua University (China), CMM (Mexico), SONATRACH (Algeria), ENWARE

esri Partner Network Silver

Objectives

- Studies for city development, planning of high-traffic roads (new or modified), location of tunnel exits and ventilation system openings (car parks, metro), traffic reduction strategies

Key features

Single input and selection of:

- site-related geographical site data: terrain, land cover, buildings, location of the meteorological stations
- project basics: study domain, development or intervention option, traffic flow (light vehicles, light utility vehicles, two wheelers, heavy vehicles), other emission sources (industrial, household)
- calculation of emissions based on vehicle flow and fleet data, using the TREFIC model
- computation: Gaussian model (ARIA Impact Model — AIM), Lagrangian particle model (Micro SWIFT SPRAY — MSS), complete CFD model (Code_SATURNE).
- expected results and maps: annual mean, regulatory percentile, simulation of a daytime period, scenario comparisons, worst case studies (2F meteorological situation).

A single concern: the atmospheric environment

Founded by a group of researchers from the French electricity board EDF, ARIA Technologies has played a pioneering role in the global development of atmospheric modelling.

The original group has grown into a team of 25 engineers drawn from various fields of atmospheric sciences, who have placed this knowledge-based SME at the cutting edge. ARIA Technologies' head office is located in Boulogne-Billancourt, near Paris; off-site staff are posted in Brest, Grenoble, Lyon, Marseille, Metz and Toulouse.

Its Italian subsidiaries ARIANET (founded in Milan in 2000) and SIMULARIA (Turin, 2010) together employ 20 engineers specialized in atmospheric sciences. In 2010, ARIA established its subsidiary in Rio de Janeiro, Brazil, with a team of 3 specialist engineers.

ARIA Technologies collaborates with key French organizations involved in monitoring air quality — regional air quality management bodies, CEA (atomic energy), INERIS (environmental safety), METEO-FRANCE (weather) CNRS (IPSL), KIC-Climate, — and with a large number of well-known international partners.

A comprehensive range of software and systems

ARIA Technologies' software and systems are designed to address issues related to air pollution—industrial, urban, hazardous, and chronic. They are also suited for specific uses in applied meteorology.

- **ARIA Impact™** and **ARIA Impact 3D™**: software for studies on the impact of industries and vehicular traffic on air quality
- **ARIA City™**: GIS-embedded software for modelling air quality in cities
- **ARIA Risk™**: 3D software for assessing air dispersion of accidental releases
- **ARIA Indoor™**: software for the assessment of indoor air quality
- **ARIA Local™**: software for calculating air flow and dispersion at micro-scale
- **ARIA Wind™**: system for mapping, calculation, and optimization for wind farm sites
- **ARIA View™**: system for continuous surveillance of air quality at industrial sites
- **ARIA Regional™**: system for air quality analysis and forecasting at urban and regional levels