ARIA Technologies

Alex Resovsky

Recent Rounds

2022 climate and regional air quality studies

+ What's next?

Exciting projects on the horizon

ARIA Technologies S.A.
15 Rue du Port, 92000 Nanterre, France

ARIA Technologies

Areas of expertise

Air Quality

Sustainable cities

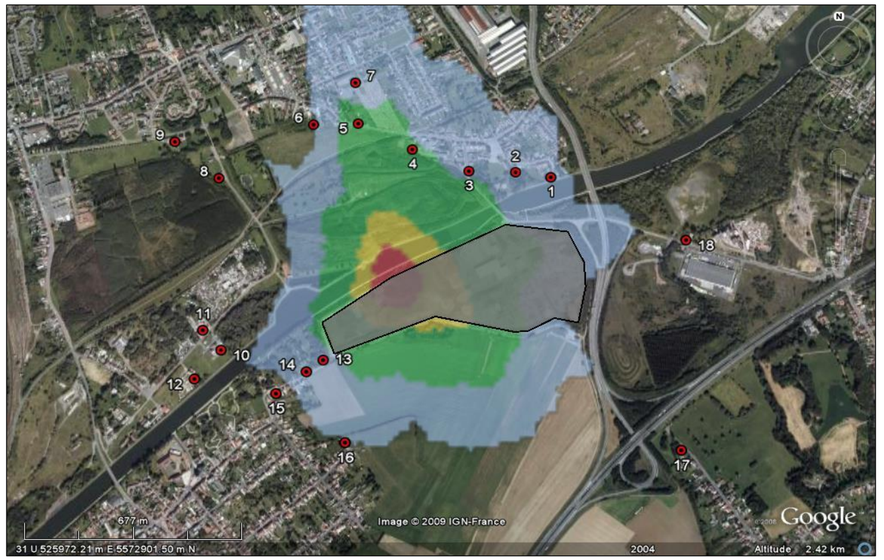
Risks

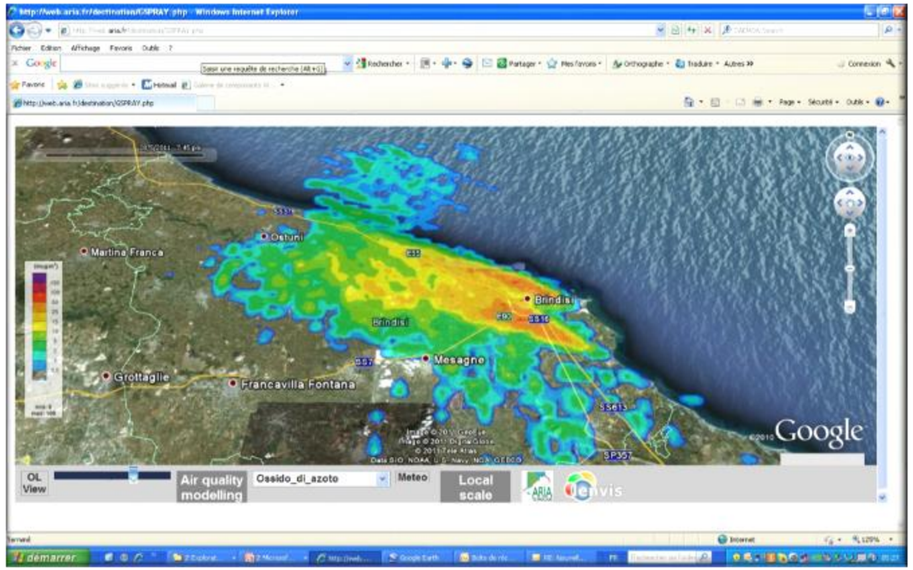
Climate

Renewables

Air Quality

- **Atmospheric pollutant dispersion studies**
  - Air quality and soil deposits
  - Gaseous, particulate, radioactive and odorous pollutants
  - Evaluations of health risks
  - Creation of monitoring plans
- **Systems for continuous tracking of emissions available online: ARIA View Web**





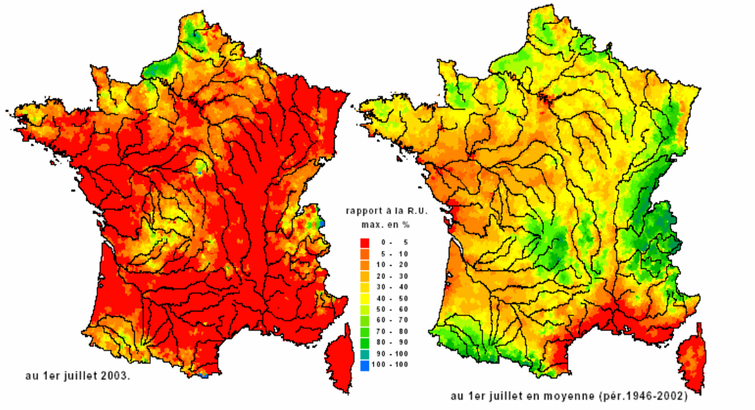
Climate

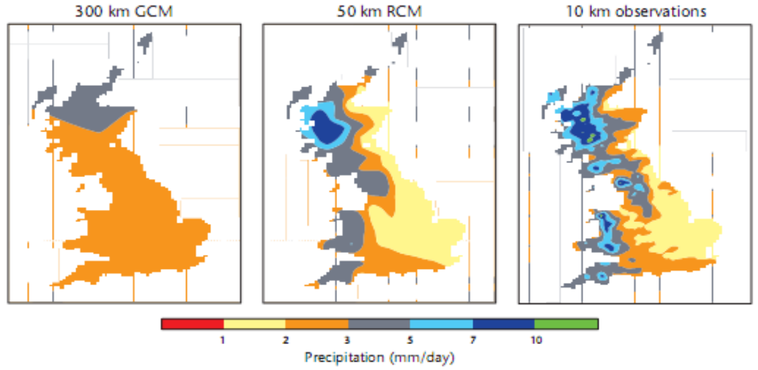
Mitigation

- Climate phenomenon understanding
- CO2 and CH4 tracking
- long-lived GHG inventories
- Inverse modelling

Adaptation

- Climate change evolution studies
- Downscaling methods from global datasets
- Studies of vulnerability
- Extreme events forecasting





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Recent Rounds

2022 climate and regional air quality studies

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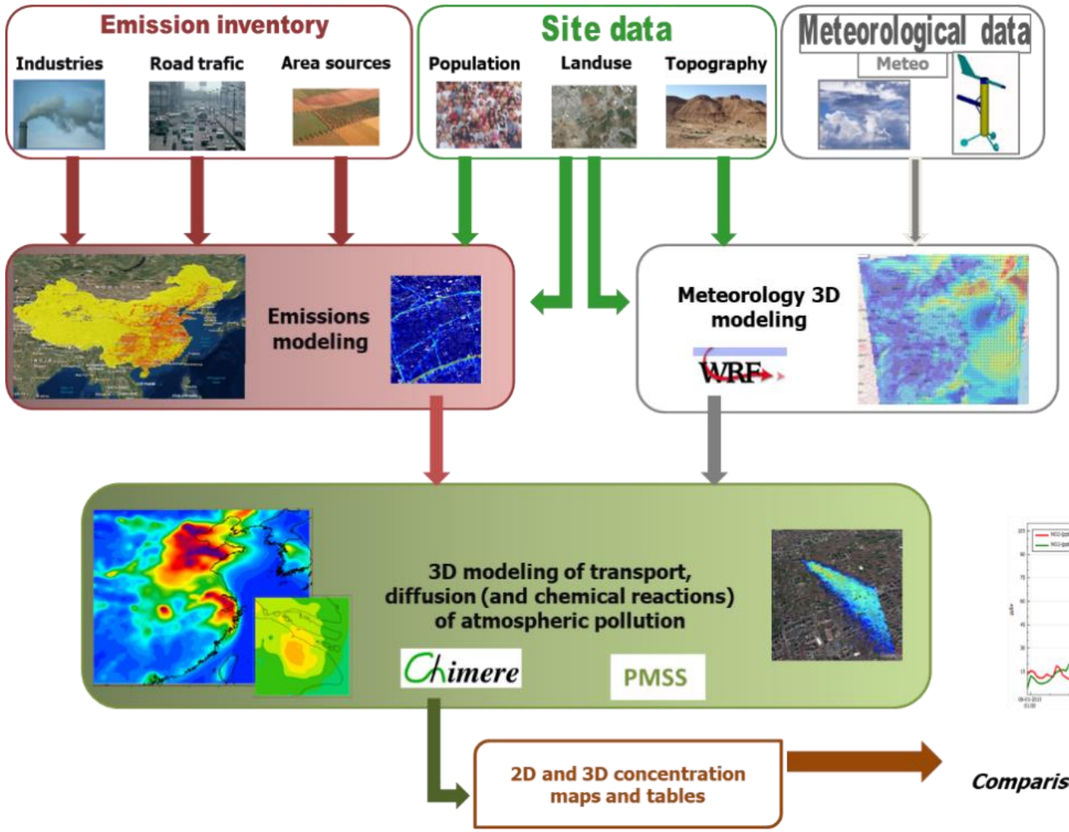
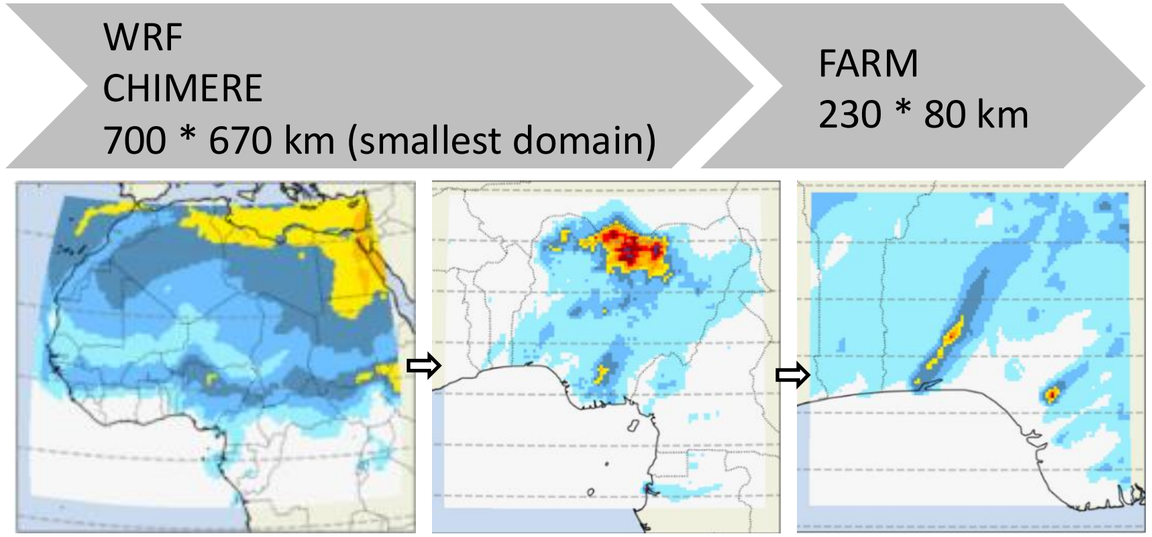
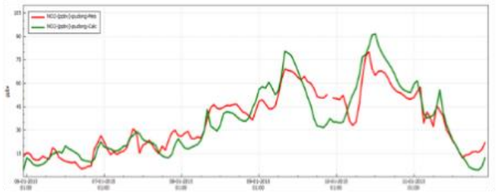
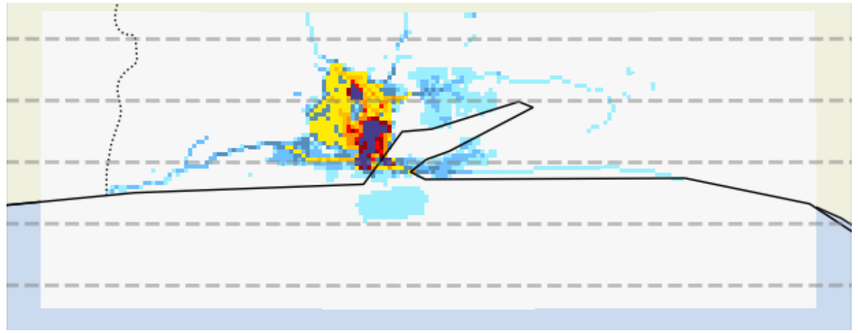
2021: Lagos emissions inventory (World Bank)







Analysis of results
Comparison with legislation (limit values, objectives)
Comparison of scenarios



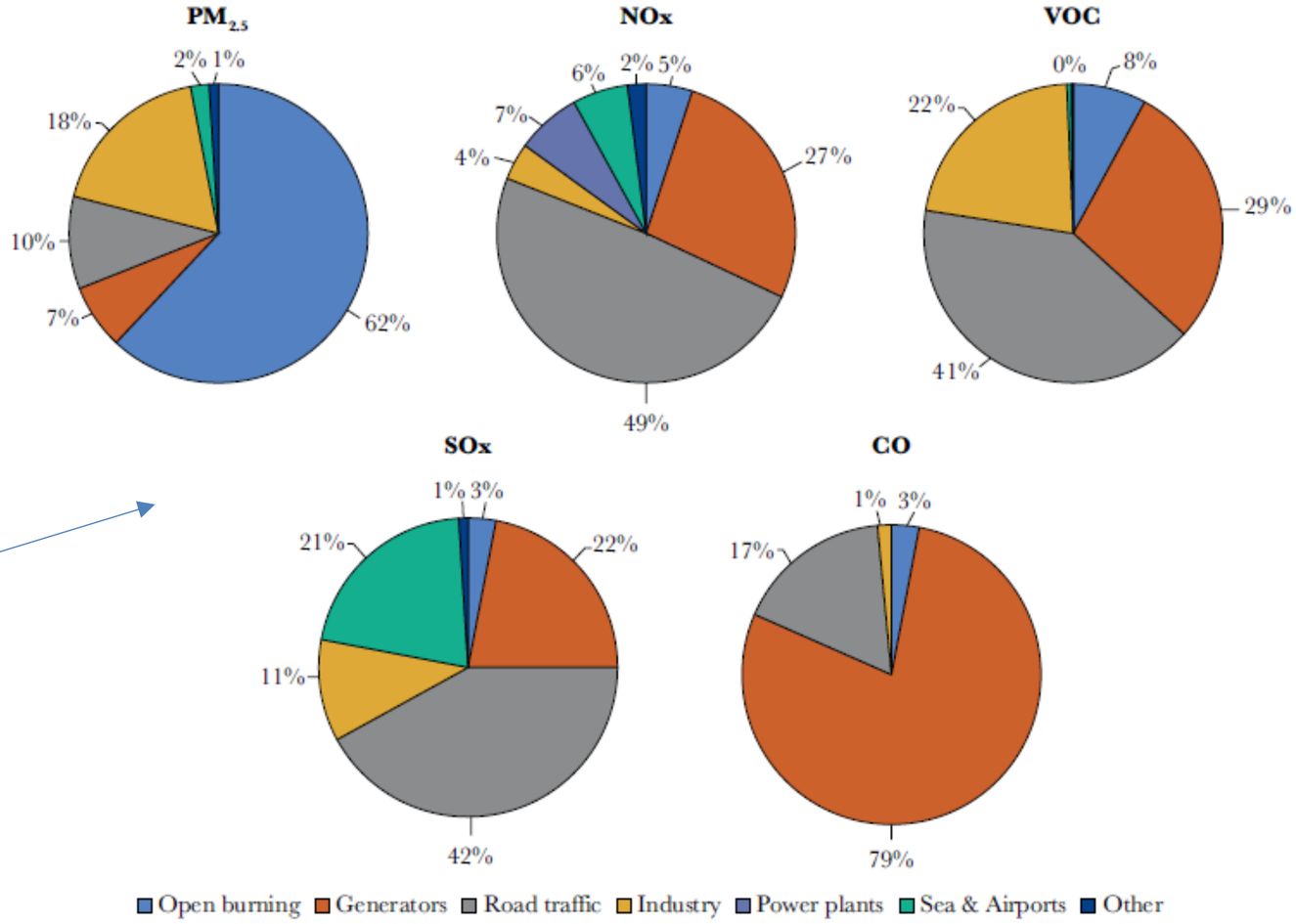
- **Develop an emissions inventory for Lagos;**
- **Use air dispersion modeling to reconcile the emission inventory with AQ monitoring and source apportionment for particulate matter (PM).**
  - Compile activity data for major sectors including road traffic, waste disposal and agricultural sources
  - Estimate emissions as (Activity) x (EF) using Emissions Factors (EFs) from EMEP/EEA and US EPA
  - Mix of bottom-up and top-down approaches

2021: World Bank PMEH Program – Lagos emissions inventory

Project goals:

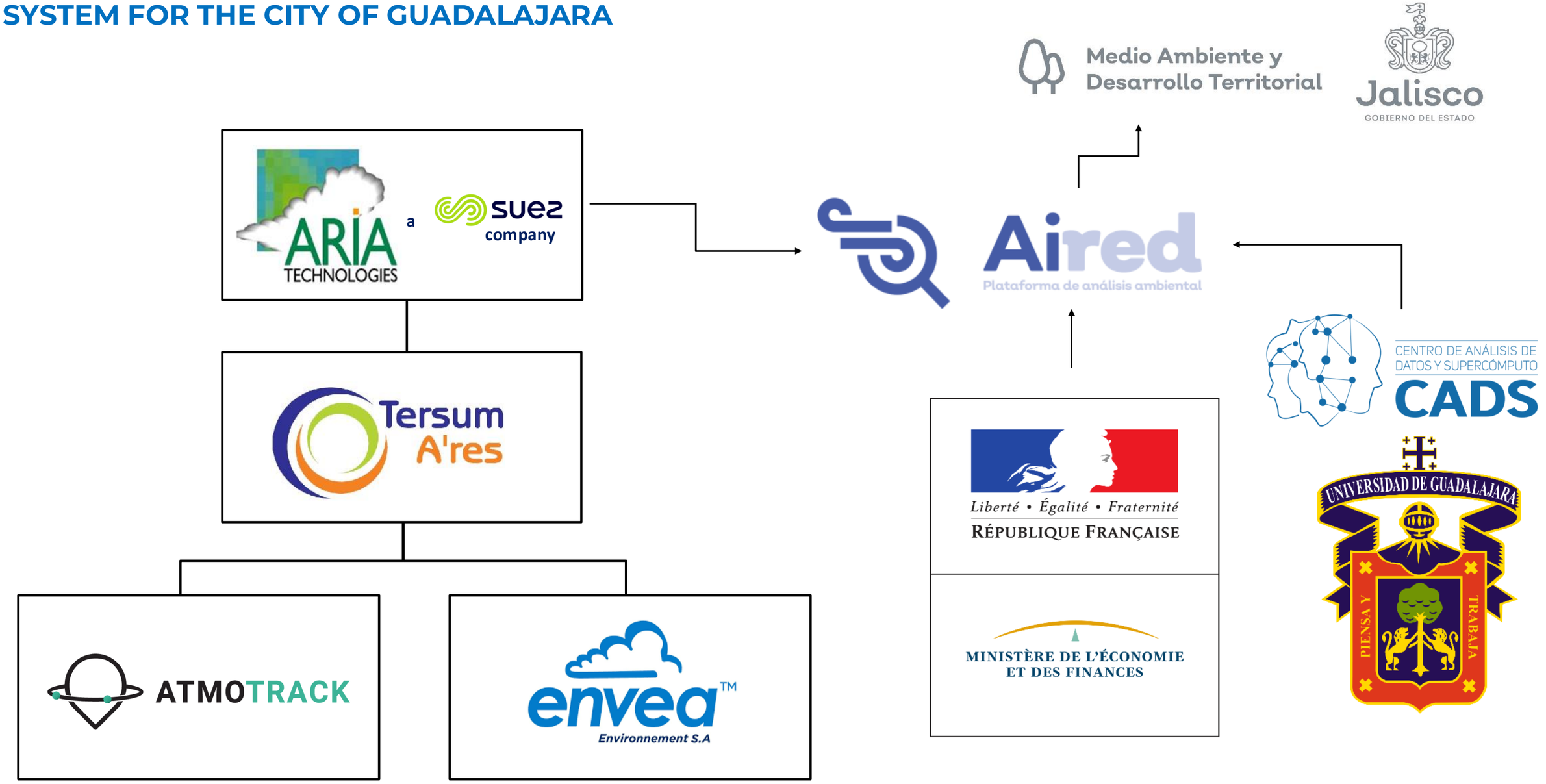
- **Identify emission control measures and perform a cost estimation by integrating the inventory results with the Lagos GAINS-PMEH model**

Results: Total emissions by sector (% of total for each pollutant)



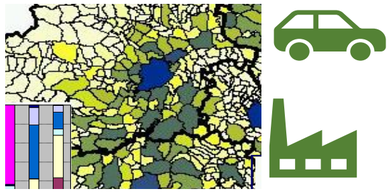
2021 – 2022: The AIRED Project

IMPLEMENTATING AN AIR QUALITY MODELING AND FORECASTING SYSTEM FOR THE CITY OF GUADALAJARA



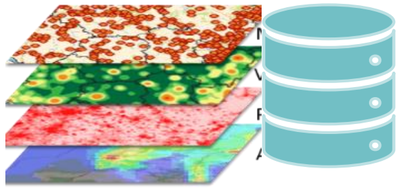
2021 – 2022: The AIRED Project

Emissions

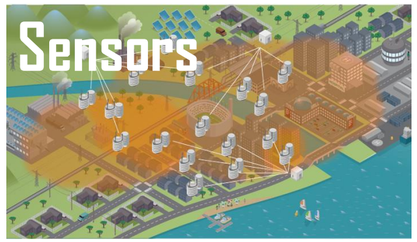


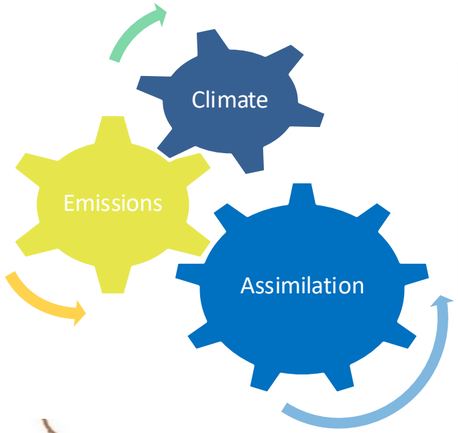
Weather data

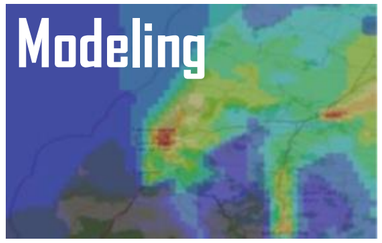
Geographic data



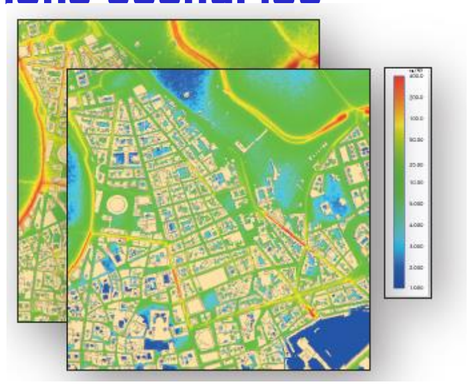
- Topography
- Landuse
- Population density



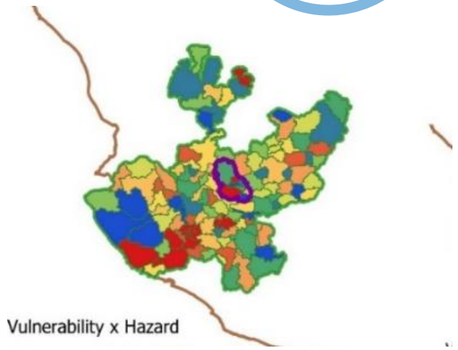




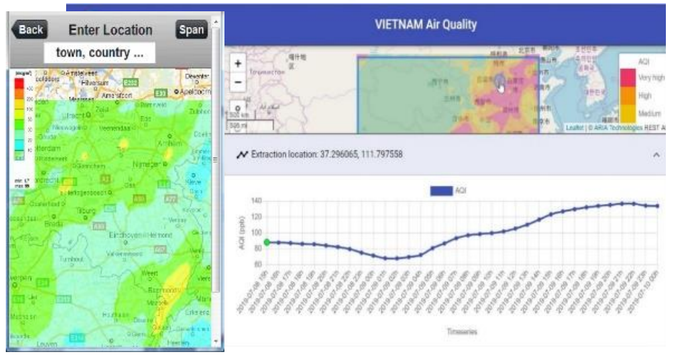
Emissions scenarios



Public health module



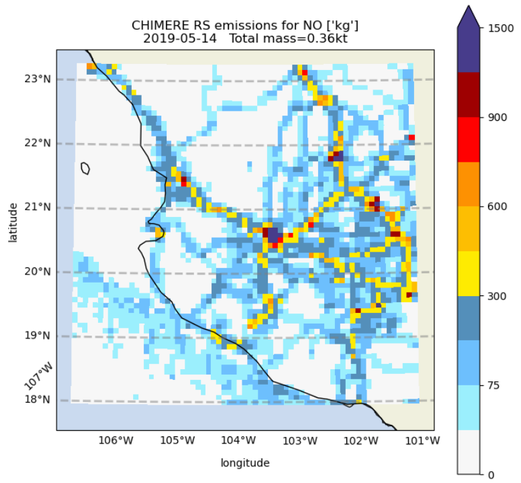
Web and smartphone API

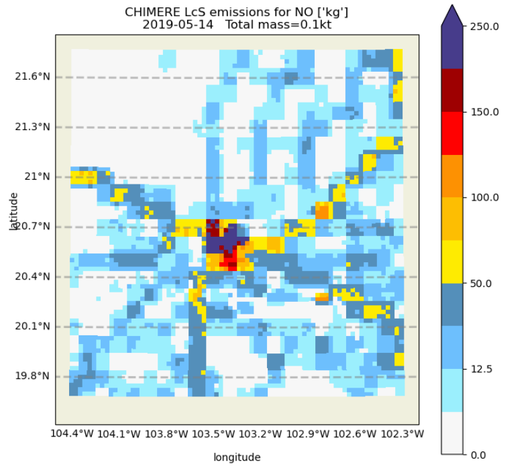


2021 – 2022: The AIRED Project

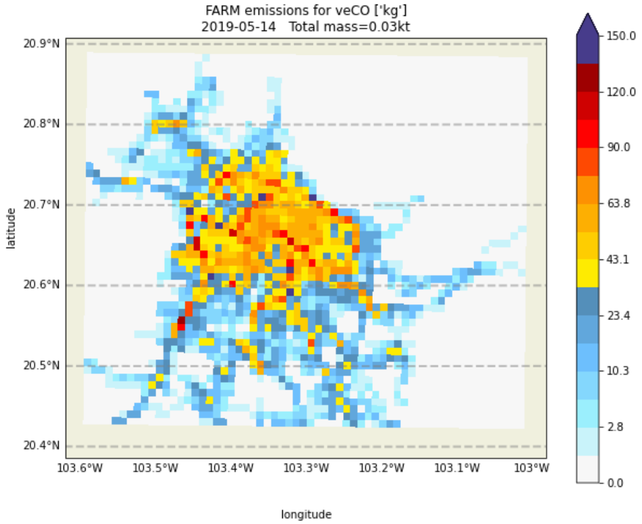
Downscaling of EDGAR global emissions to create a local inventory:

EDGARv5.0 0.1 x 0.1° (global inventory)

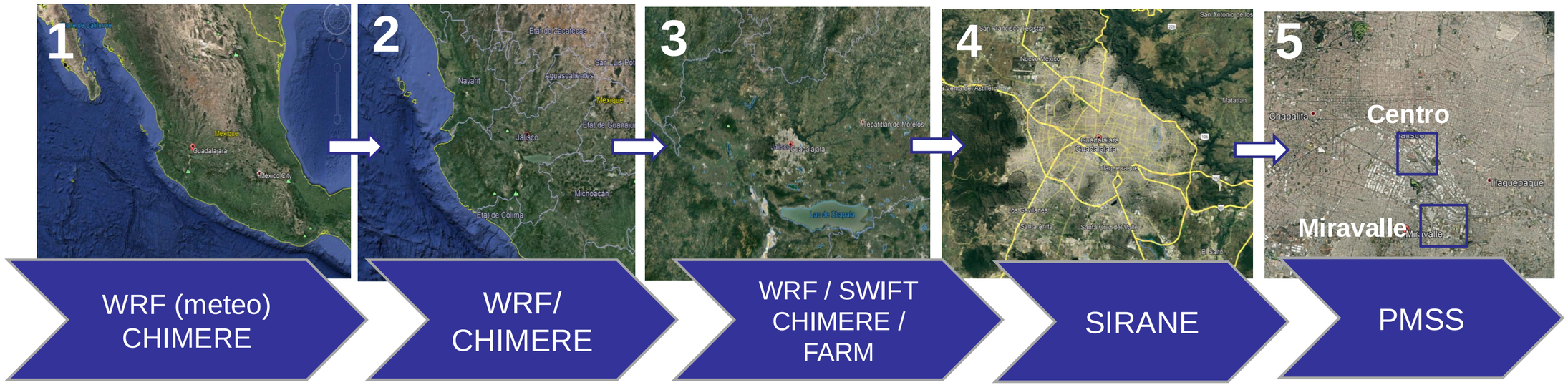




Local emissions inventory



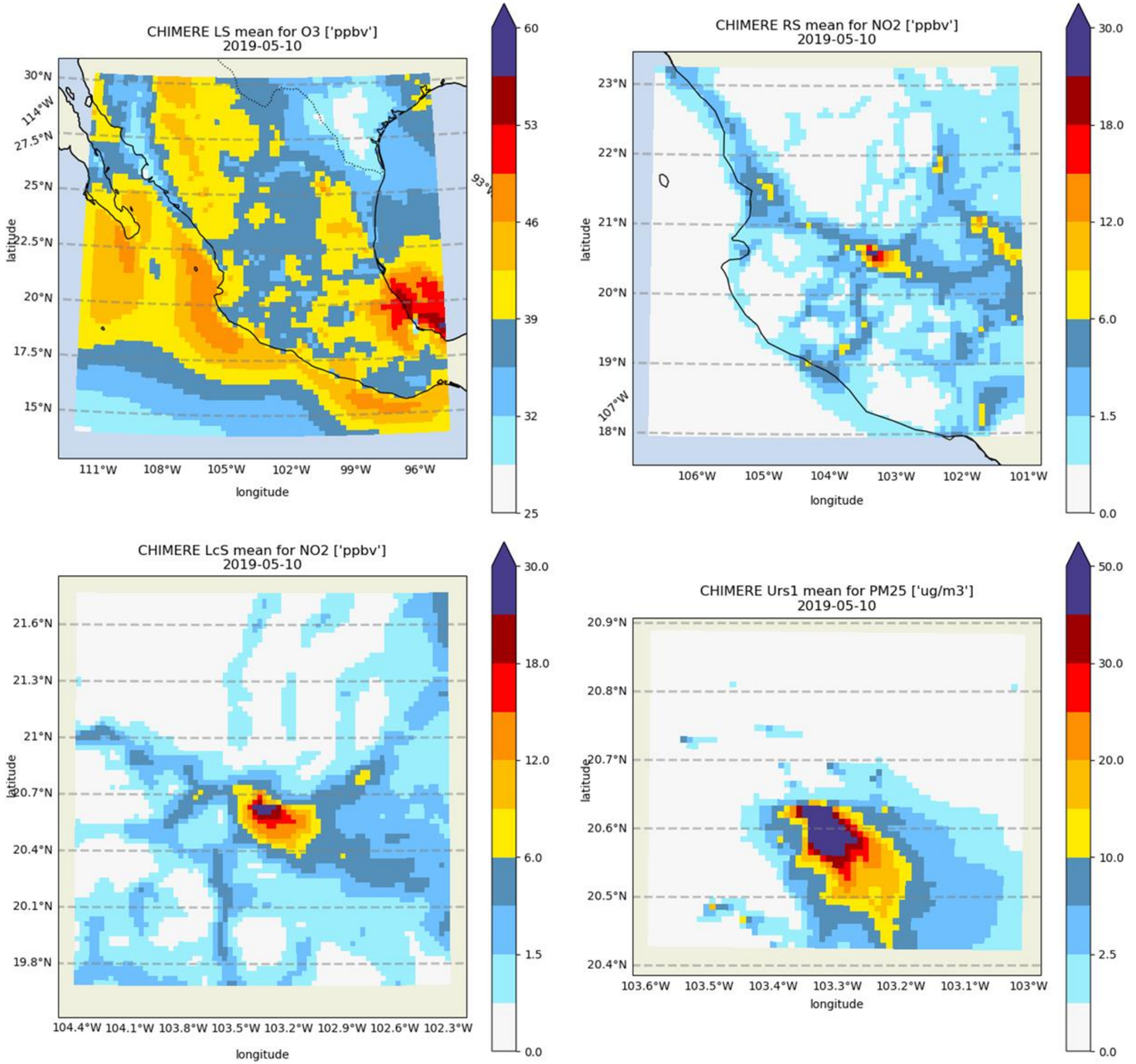
Study domains



2021 – 2022: The AIRED Project

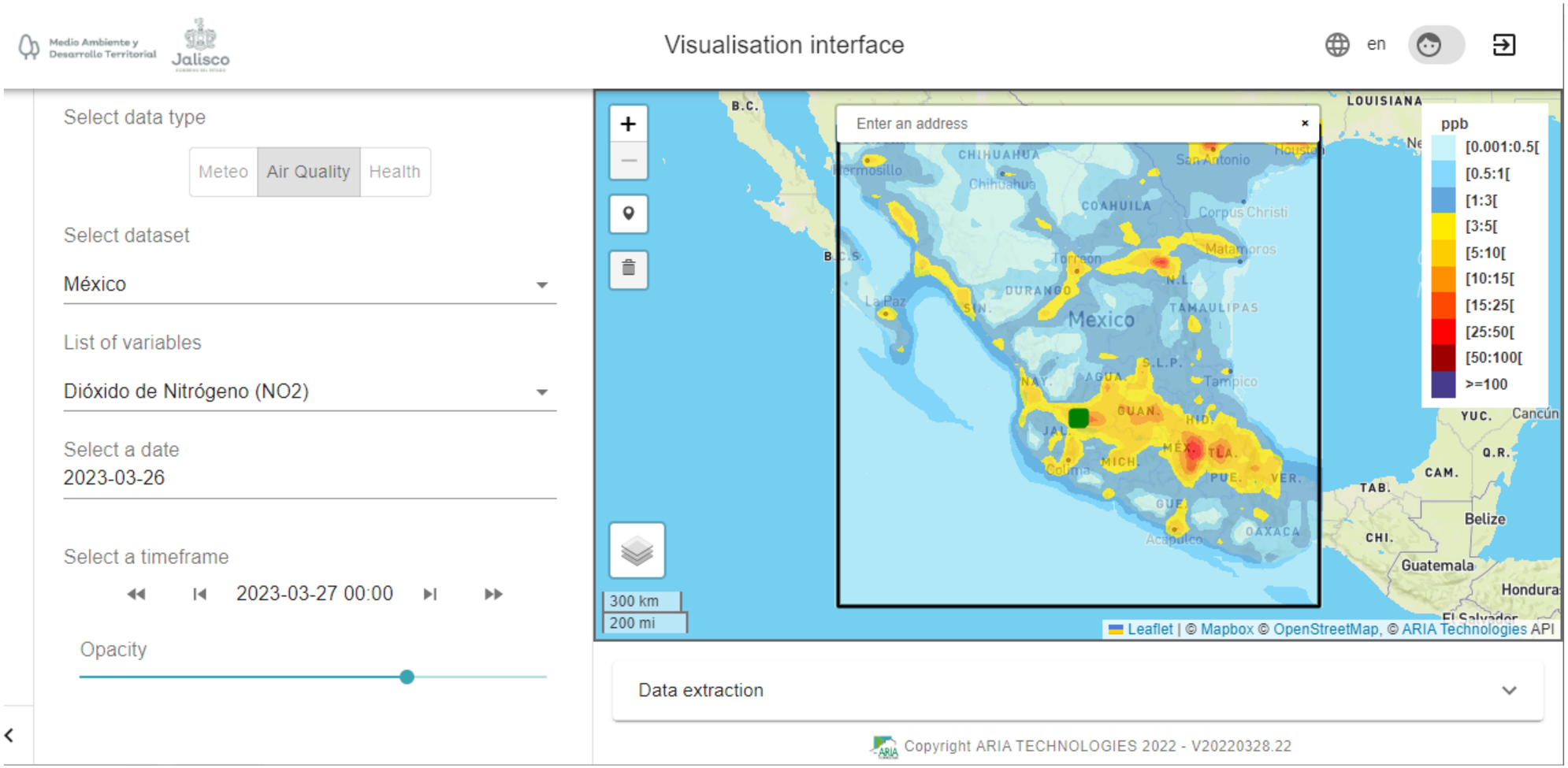
Modeling results:

- **CHIMERE multi-scale chemistry-transport model** (https://www.lmd.polytechnique.fr/chimere/)
- **FARM (Flexible Air quality Regional Model) three-dimensional Eulerian model (**http://www.aria-net.it/qualearia/en/**)**
- **AIRED web site (demo):** http://webapp.aria.fr/awa-aired/2.0.2/index.html



2021 – 2022: The AIRED Project

Web interface allows users to monitor air quality evolution in near-real time



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What's next?

Exciting climate/air quality projects on the horizon

+ Road map for integration of ARIA tools w/ F-AIR

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2023: Nouakchott emissions inventory

AIR QUALITY STUDY FOR THE REGION OF NOUAKCHOTT, MAURITANIA

Project goals:

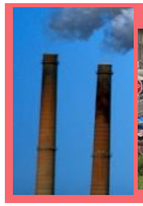
- **Carry out two measurement campaigns**
  - Continuous measurements:
    - Equipment rented and installed for the duration of the study (8 months)
    - 5 stations of PM10, PM2.5 and PM1 micro-sensors
    - 220V power supply and/or solar panel
  - 2 measurement campaigns:
    - An intensive campaign of one month during each of the country's 2 seasons
    - Passive tubes will be installed to measure: SO2, NO2, O3, CO and Benzene, as well as samplers on filters for PM10 particles
    - The deployment of the tubes will be carried out by RN personnel in collaboration with LEERG students following training by SUEZ
    - Analyses to be carried out in France

2023: Nouakchott emissions inventory

AIR QUALITY STUDY FOR THE REGION OF NOUAKCHOTT, MAURITANIA

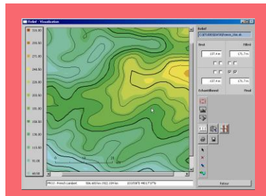
Project goals:

- **Create an emissions inventory**
- **Estimate air pollutant concentrations using ARIA modeling chain**

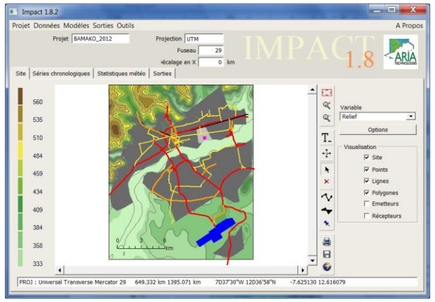



Emissions data
Road traffic, industries…
Types and location of sources
Emission flows

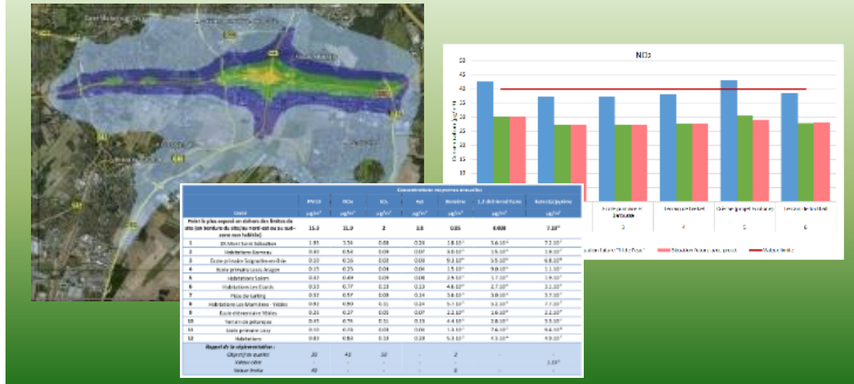
Weather data
Time series
Statistical processing
Choice of weather situations



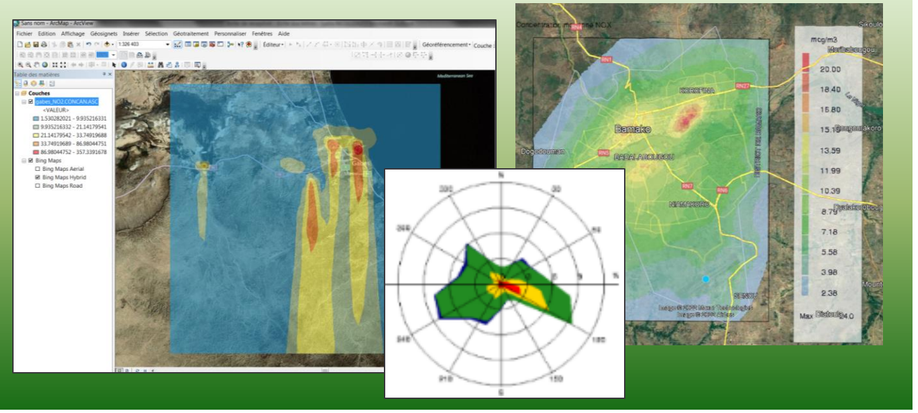
Site data
Topography
Land use



Implementation of ARIA Impact dispersion model:
Estimation of aerial pollutant concentrations



Concentration maps
Results tables
Comparison diagrams



2023: Nouakchott emissions inventory

AIR QUALITY STUDY FOR THE REGION OF NOUAKCHOTT, MAURITANIA

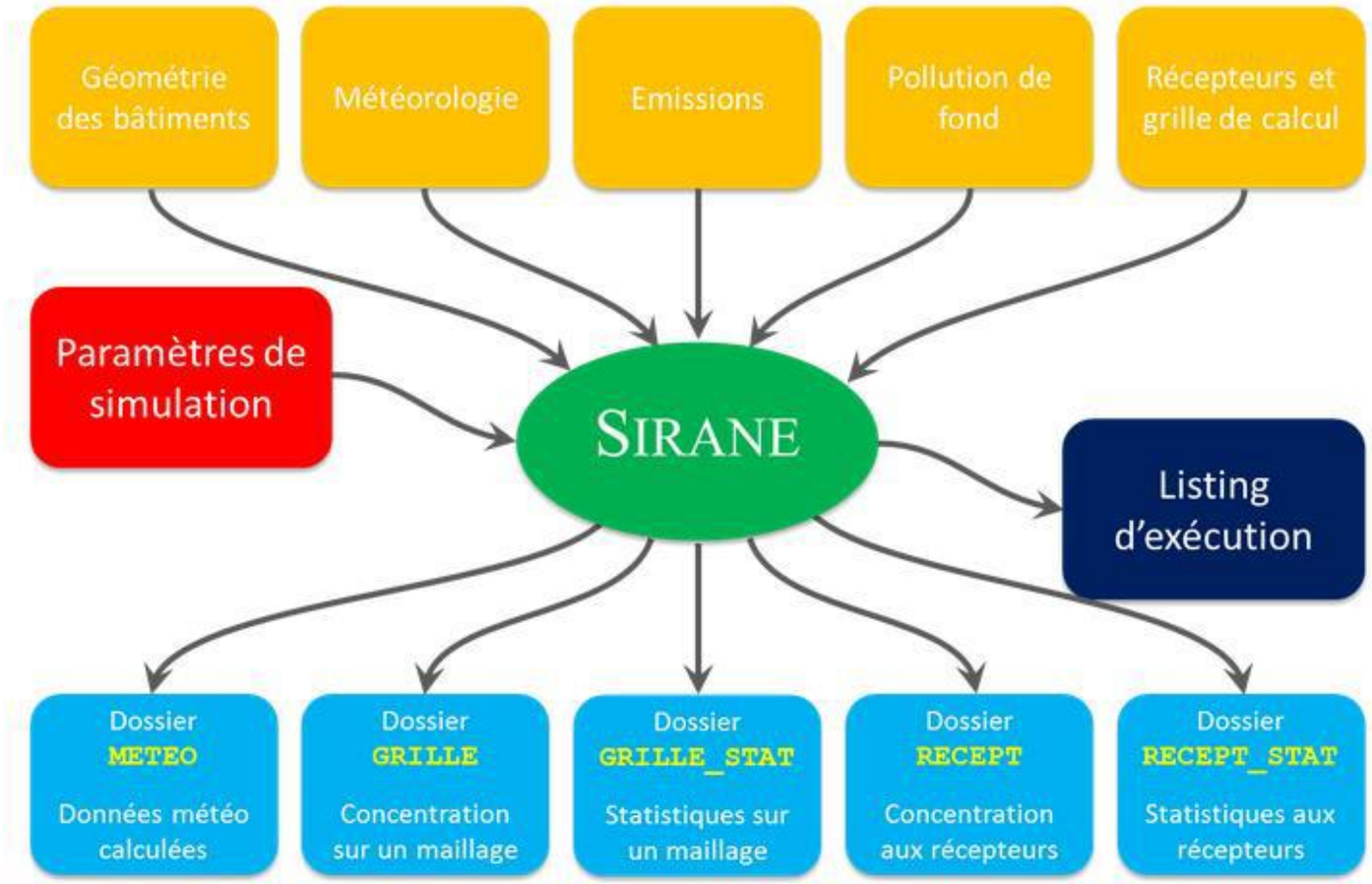
Project goals:

- **Air quality monitoring and surveillance plan**

2023: AIRCITY Tel Aviv

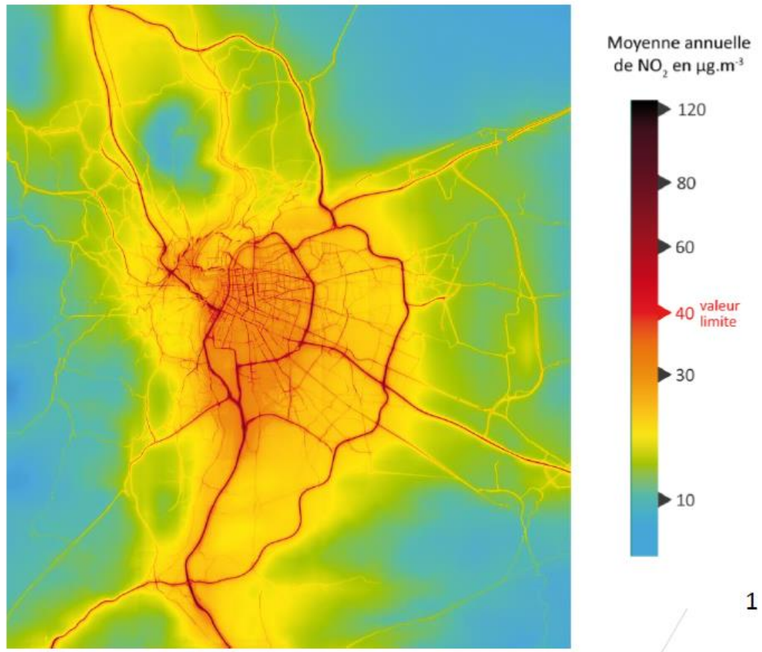
Air quality study and modeling framework for the Israeli Environment Ministry

WRF/CHIMERE/SIRANE modeling chain:



- SIRANE Urban Air Quality Model : **Pollution atmosphérique en milieu urbain**
  - **Cartographie de la pollution urbaine chronique**

Exemple d'application sur l'agglomération de Lyon

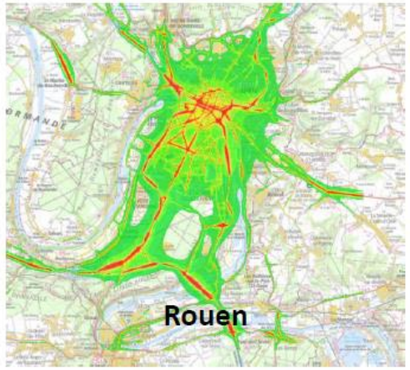


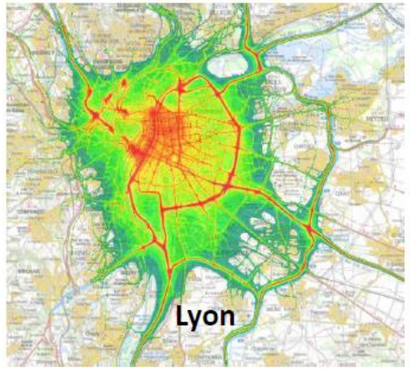
2023: AIRCITY Tel Aviv

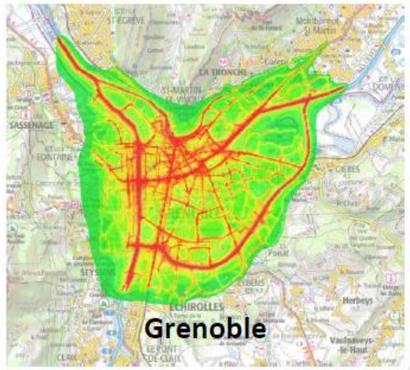
Air quality study and modeling framework for the Israeli Environment Ministry

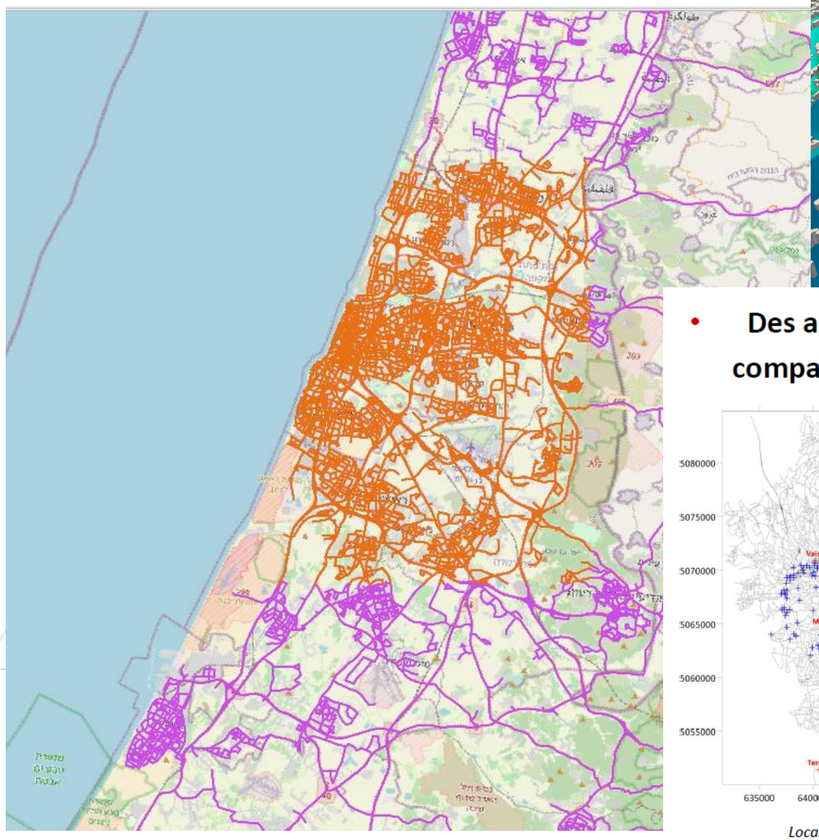
SIRANE:

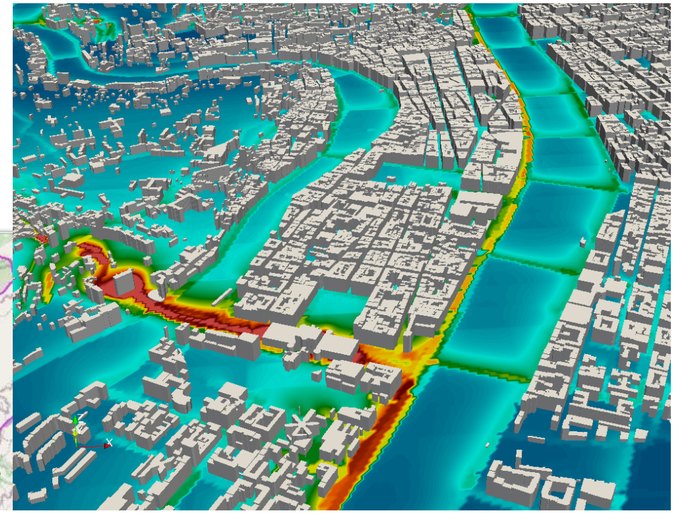
- De nombreuses applications en France et en Europe



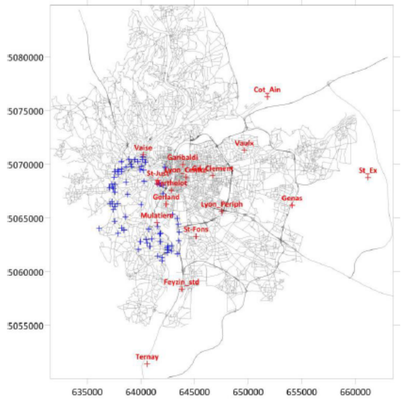




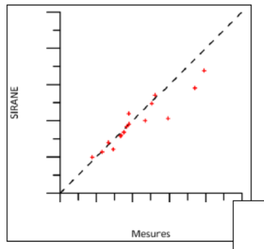




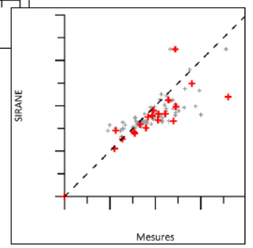
- Des analyses statistiques permettant réaliser des comparaisons modèle/mesures



Localisation des points récepteurs



Comparaisons des résultats SIRANE à ceux mesurés



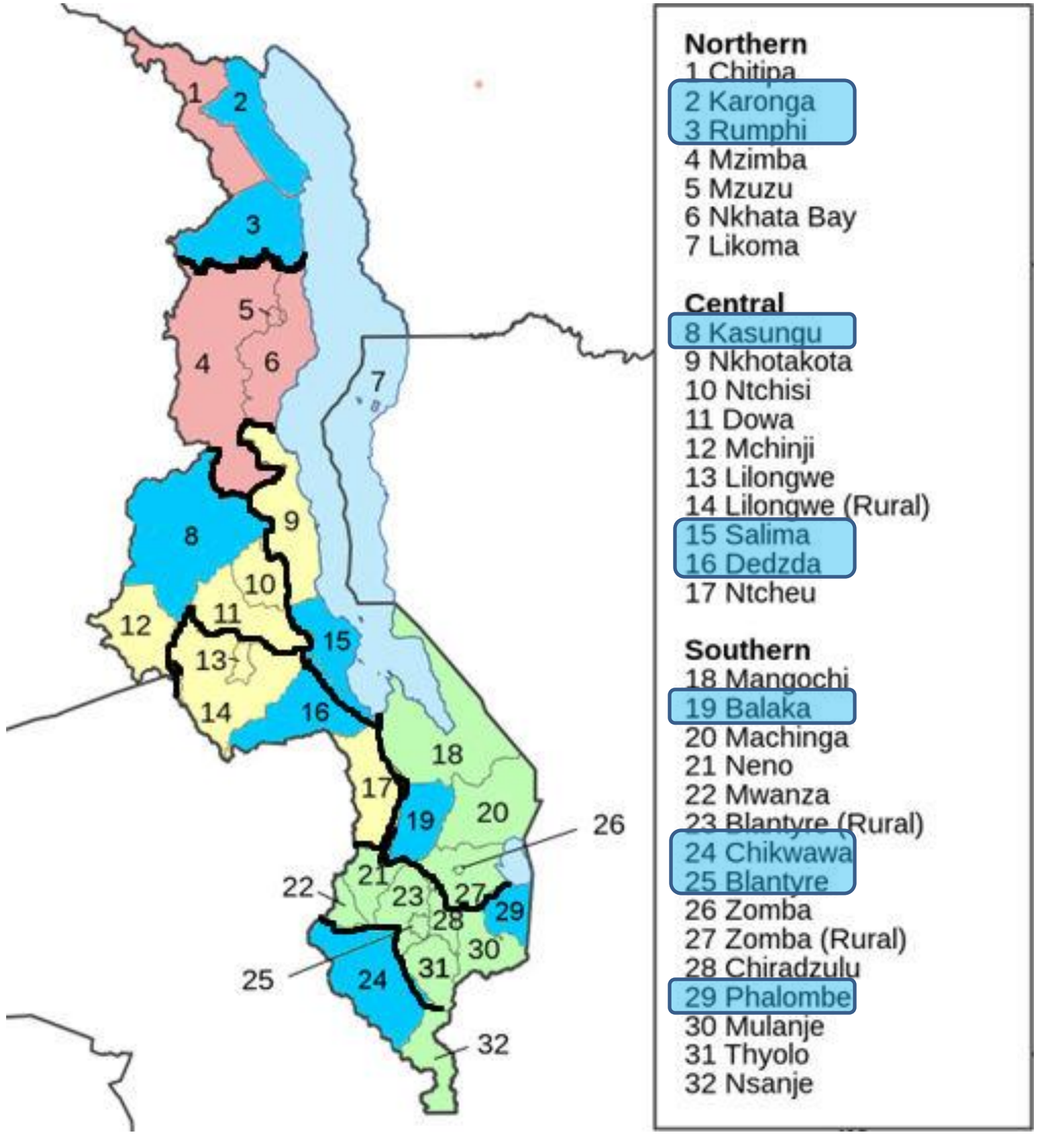
Comparaisons des résultats SIRANE à ceux mesurés (analyseurs et tubes)

2022 – 2023: UNON – Malawi Climate Risk Assessment

CLIMATE CHANGE MODELLING AND RISK ASSESSMENT FOR THE NATIONAL ADAPTATION PLAN OF MALAWI

- **Focus on 8 key districts throughout the country**
  - Diverse agro-ecological profiles in each district
  - Diverse livelihood profiles
  - Diverse hazard profiles

- **Identify the likelihood of future climate hazards including floods, droughts and extreme storm events**
  - What has been the experience to date?
  - What is likely to be the experience in the future?
  - What does this mean in terms of risk?
  - What can we do to mitigate the risk through effective applied adaptation?



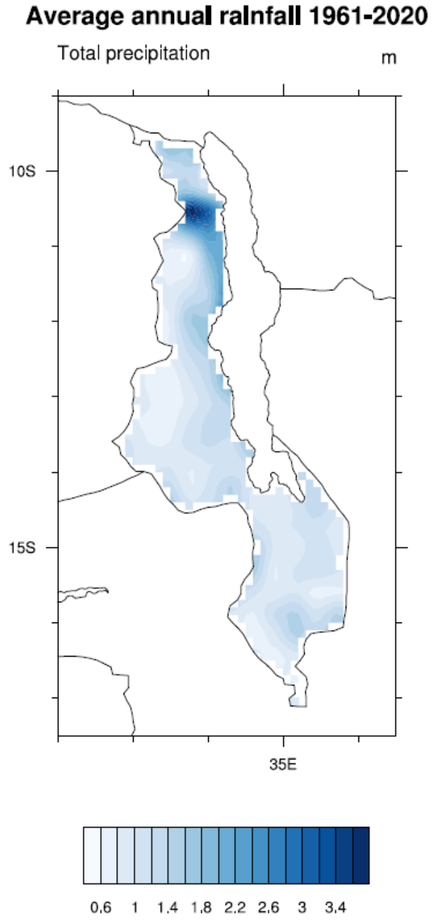
2022 – 2023: Malawi Climate Risk Assessment (UNON)

CLIMATE CHANGE MODELLING AND CLIMATE CHANGE RISK ASSESSMENT FOR THE NATIONAL ADAPTATION PLAN READINESS PROJET IN MALAWI

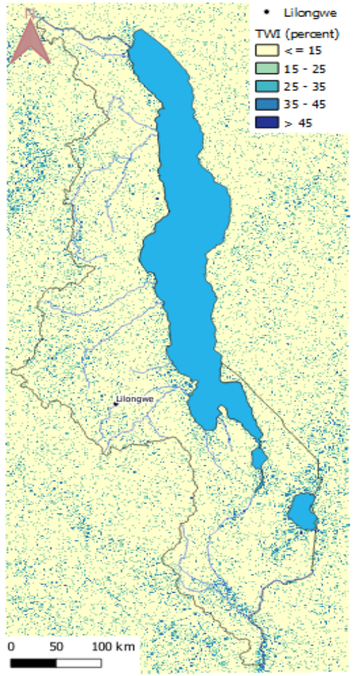
- Identify and evaluate risks AND opportunities (yes, they do exist!)

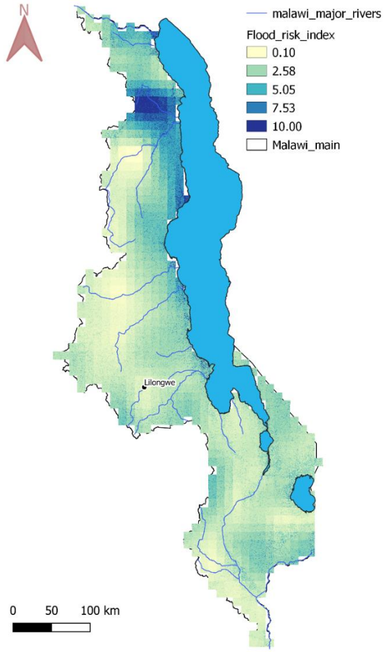
- Plan and prioritize effective adaptation to protect lives and livelihoods

- Mainstream into development plans and projects to prepare for inevitable extreme events and loss/damage occurring when the limits of adaptation have been breached



Topgraphic wetness index

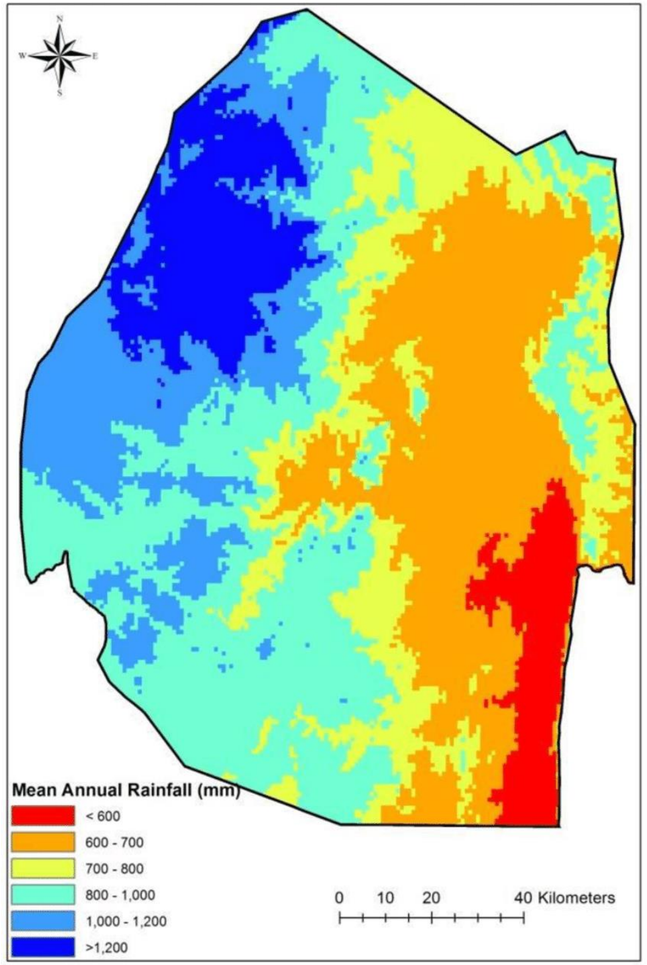




2023: PRODUCING CLIMATE CHANGE SCENARIOS AND RISK ASSESSMENTS FOR ESWATINI (UNON)

Project goals:

- **Develop downscaled or area-based climate change projections**
  - Climate scenarios for 2030, 2063 and 2100 with details for four regions
  - Train National Meteorological Service staff to use climate data to prepare climate change projections, scenarios, risk and vulnerability assessments
- **Produce ecosystem-based climate risk assessments for four regions**
  - Country climate change impact story lines
  - Set of climate risk assessments, developed in collaboration with national stakeholders
- **Organize a one-day capacity building virtual workshop on climate risk assessment and key findings**



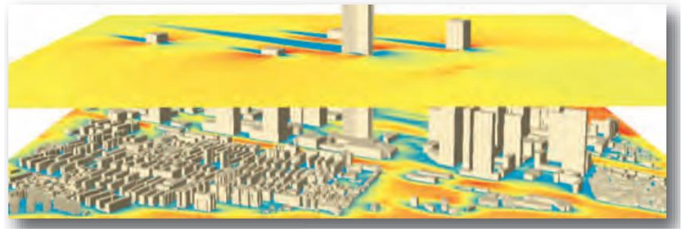
2023 Roadmap for integration of ARIA tools with F-AIR

Motivation:

- **Create centralized modules to manage operational execution of Integrated Modeling Chains for air quality prediction**

ARIA City

GIS-embedded software for modelling air quality in cities

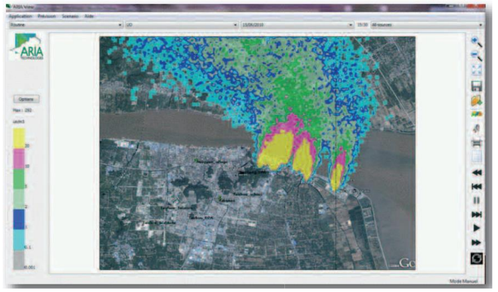


ARIA Impact 3D

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

ARIA View

Air quality surveillance system for industrial sites



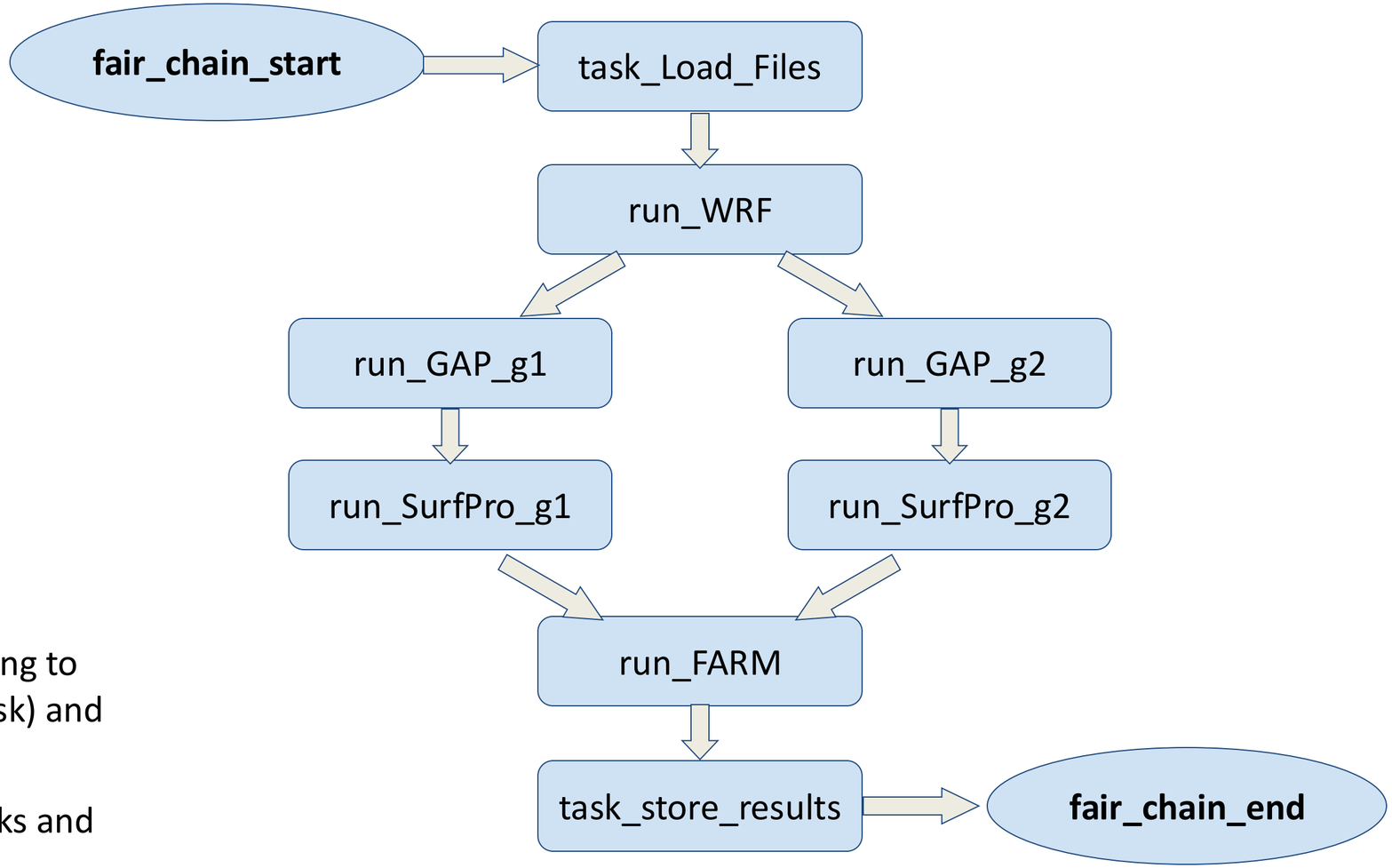
- **Improve user control in customizing modelling chain execution in operational mode and study applications**
- **Automation of data flows**
- **Improved portability of ARIA/ARIANET software tools**

2023 Roadmap for integration of ARIA tools with F-AIR

Motivation:

- **Allow easy configuration of new simulations by allowing users to set up simulations from a collection of templates**

```
Modelling chain configuration
workflow:
    - fair_chain_start --> task_Load_Files
    - task_Load_Files --> run_WRF
    - run_WRF --> run_GAP_g1
    - run_WRF --> run_GAP_g2
    - run_GAP_g1 --> run_SurfPro_g1
    - run_GAP_g2 --> run_SurfPro_g2
    - run_SurfPro_g1 --> run_FARM
    - run_SurfPro_g2 --> run_FARM
    - run_Arplot --> task_store_results
    - task_store_results --> fair_chain_end
```



- The “workflow” key defines the **order** and **dependencies** of tasks execution
- The workflow gets **validated** by F-Air according to the tasks requirements (specified by each task) and **DAG consistency rules**
- **Arbitrary degree of parallelism** between tasks and portions of the chain

2023 Roadmap - Integration of ARIA software tools into F-AIR

SIMPAC 3D SaaS Suite for assessing air dispersion of accidental releases **PO - Bruno Ribstein** **BO - Fréderic Mahé**	**VISION 360 "ARIA INSIDE"** SaaS system for continuous surveillance of air quality at industrial sites ***ARIA VIEW*** On Premise system for continuous surveillance of air quality at industrial sites **PO - Bruno Ribstein** **BO - Claude Derognat**	**ARIA-CITY** GIS-embedded Desktop software for modelling air quality in cities **PO - Victor David** **BO - Maxime - Maxime**	**ARIA IMPACT 3D** Desktop software for studies on the impact of industries and vehicular traffic on air quality **PO - Lydia Ricolleau** **BO - Anne-Sophie Saffre**	**ARIA REGIONAL** On premise system for air quality analysis and forecasting at urban and regional levels **PO - Ines Makni** **BO - Fanny Velay**	**SARRIM** Desktop software for assessing rocket launch plumes impact **PO - Marine Laplanche** **BO - Maxime Nibart**
SIMPAC FIRE module Forest fire module for SIMPAC 3D SaaS Suite (3D SaaS Suite for assessing air dispersion of accidental releases)	**Data fusion/Assimilation modules** Combination observations and modelling results information can be achieved by what is known as "data assimilation" (variational method or Bayesian filter) or "data fusion" (e.g. land use regression)	**WEC & Weather Apps** Extreme rain events service (nowcast/forecast)	**RISKFP** Modeling platform developed to support both forest managers, investors and insurance actors in managing the vulnerability of their assets/portfolios to fire risk.	**FIRE WUI** (Wildfire and the wildland Urban Interface) Fire Widland-Urban Interface Service WEB-SIG (SaaS) for WUI management	**CLIMATE PORTAL** (climat-c.tn) - Solution to make climate projection data produced by nation institute available to the public and to facilitate direct access to these data for potential users

Ready-to-market

Client base needs refinement and business value assessment

Needs business model definition

Thank you!