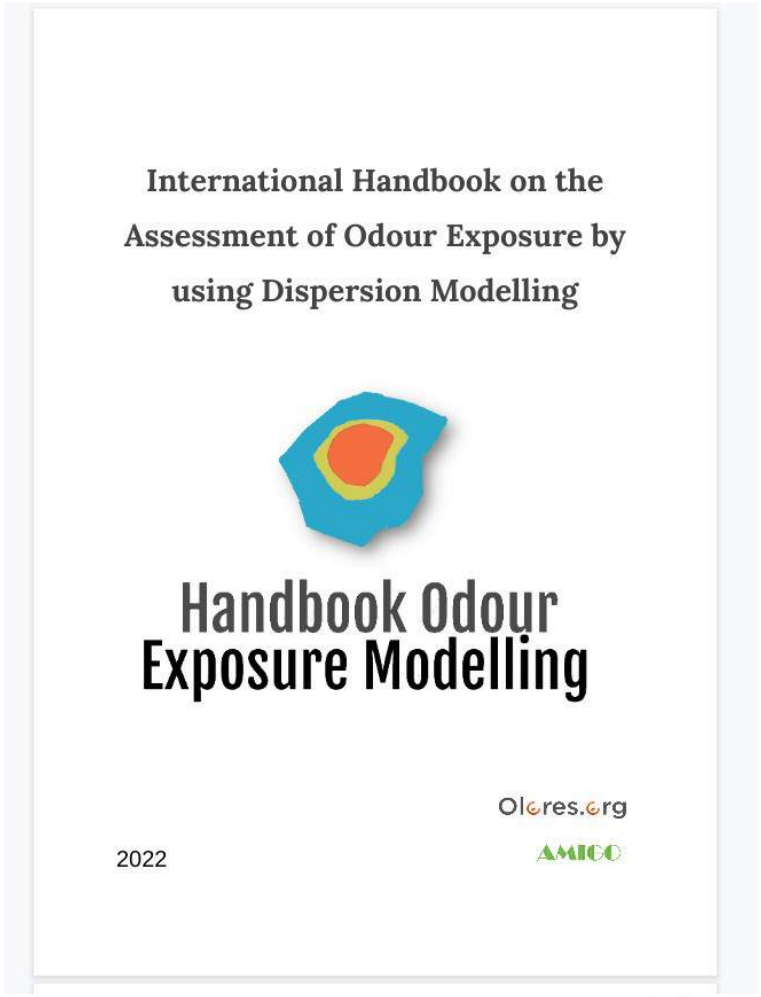

New International Handbook on the Assessment of Odour Exposure Using Dispersion Modelling

Jennifer Barclay / Carlos Nietzsche Díaz

Olores.org AMIGO ASG ATMOSPHERIC SCIENCE GLOBAL AMBIENTE ET — ODORA S.L. —

HARMO21

21st International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes
27 – 30 September 2022, Aveiro Portugal

New International Handbook on the Assessment of Odour Exposure Using Dispersion Modelling

- 50+ international experts from 17 countries.
- Meet once a month
- 7 Task Groups (TG)

Convenors

Jennifer Barclay • 1st
Independent - Atmospheric Modelling and Odour Specialist
Auckland

113 shared connections

View full profile | Message

Günther Schauberger • 1st
Professor, University of Veterinary Medicine
Austria

49 shared connections

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Task Group Leaders

- TG1 Definitions, Terms, Units (**Imelda Shanahan**, *Ireland*)
- TG2 Meteorology (**Christelle Scoffier**, *United Kingdom*; **Jennifer Barclay**, *New Zealand*)
- TG3 Odor Emissions and Source Characterization (**Andrew Bach,** *Australia*; **Anne Claude Romain**, *Belgium*)
- TG4 Dispersion Algorithms (**Giuseppe Brusasca**, *Italy*; **Gianni Tinarelli**, *Italy*)
- TG5 Odor Dose Response (**Rodrigo Rosales**, *Chile*)
- TG6 Reporting (**Tiziano Zarra**, *Italy*; Giusi Oliva, *Italy*)

Other Experts

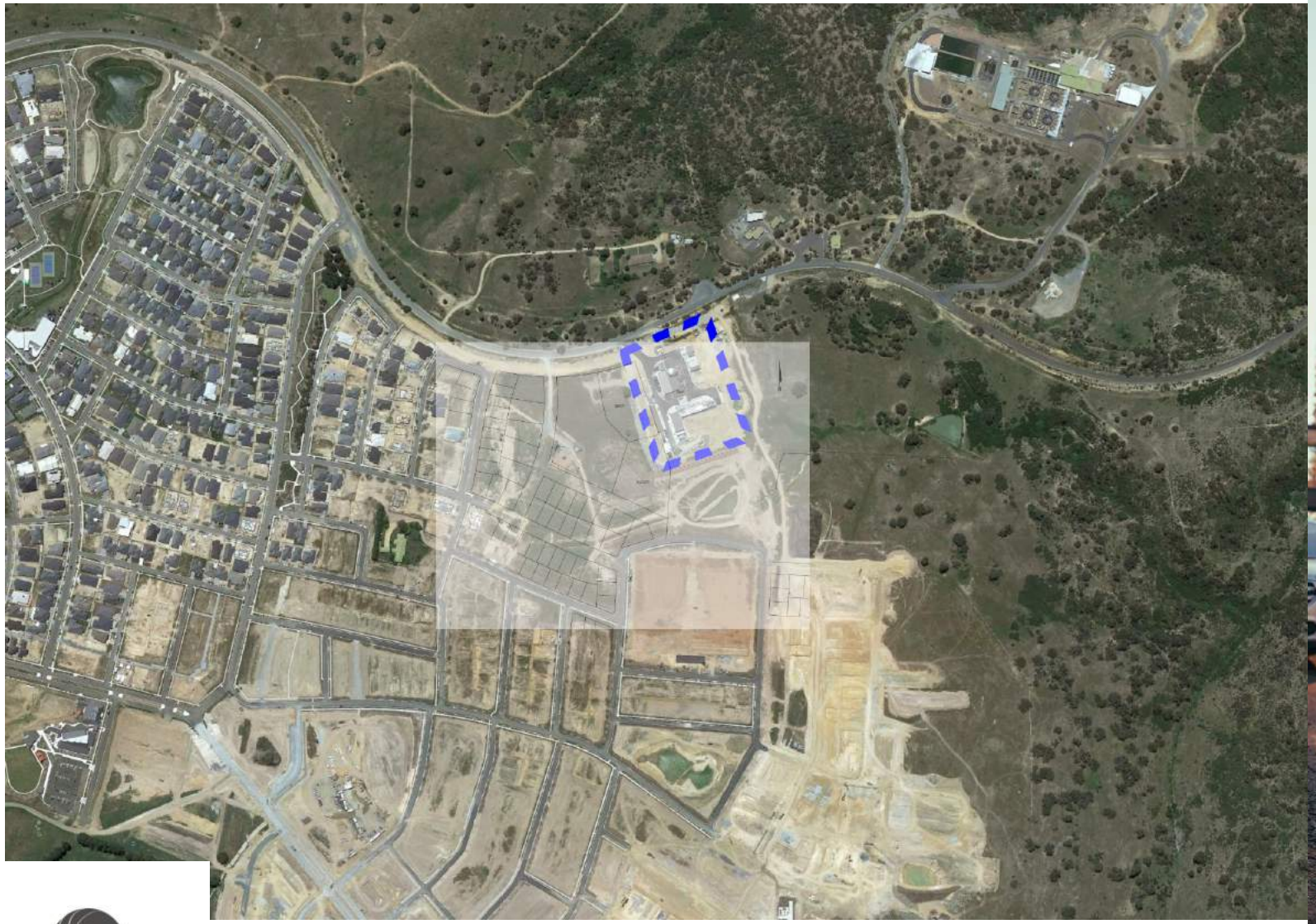
- Ms. Laura Capelli ,University Politecnico di Milano,researcher,Italy
- Ms. Hélène Piet Sarnet ,Egis Group,consultant,France
- Mr. Luis Diaz ,Particulas ,researcher,Chile
- Mr. Andrea Rossi ,Progress SRL. ,consultant,Italy
- Ms. Hellen Arichábala ,Ikani SA,consultant,Ecuador
- Mr Andrew Balch ,Air Environment,consultant,Australia
- Ms. Débora Lia Perazzoli ,Envex,consultant,Brazil
- Ms. Christelle Escoffier ,Wood Environment & Infrastructure Solutions,consultant,United Kingdom
- Mr. Rafael Geha ,Ambiental RB,consultant,Brazil
- Mr. Kenny K M Lok ,EnviPro Technology Company Limited,consultant,China
- Mr. Geordie Galvin," Astute Environmental Consulting Pty Ltd,",consultant,Australia
- Mr. Nick Jones ,Olfasense,consultant,United Kingdom
- Mr. Manuel Santiago ,Advisian,consultant,Spain
- Mr. Rodrigo Rosales,"Ministry of Environment of Chile, ",Public officer,Chile
- Ms. Phyllis Diosey,Hazen and Sawyer,consultant,United States of America
- Ms Valérie Nastasi,Suez,consultant,France
  Ms. Emmanuelle Duthier,Numtech,consultant,France.
- Mr Sarveshkumar Sharma ,"Indian Institute of Technology Bombay, ",researcher,India
- Mr. Eric Concepción ,Ceimic,consultant,Peru
- Mr. Oliver Olang',Element,consultant,Qatar
- Ms. Rossella Prandi ,Simularia,consultant,Italy
- Mr. Jerome Godart ,Atmo Normandie,consultant,France
- Mr. Adrien Bouzonville ,Atmoterra,consultant,France
- Mr. Dietmar Öttl ,"Dept Housing, Energy, Tech.of the Gov. Styria, ",Public officer,Austria
- Ms. Angie Wagner ,"Trinity Consultants, USA, ",consultant,United States of America
- Mr. Jean-Michel Guillot , Ecole des Mines d'Ales France ,researcher,France
- Mr. Carlos Diaz,Ambiente et Odora,consultant,Spain
- Mr. Roberto Bellasio,"Enviroware srl,",Consultant,Italy
- Dr. Silvia Trini Castelli,CNR-ISAC (National Council for Research),researcher,Italy
- Mr. Loren Trick,LT Environmental LLC,Consultant,USA
- Mr. Martí de Riquer,Meteosim,Consultant,Spain
- Ms. Eva Berbekar,Uppenkamp + Partner,Consultant,Germany
- Ms. Laura Hinderink,Uppenkamp + Partner,Consultant,Germany
- Ms. Heike Hauschildt,Olfasense,Consultant,Germany
- Ms. Helga Lauerbach ,Lohmeyer,Consultant,Germany
- Ms. Osnat yossef,Ministry of Environment of Israel,Public officer,Israel

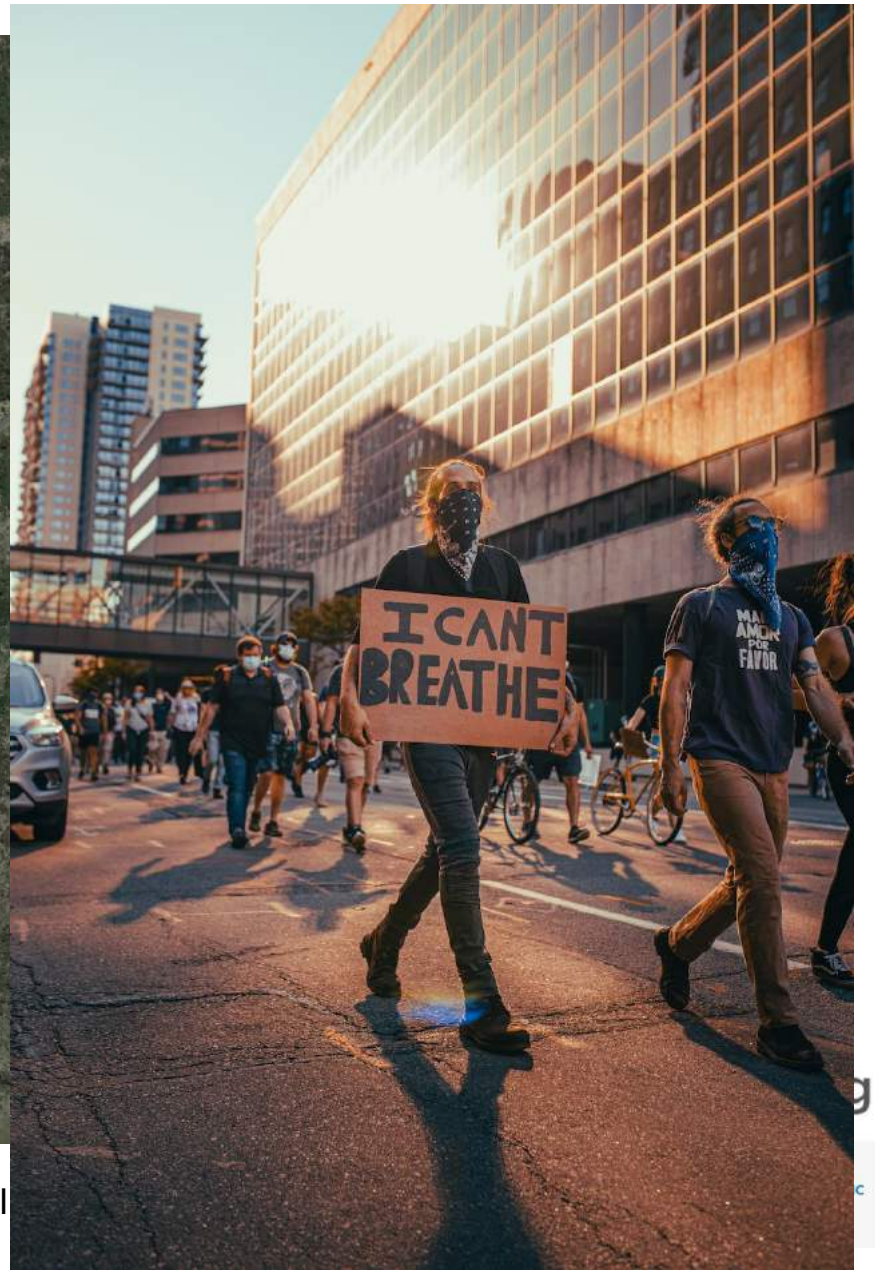
We need more volunteers!!!

Why?

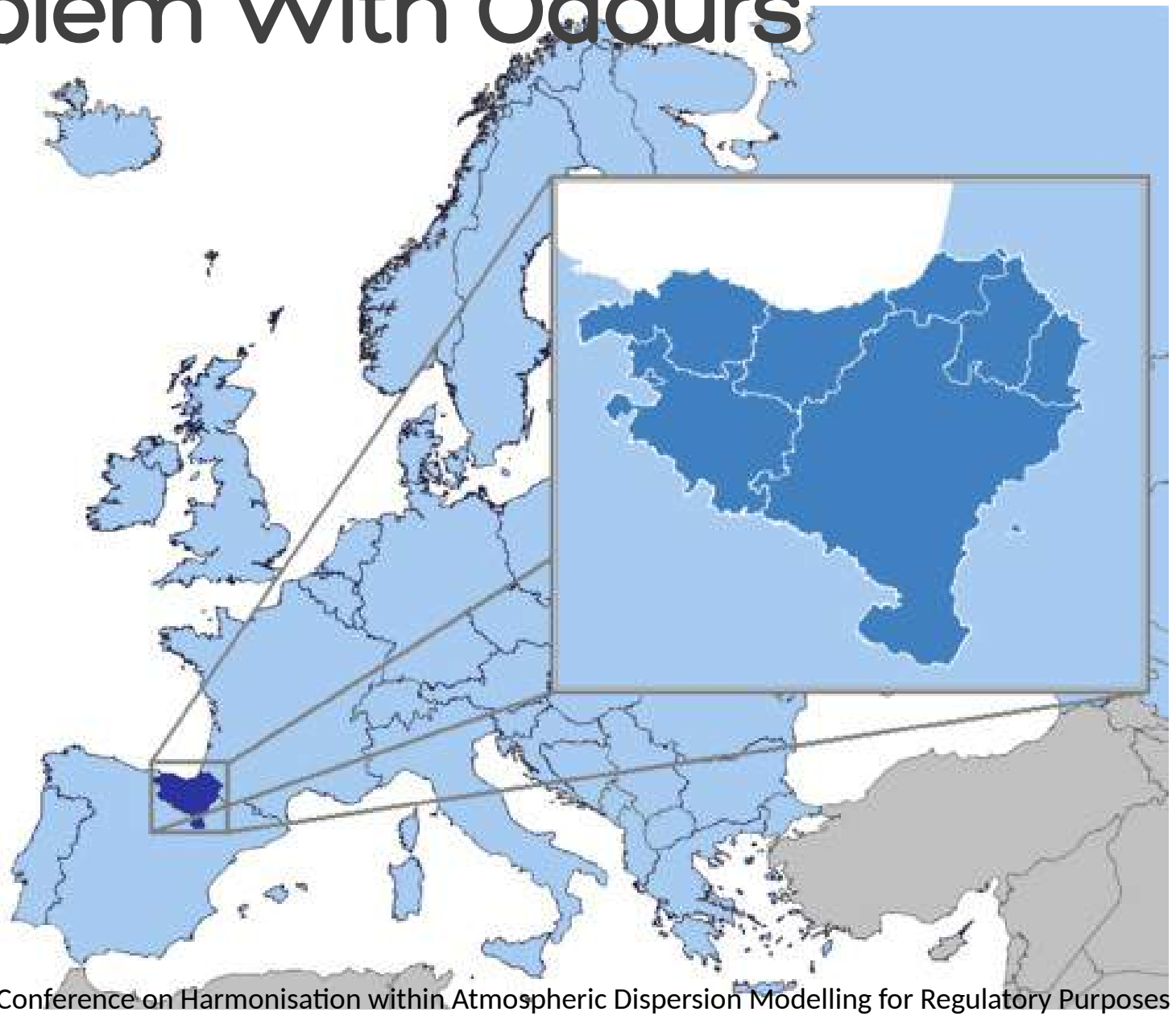
- Modelling odours is **complex** and many of the guidelines on modelling published around the world fall short in treating this vector.
- Modelling odours often requires to forget about traditional dispersion modelling operating modes and to **focus on exposure**.
- Odours are perceived in **seconds or minutes, not hours** and this is key in calculating its impact on ambient air.
- Most odour incidents are generated during **calm or very low wind speeds**.
- There is a need to investigate the **role of *Instrumental Odour Monitoring Systems* (IOMS)** on the evaluation of model performance.

The Problem With Odours





The Problem With Odours



The Problem With Odours

Decrease on property values

Health effects

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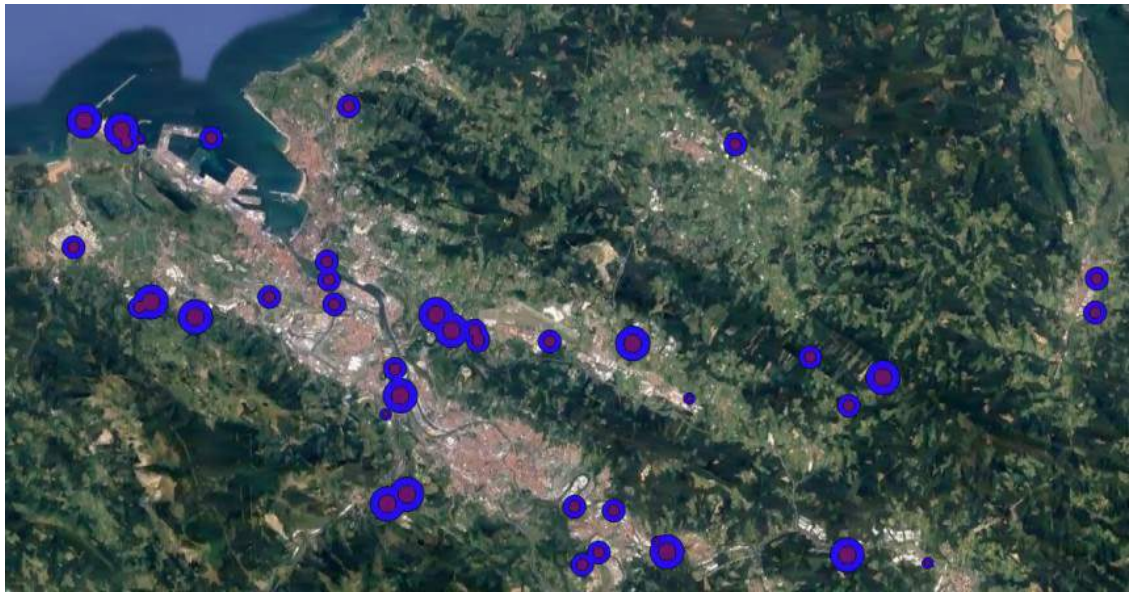
The Problem With Odours

Region of Basque country

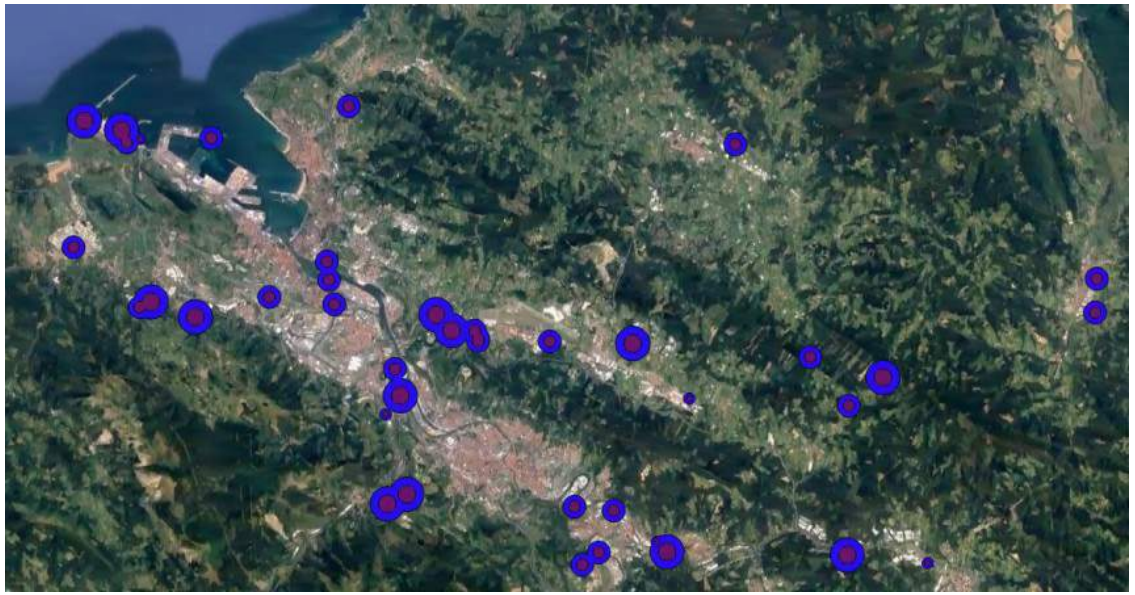


Decrease on property values → 1,942 million euros.

Health effects → 174,2 million euros

The Problem With Odours

Region of Basque country



Decrease on property values → 1,942 million euros.

Health effects → 174,2 million euros

TOTAL: 2,120 million euros

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The Problem With Odours

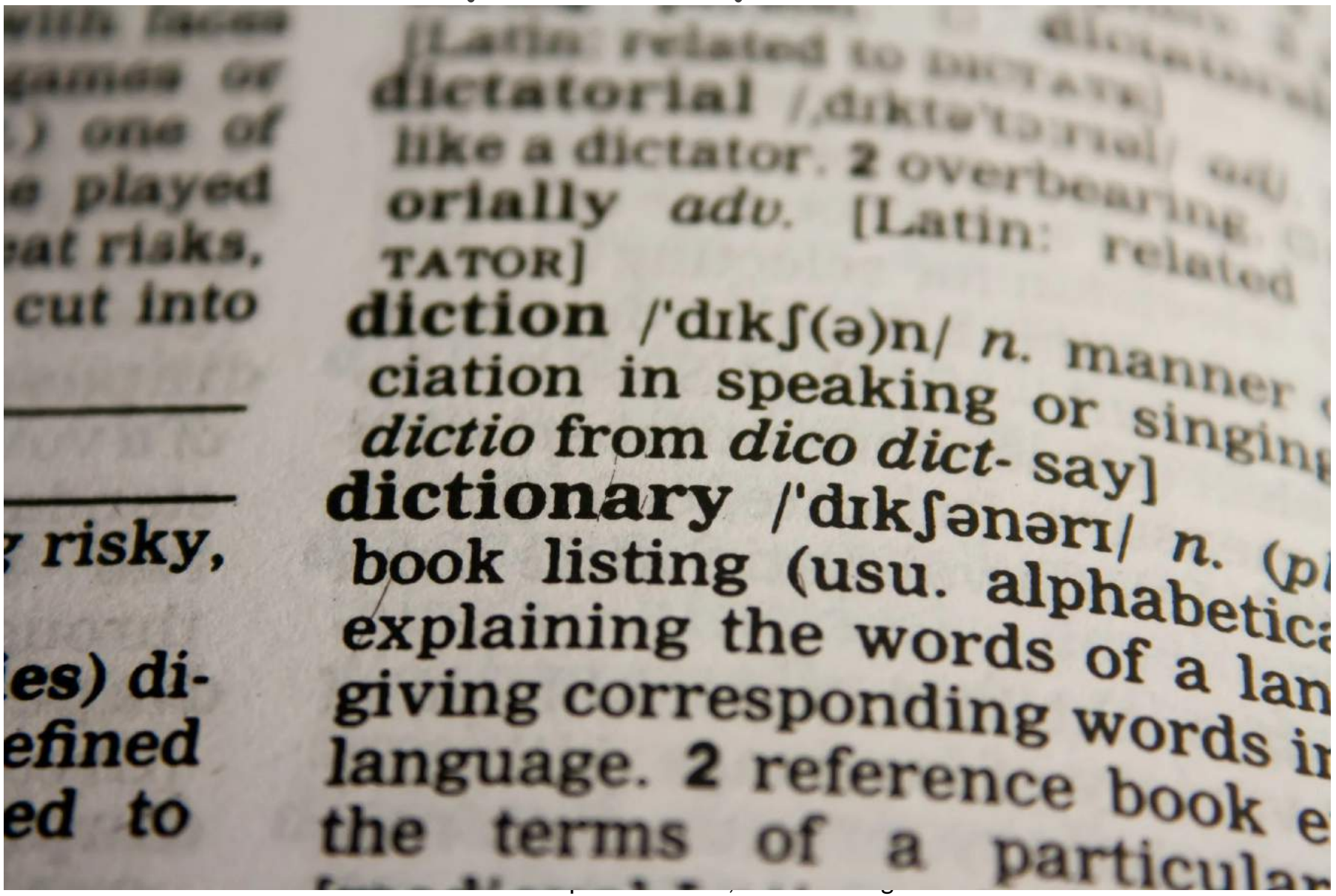
3 Million people → 2,120 million euros

746 Million people → **527,000 million euros**

7 Task Groups

1. Definitions, Terms, Units
2. Meteorology
3. Emissions and Source Characterization
4. Dispersion Algorithms
5. Dose Response
6. Reporting
7. Other approaches

TG1. Definitions, Terms, Units



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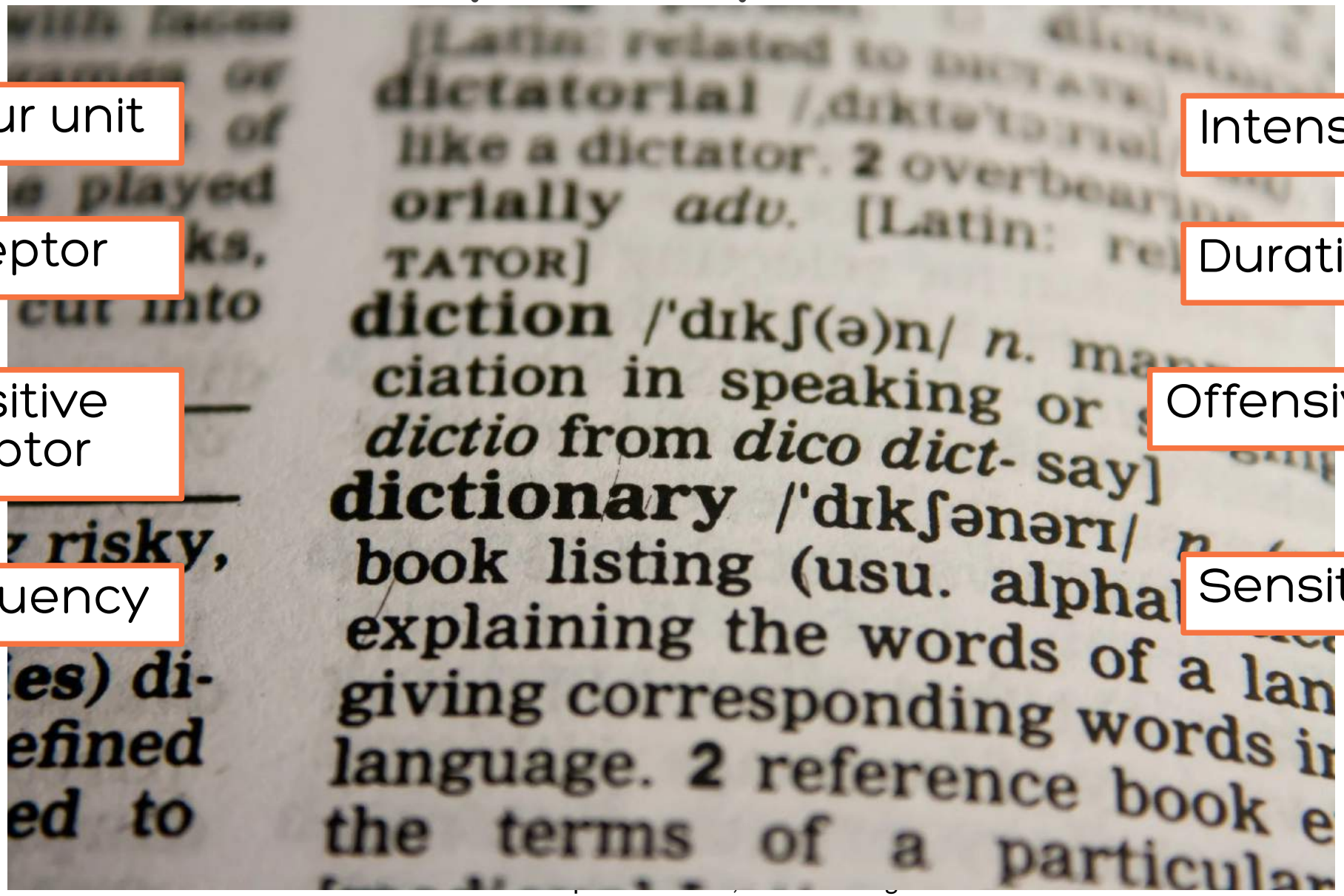
TG1. Definitions, Terms, Units

Odour unit

Receptor

Sensitive receptor

Frequency



Intensity

Duration

Offensiveness

Sensitivity

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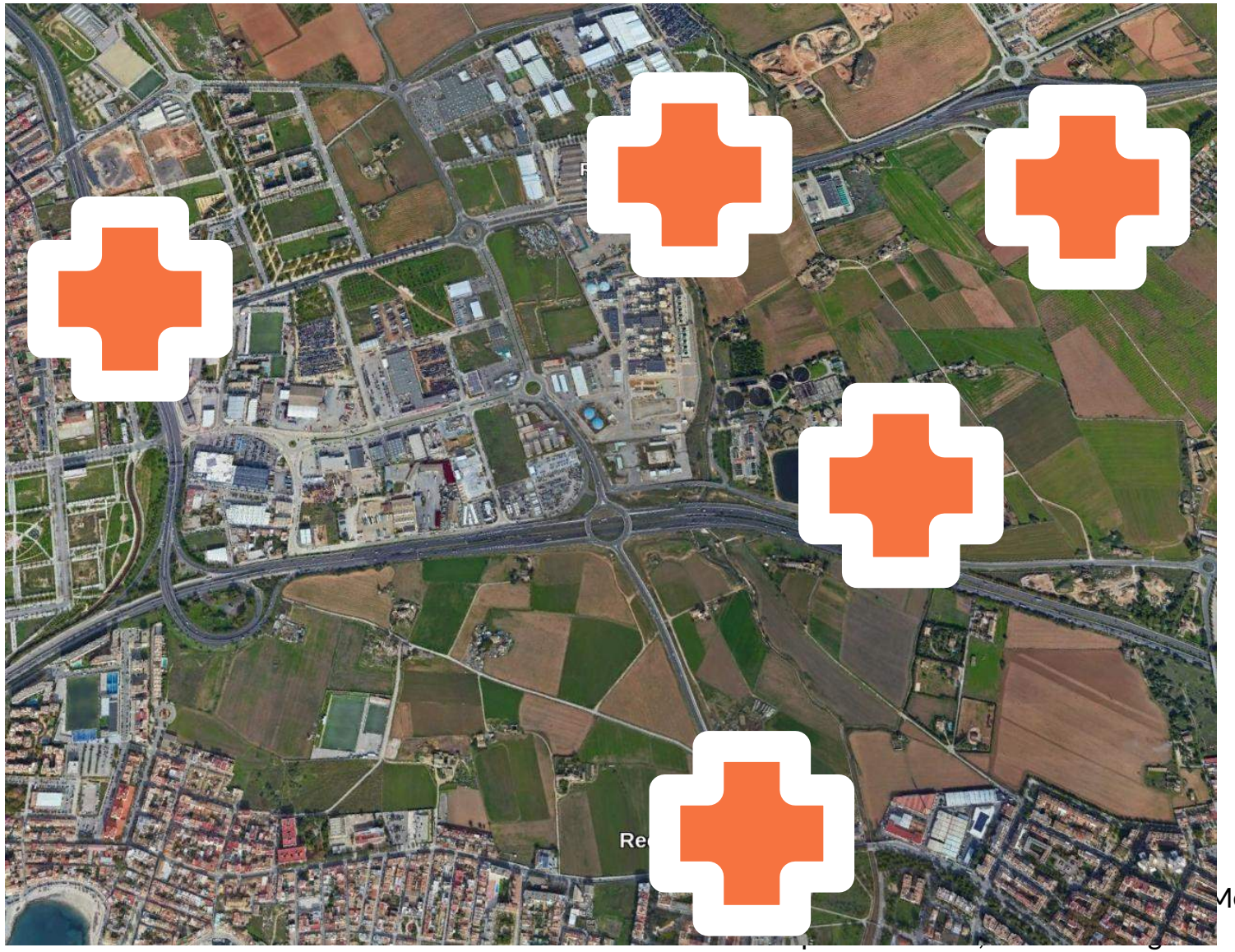
Example of definition: Receptor



Example of definition: Sensitive Receptor

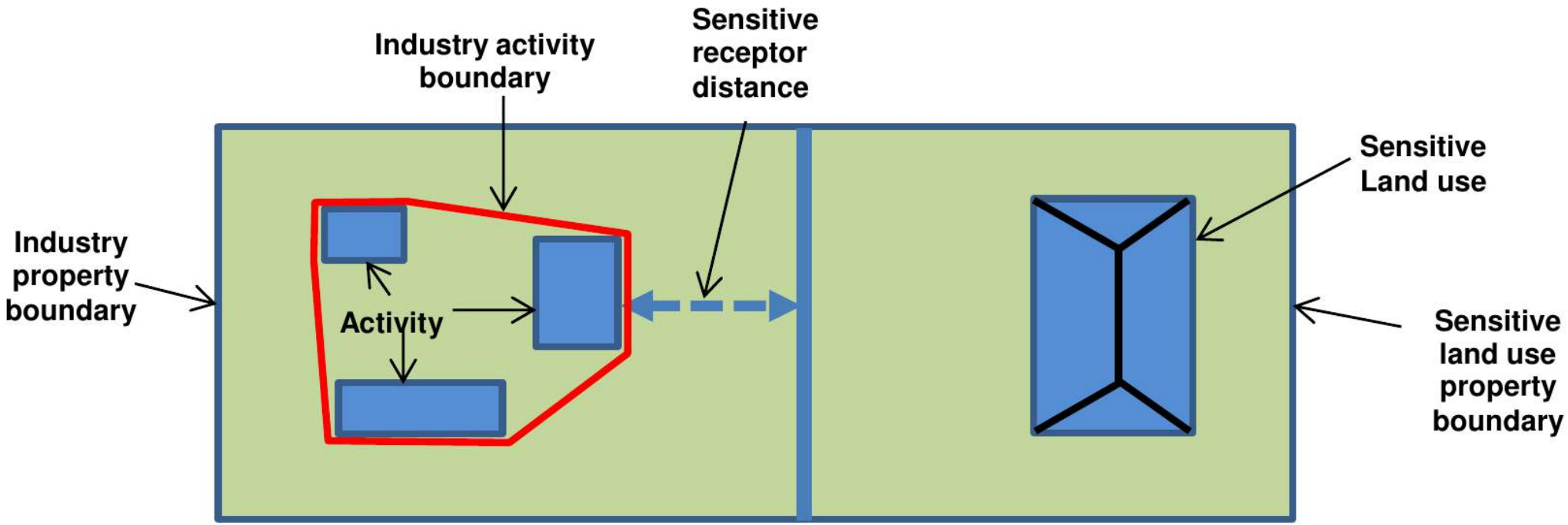


Figure 4: Method 1 - 'urban' method

Example of definition: Sensitive Receptor

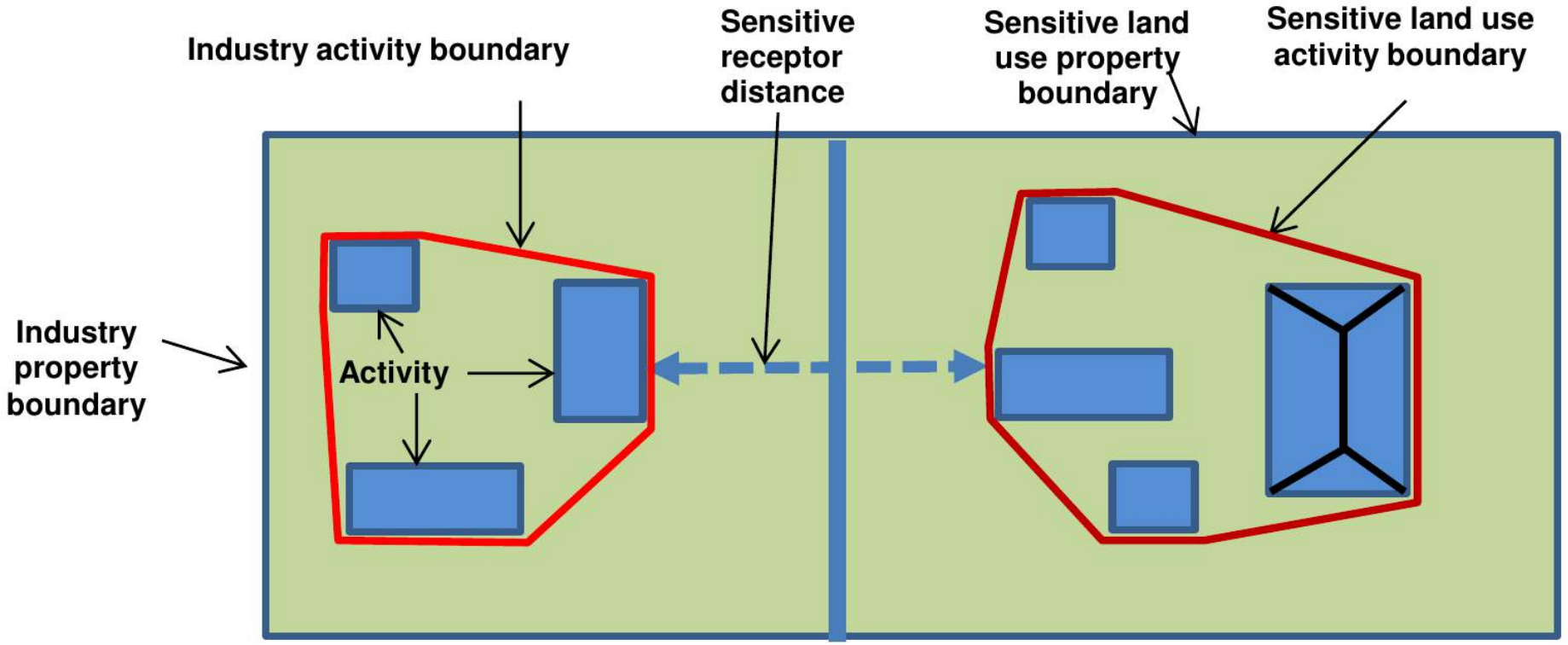


Figure 5: Method 2 - 'rural' method

TG2 Meteorology

These are some essential aspects to be covered.

- **1D meteorology to 3D meteorology**
- **Single/multiple station meteorology** vs **numerical weather prediction models**
- **Complex meteorological conditions**
- **Relevance of model year** against the long term historic records.
- Model **evaluation**
- **Reporting** meteorology

TG3 Sources and emission characterisation.

These are some essential aspects to be covered.

- Point Sources
- Area Sources
- Fugitive Sources
- Specific Cases

Point sources

Point sources

Point sources

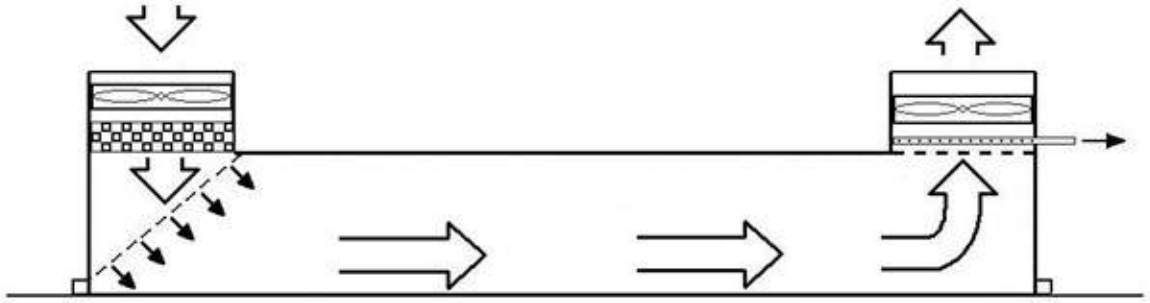
Point sources

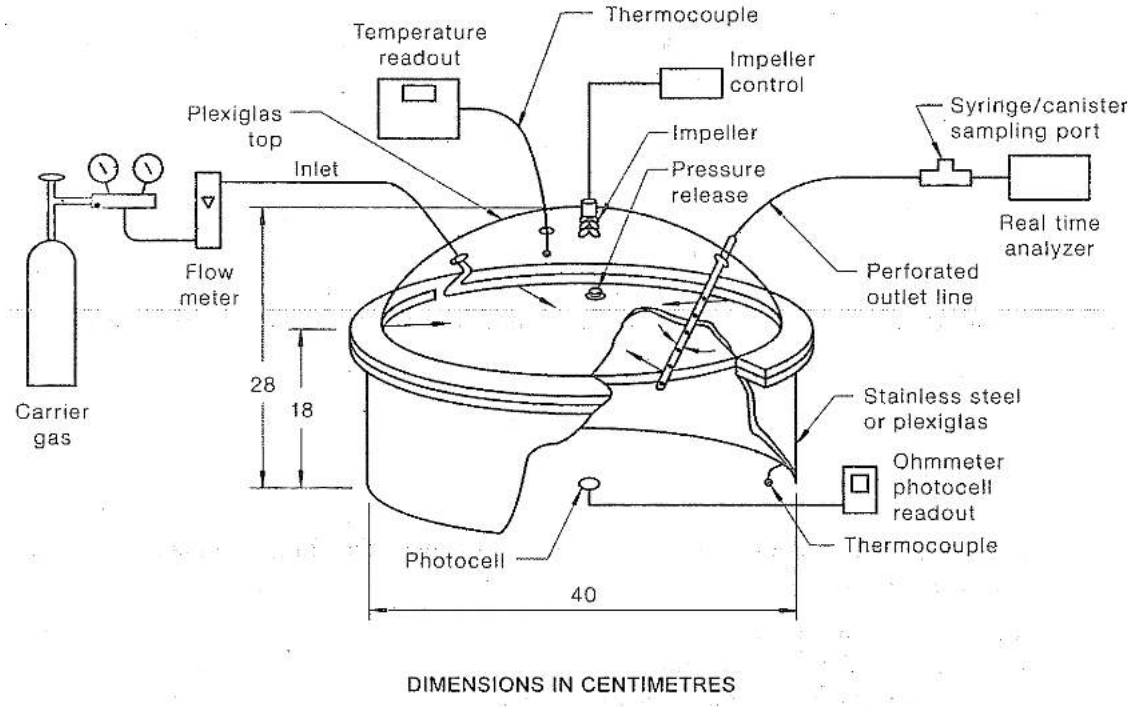
Sampling

Area sources (passive)

Area sources (passive)

Area sources Sampling (passive)

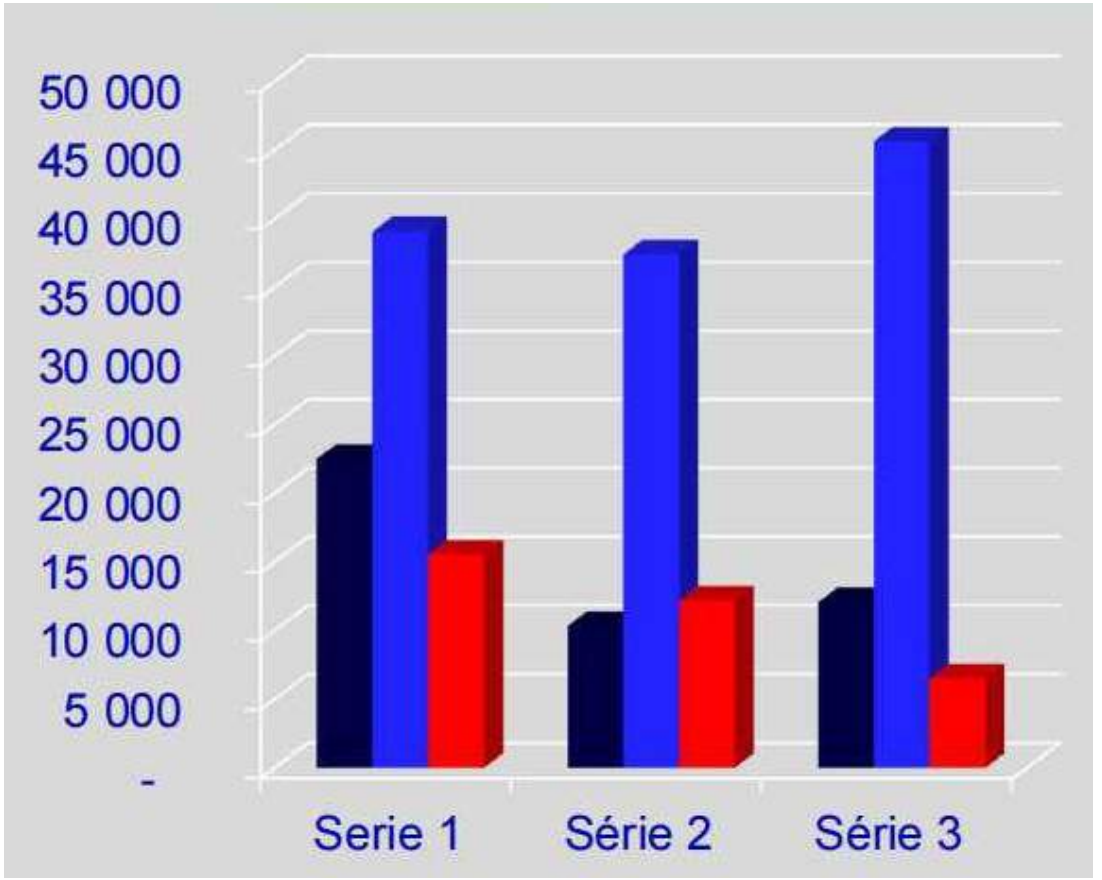




Area sources Sampling (passive)

Area sources Sampling (passive)

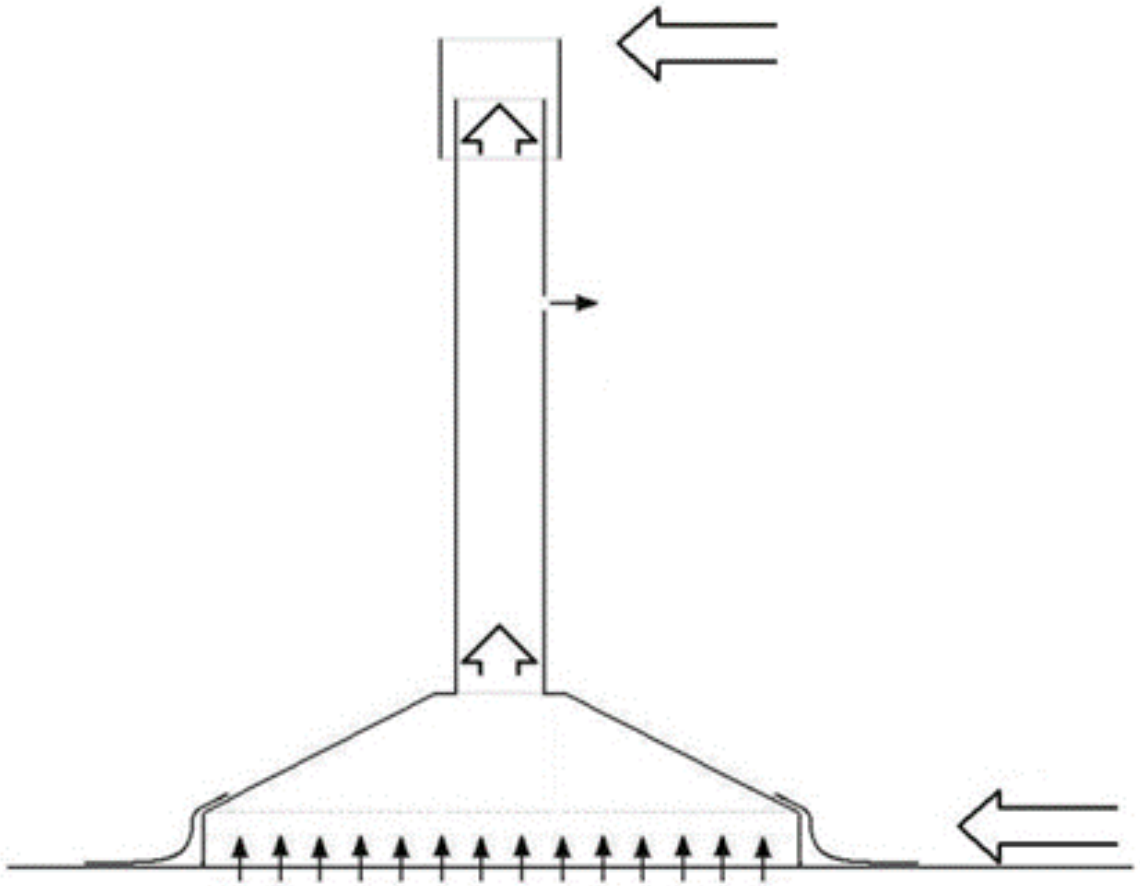
Area sources Sampling (passive)



Area sources (active)

Area sources (active)

Area sources Sampling (Active)

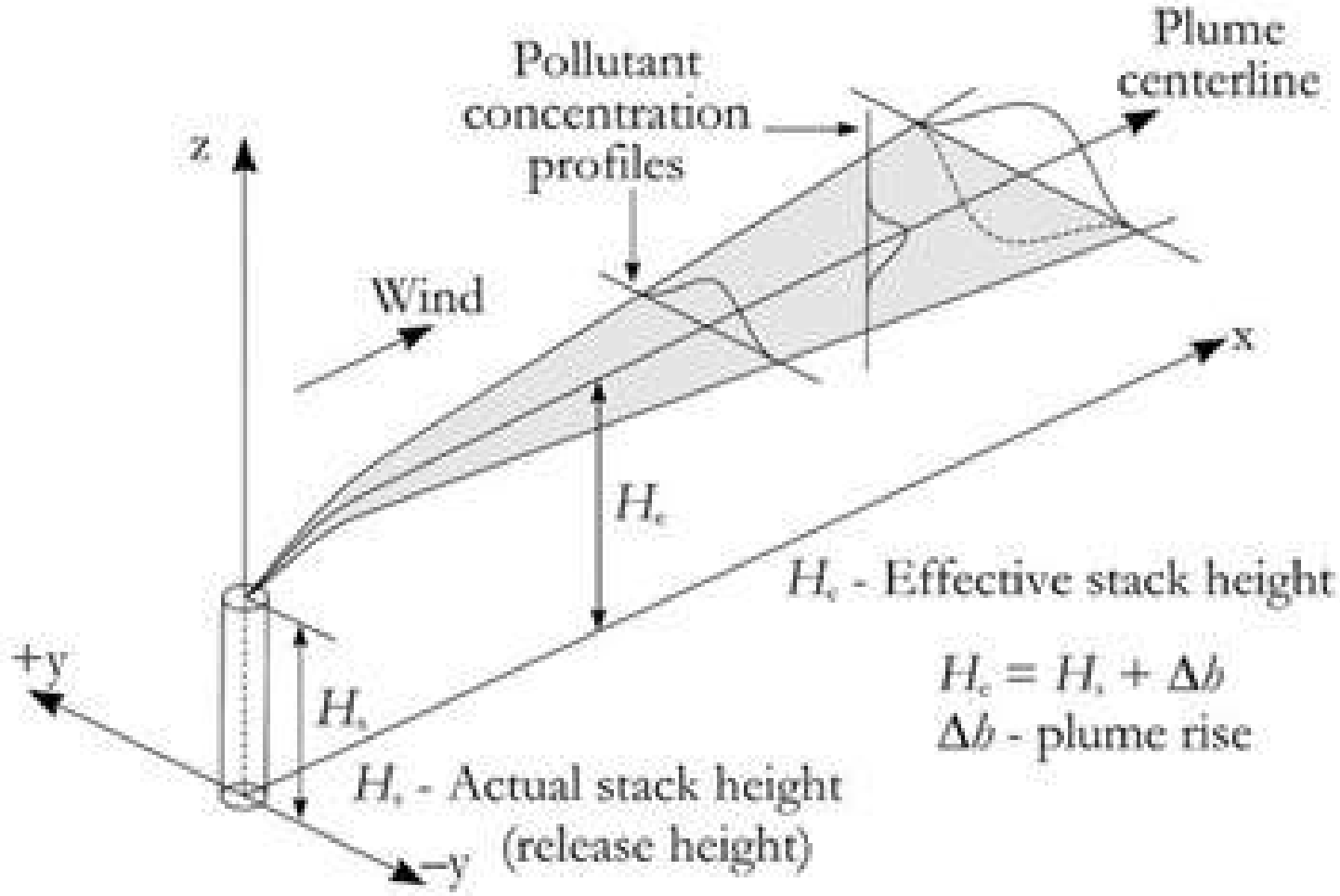


Diffuse emissions.

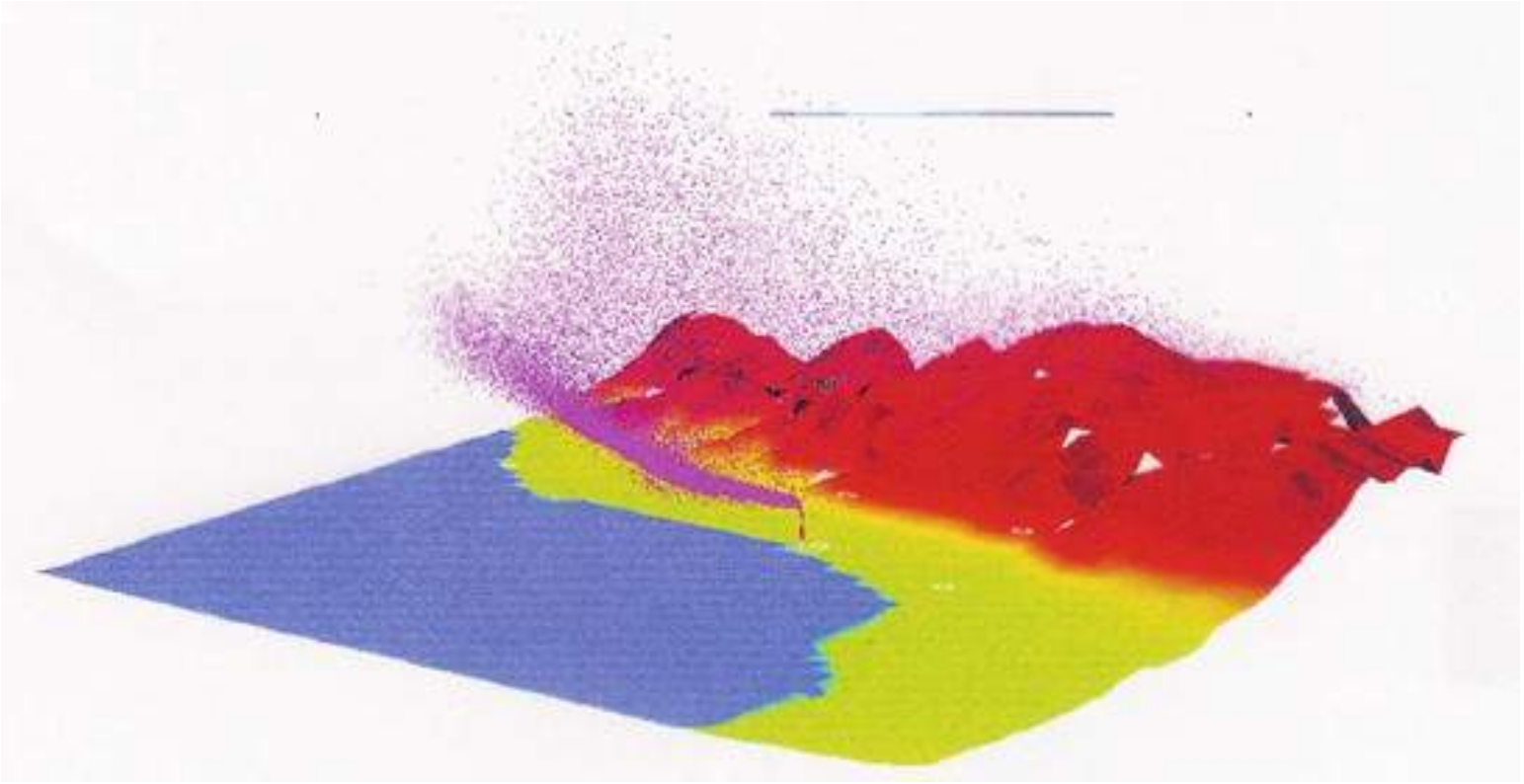
TG4. Dispersion Models and Algorithms

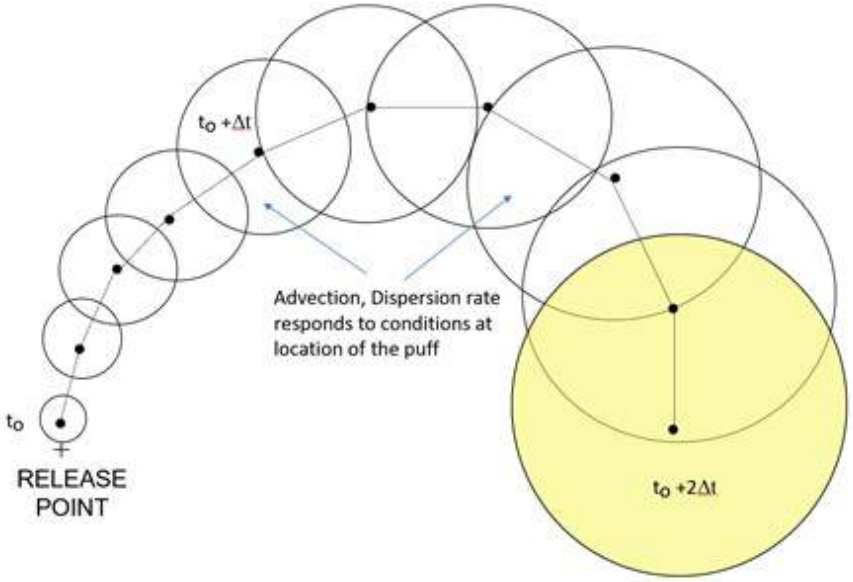
- The role of dispersion models in the frame of odour applications
- General **synthetic description of the dispersion algorithms**
- **Operational existing models**
- General **well-known problems/limitations/solutions**
- Which **model or type of model is suitable for odours?**
- **Model validation** in the frame of odor applications
- A **window open on the research**
- A **bridge towards the stakeholders**

Gaussian

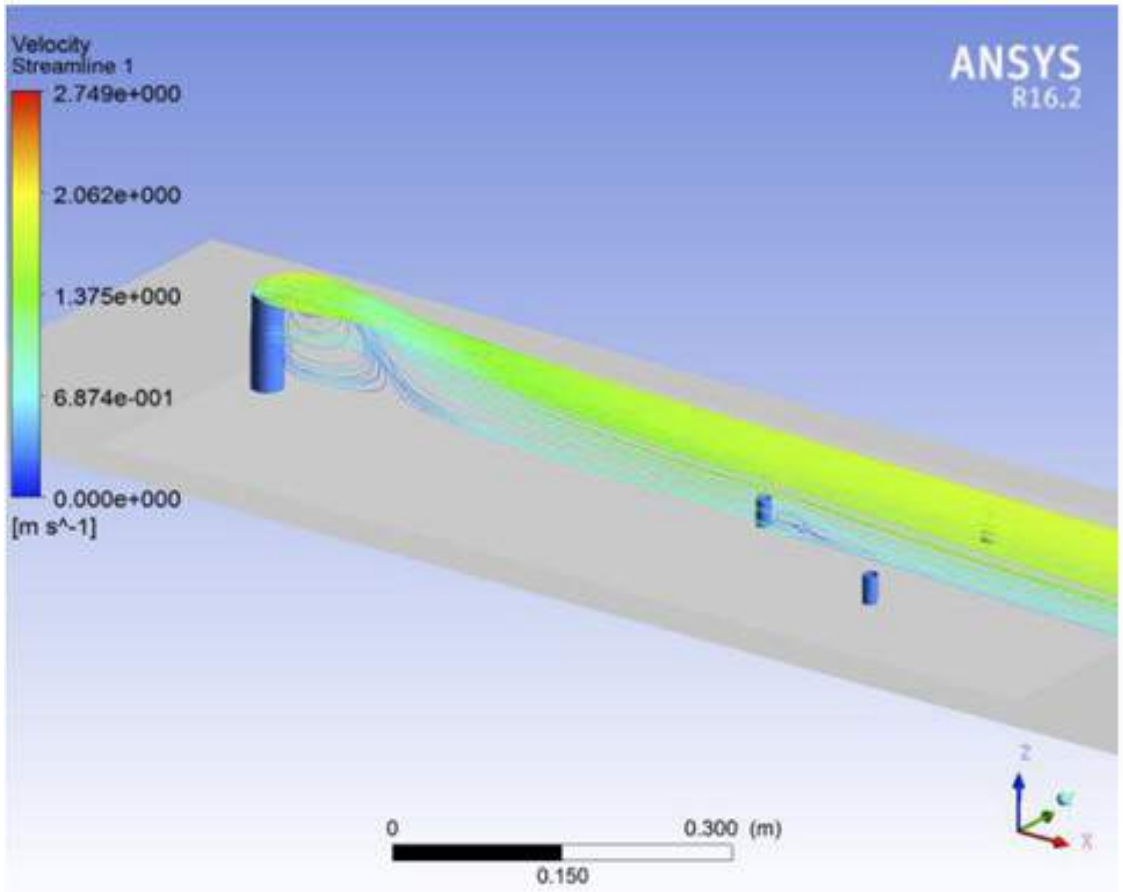

Pollutant
concentration
profiles
Plume
centerline
z
Wind
x
H_e
H_e - Effective stack height
$H_e = H_s + \Delta b$
Δb - plume rise
+y
H_s
H_s - Actual stack height
(release height)
-y

Lagrangian

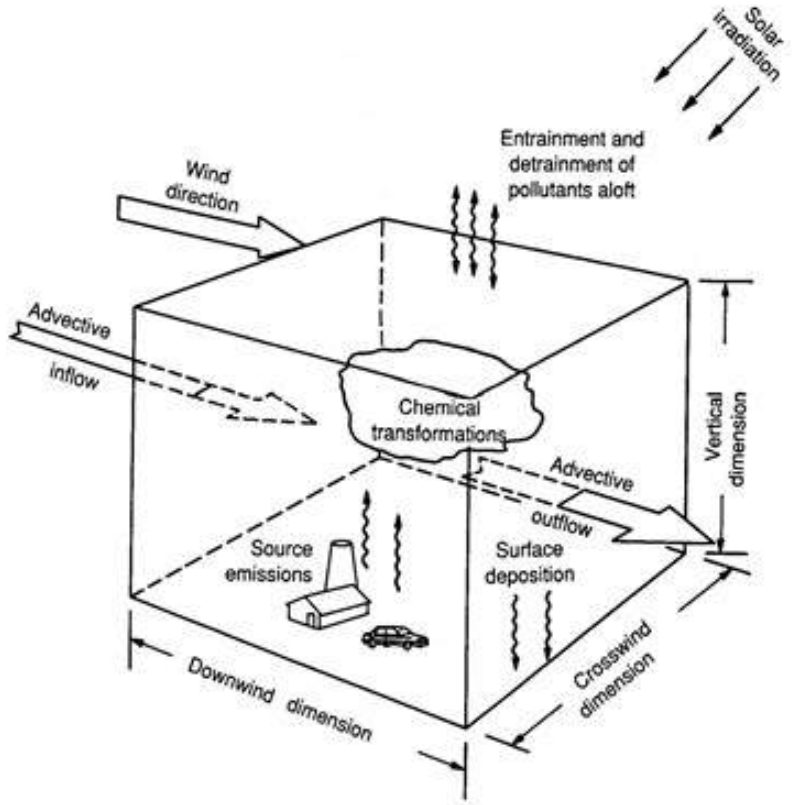



$t_o + \Delta t$
Advection, Dispersion rate responds to conditions at location of the puff
t_o
RELEASE POINT
$t_o + 2\Delta t$

Eulerian

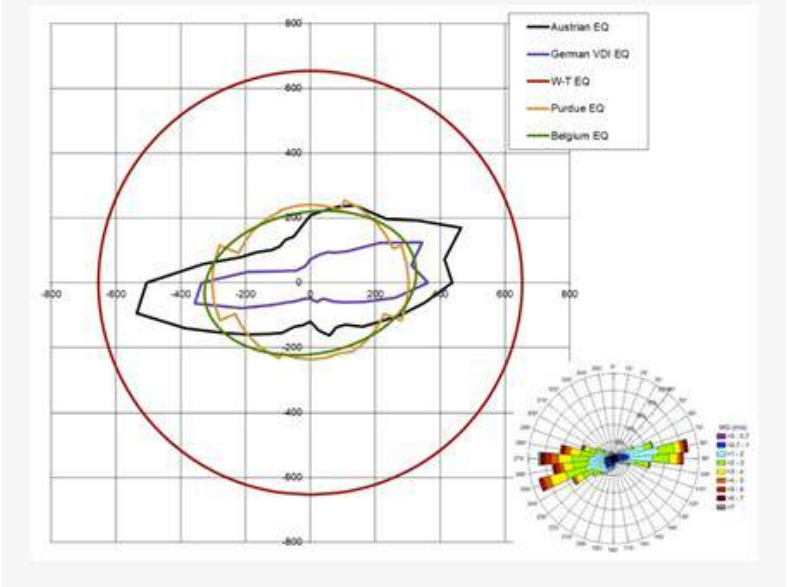


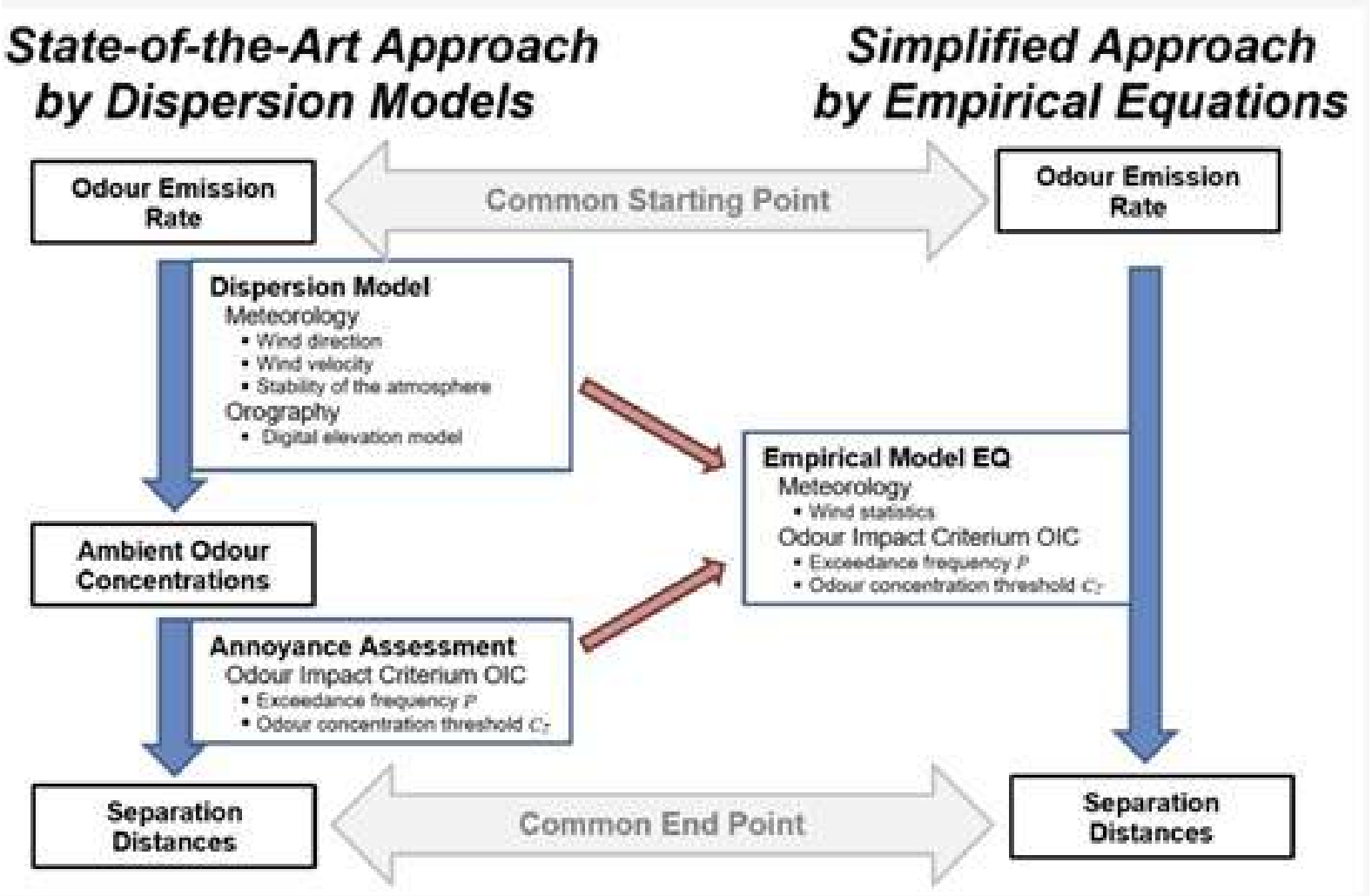
CFD model (source: Brusca, 2008).



Eulerian dispersion model (source: (NOAA, 2008)

Separation distances





source: Brancher, 2020

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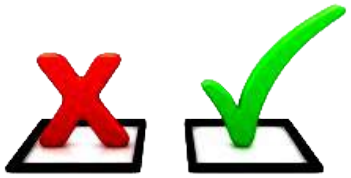
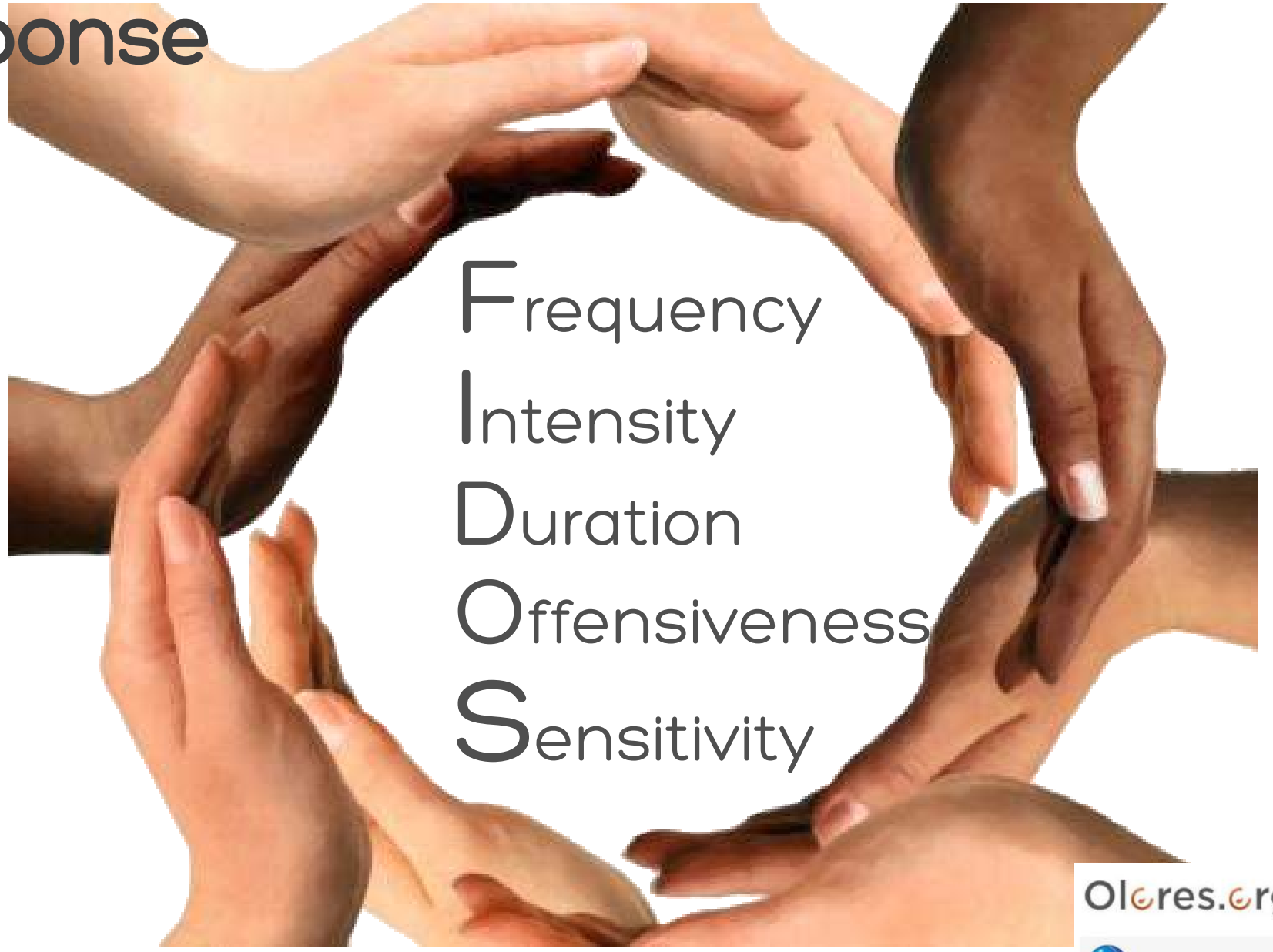
TG5. Dose Response

OIC





TG5. Dose Response

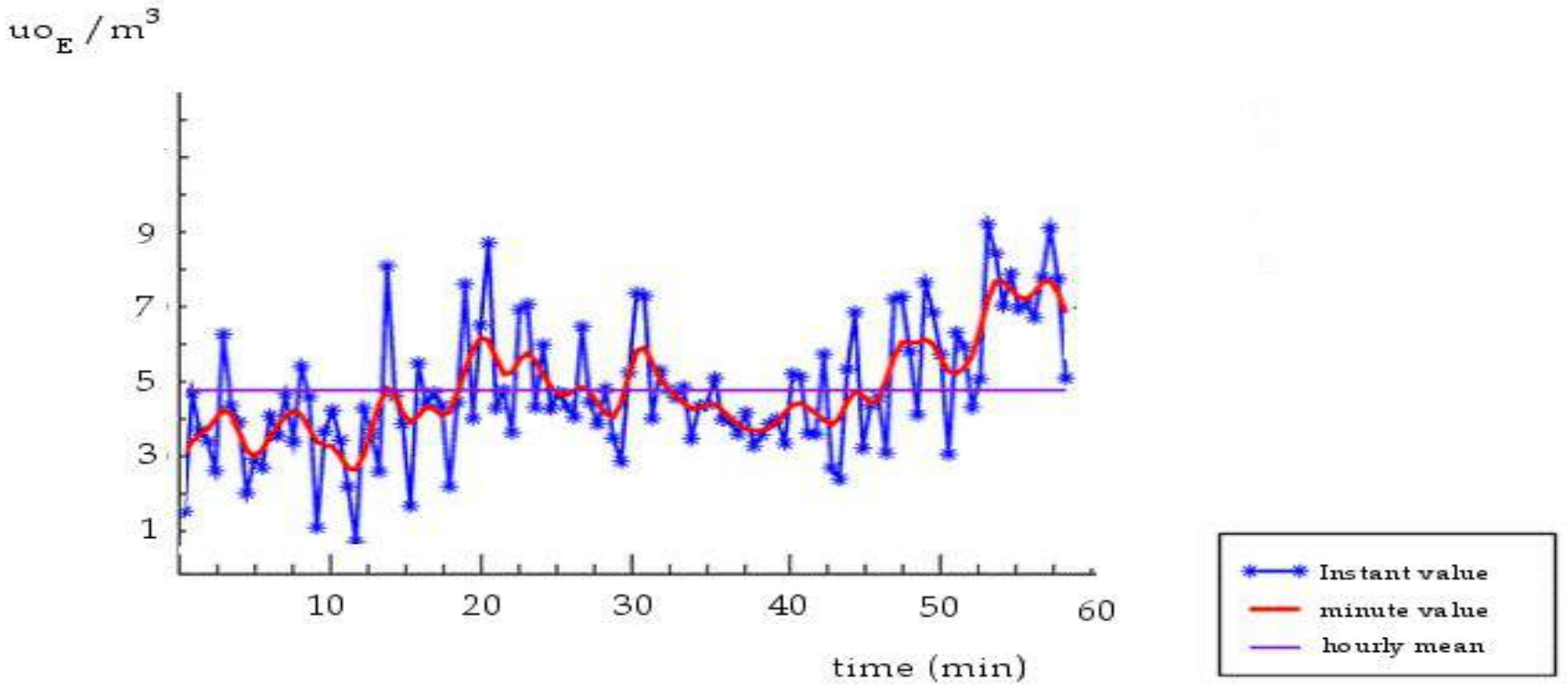
IT IS IMPORTANT THE FREQUENCY

TG5. Dose Response

IT IS IMPORTANT THE INTENSITY

TG5. Dose Response

IT IS IMPORTANT THE DURATION



TG5. Dose Response

IT IS IMPORTANT THE Offensiveness

TG5. Dose Response

IT IS IMPORTANT THE Sensitivity

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21st International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes
27 – 30 September 2022, Aveiro Portugal
ODORS AND AIR POLLUTANTS: A Virtual Event

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TG5. Dose Response

IT IS IMPORTANT THE Sensitivity

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TG5. Dose Response

IT IS IMPORTANT THE Sensitivity

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TG5. Dose Response

IT IS IMPORTANT THE Sensitivity

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TG6. Reporting

TG6. Normative Requirements

Table 2 - *Minimum elements to be considered in the discussion of the normative references*

Minimum elements	Description
Definition of the law, guideline, ordinance, etc.	This element has to briefly report the scope, aims and general provisions. Moreover, implementing rules and regulations (IRR) must also be included.
Responsible authorities	The relevant government agencies must be introduced, which can be at the regional level, state, country and/or an internationally recognized organisation.
Parameters or variables regulated	The extent of applicability of the law must be emphasized, particularly to the parameter being regulated. If a specific law or guidance is not applicable to the facility, an indication of the most appropriate best practice guidance should be included.
Maximum threshold limits	The maximum threshold value authorized for each odour sources should be reported in terms of odour concentration.

TG6. Model selection and development.

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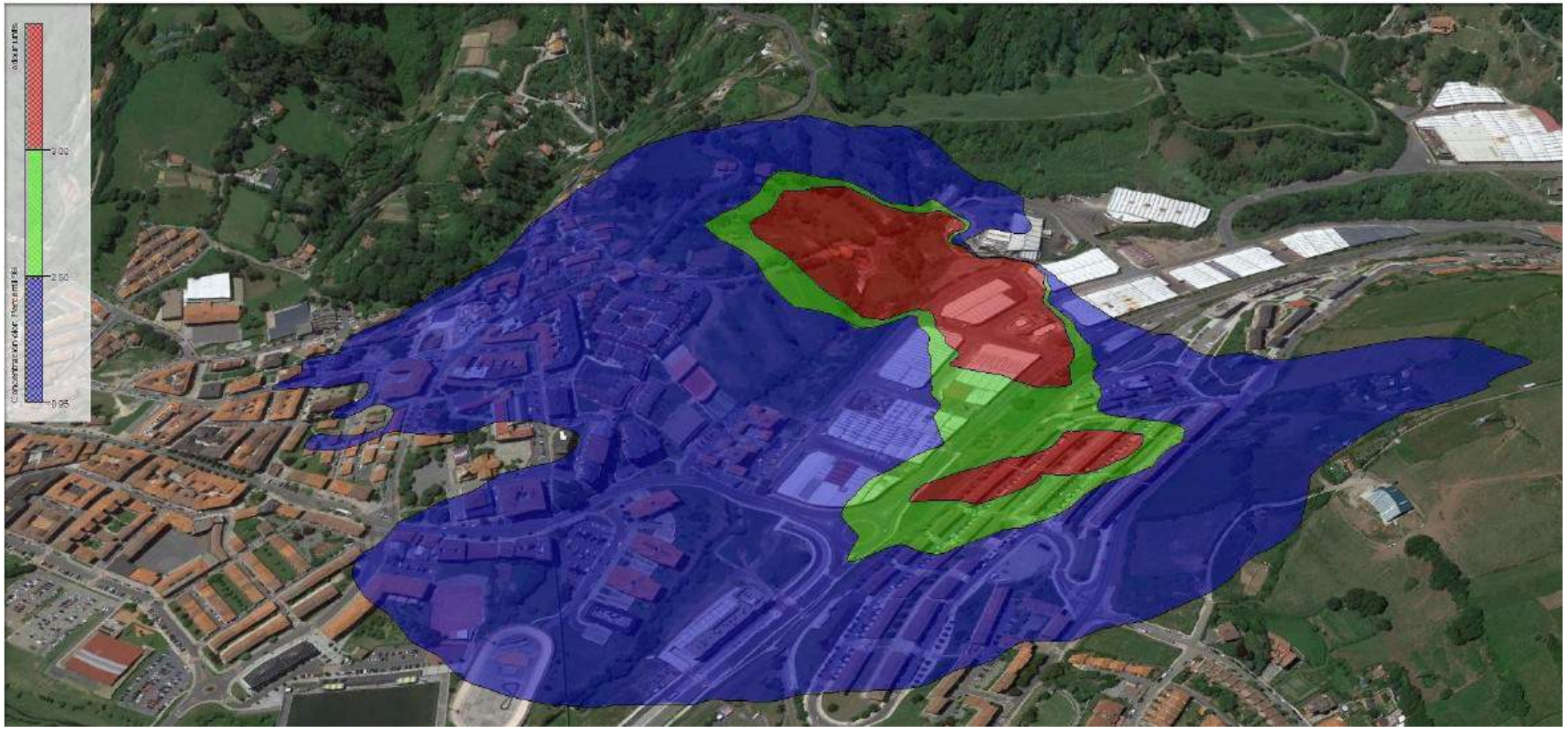
TG6. Odour impact assessment criteria

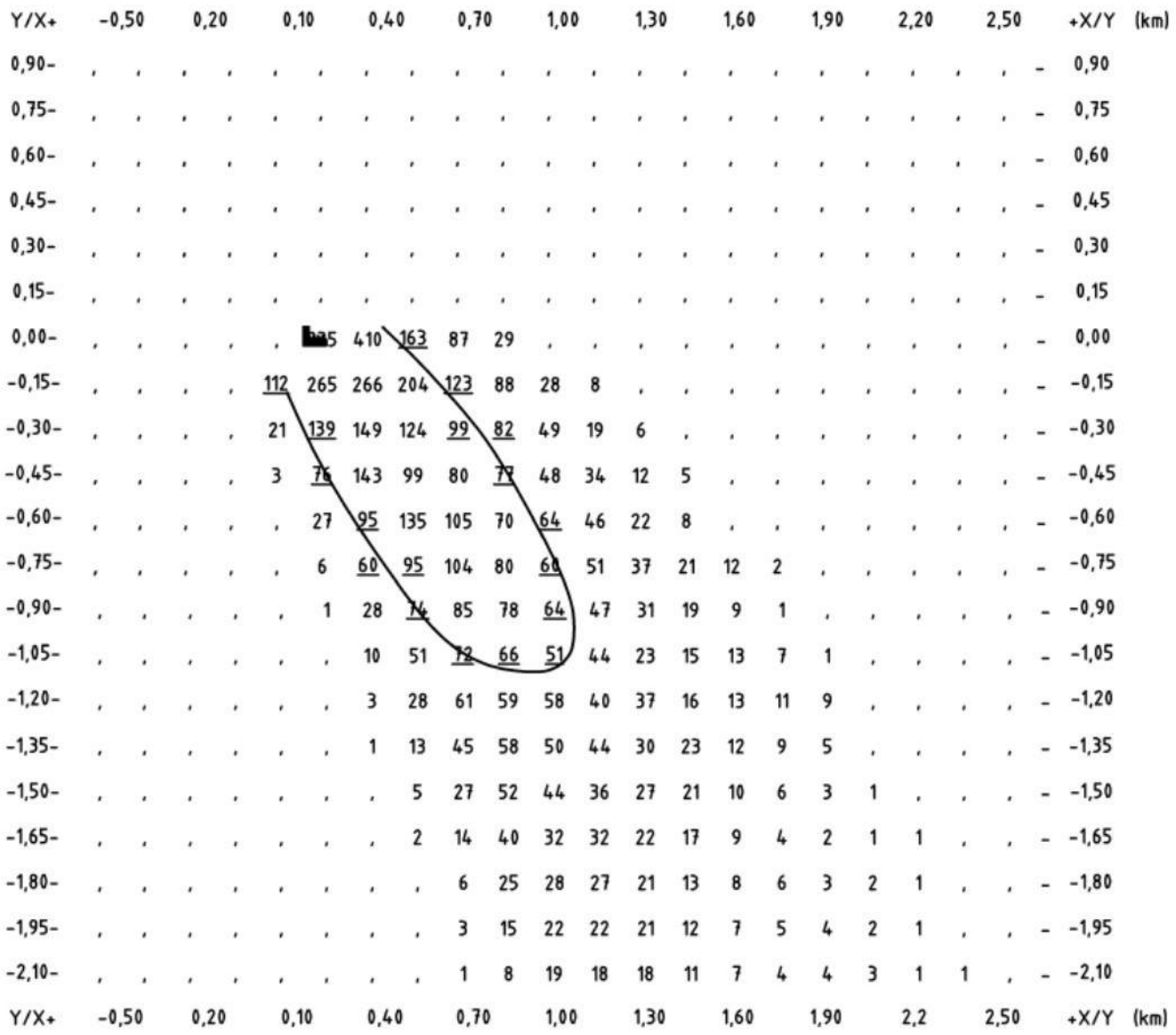


TG6. Report results

General	Minimum elements to report
	Supporting data for the input parameters and the factors affecting the variations
	Explanation of the accuracy and the shortcomings (if relevant)
	High-resolution isopleth, or maps of odour dispersion
	Concise data in tables
	Impacts of the odour emission, especially the most influential factors in determining the peak ground-level concentrations
Presentation of Maps	**Criteria**
	Overlay the odour concentration with base and terrain map with the finest resolution (e.g., 50 m)

TG7. Other approaches

TG7. Reverse modelling



Y/X+	-0,50	0,20	0,10	0,40	0,70	1,00	1,30	1,60	1,90	2,20	2,50	+X/Y (km)
0,90-												0,90
0,75-												0,75
0,60-												0,60
0,45-												0,45
0,30-												0,30
0,15-												0,15
0,00-			[redacted]	5	410	163	87	29				0,00
-0,15-			112	265	266	204	123	88	28	8		-0,15
-0,30-			21	139	149	124	99	82	49	19	6	-0,30
-0,45-			3	76	143	99	80	77	48	34	12	5 -0,45
-0,60-				27	95	135	105	70	64	46	22	8 -0,60
-0,75-				6	60	95	104	80	66	51	37	21 12 2 -0,75
-0,90-				1	28	74	85	78	64	47	31	19 9 1 -0,90
-1,05-					10	51	72	66	51	44	23	15 13 7 1 -1,05
-1,20-					3	28	61	59	58	40	37	16 13 11 9 -1,20
-1,35-					1	13	45	58	50	44	30	23 12 9 5 -1,35
-1,50-						5	27	52	44	36	27	21 10 6 3 1 -1,50
-1,65-						2	14	40	32	32	22	17 9 4 2 1 1 -1,65
-1,80-							6	25	28	27	21	13 8 6 3 2 1 -1,80
-1,95-							3	15	22	22	21	12 7 5 4 2 1 -1,95
-2,10-							1	8	19	18	18	11 7 4 4 3 1 1 -2,10
Y/X+	-0,50	0,20	0,10	0,40	0,70	1,00	1,30	1,60	1,90	2,2	2,50	+X/Y (km)

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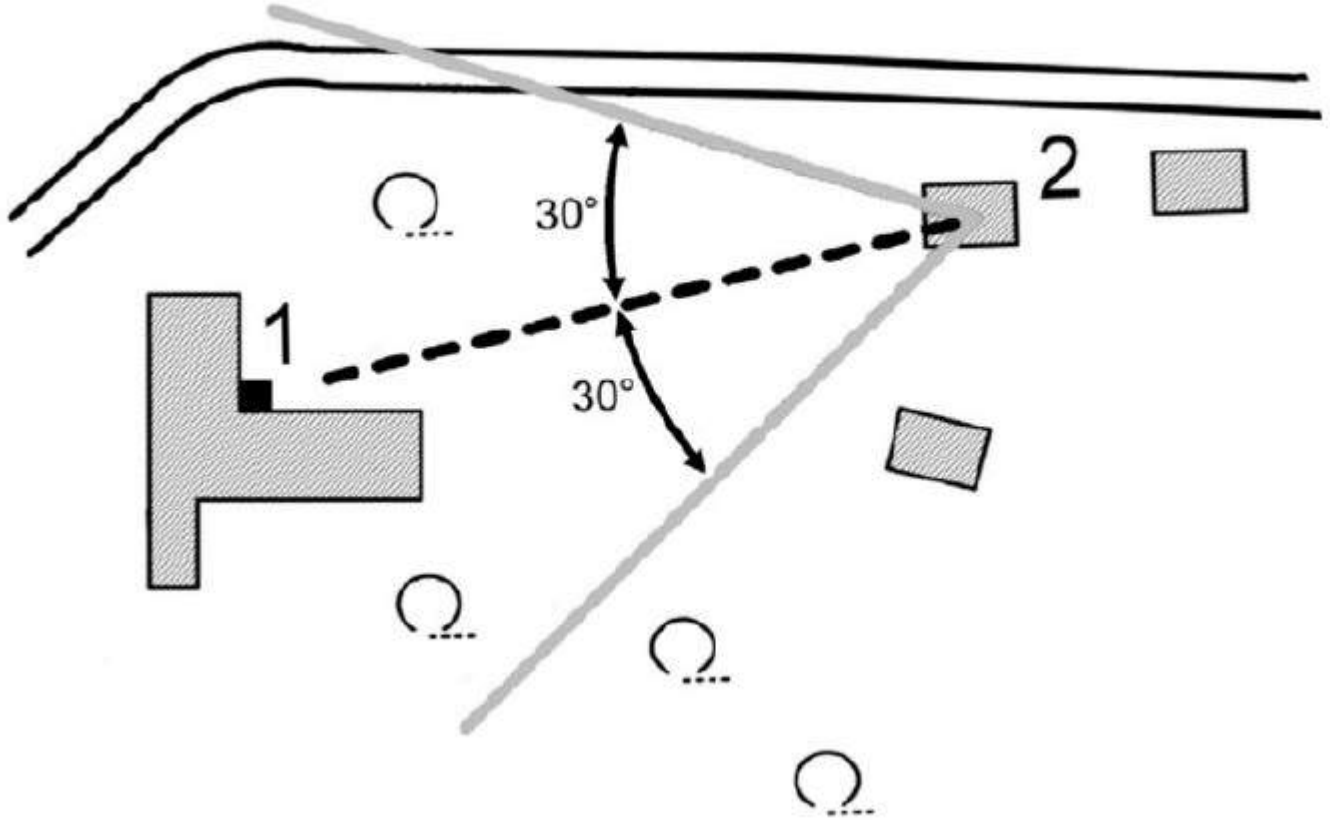
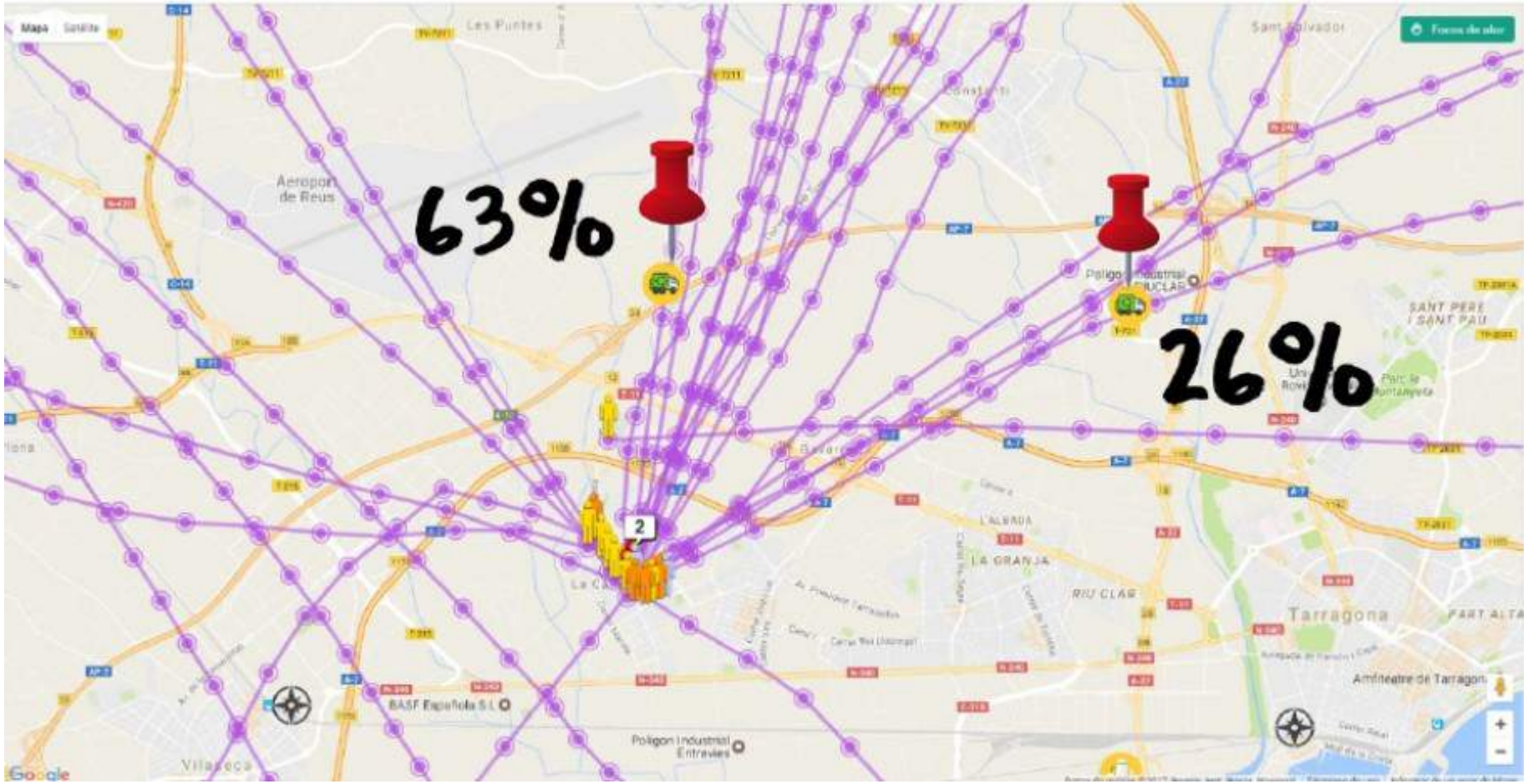
TG7. Calculate origin/type of a source

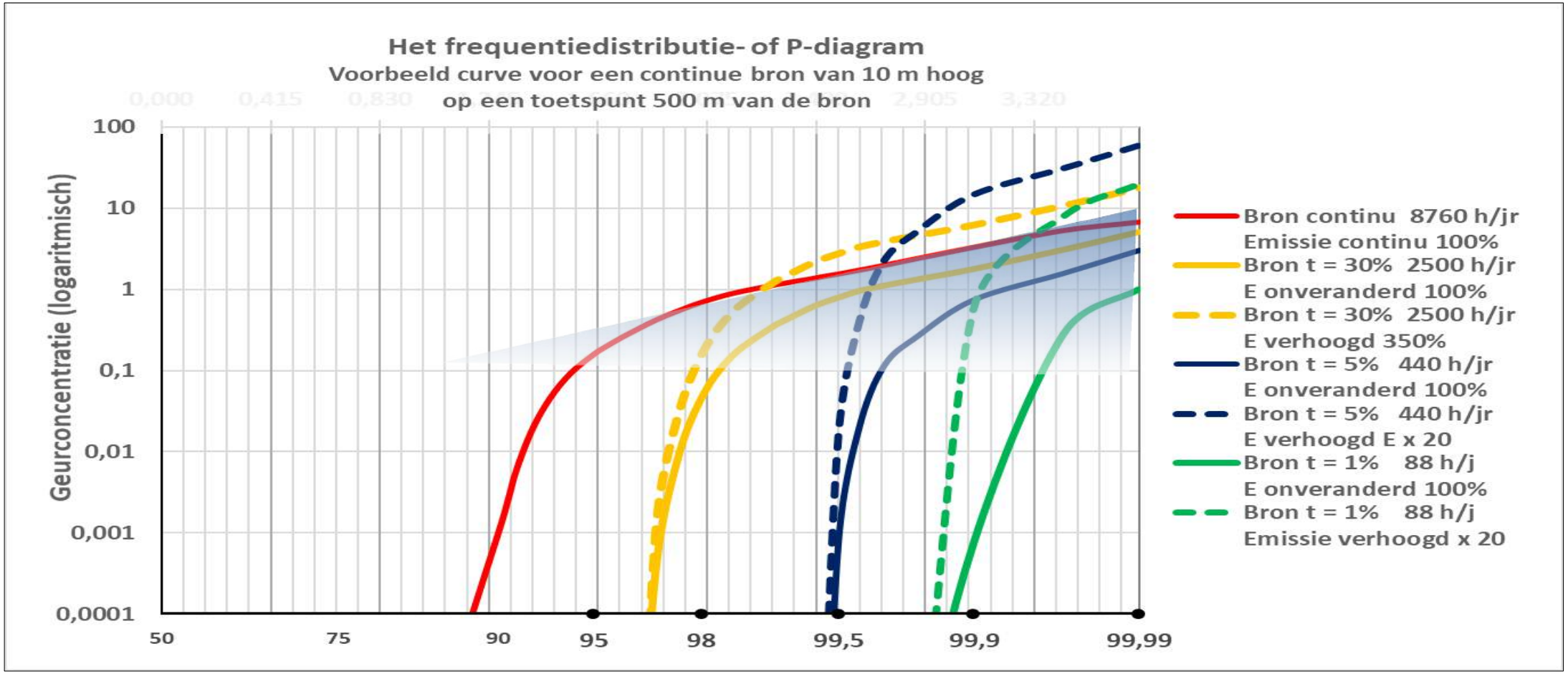


TG7. Calculate origin/type of a source



TG7. Balance hedonic tone of multiple sources

TG7. intermittent sources and non static receptors



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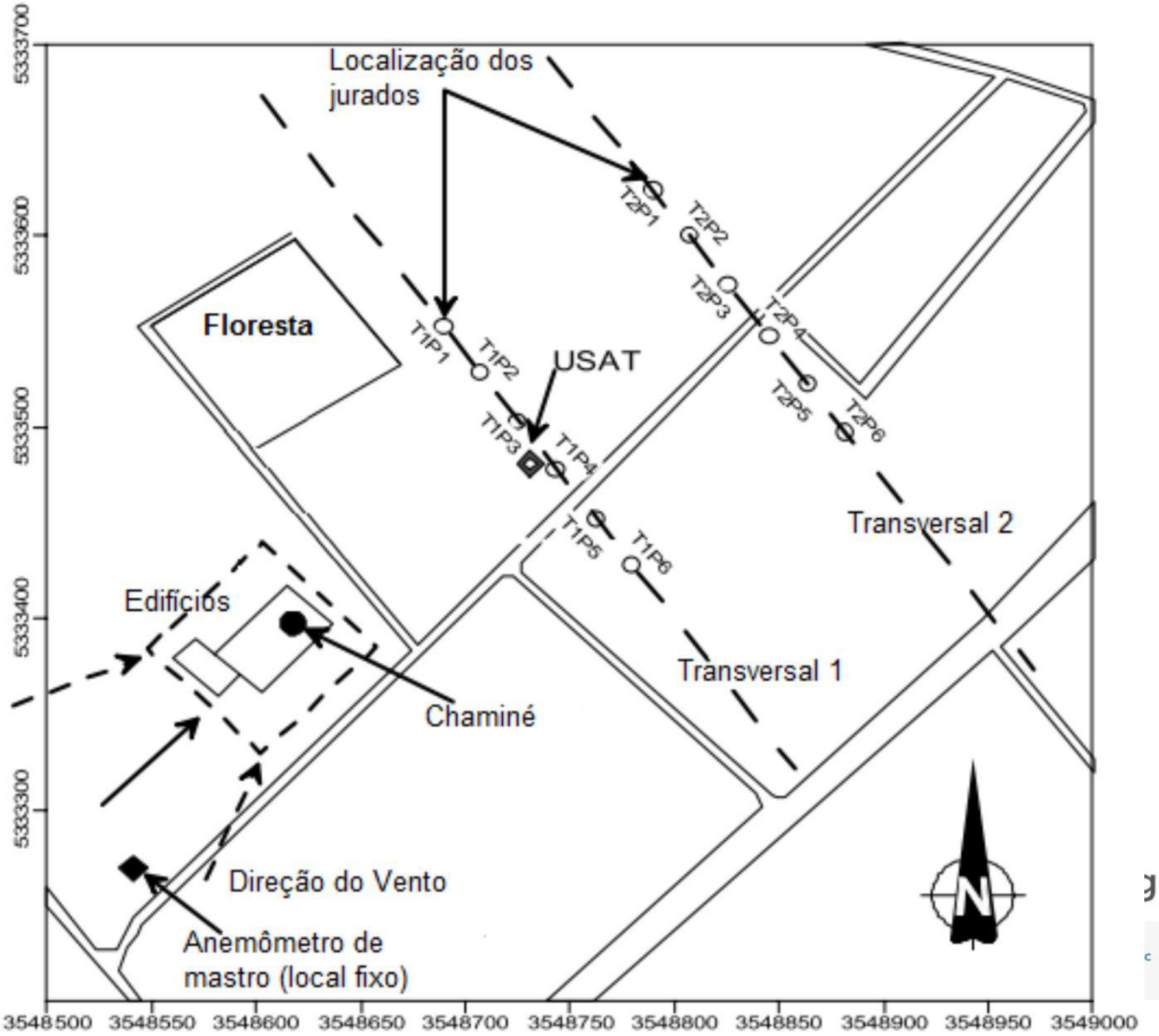
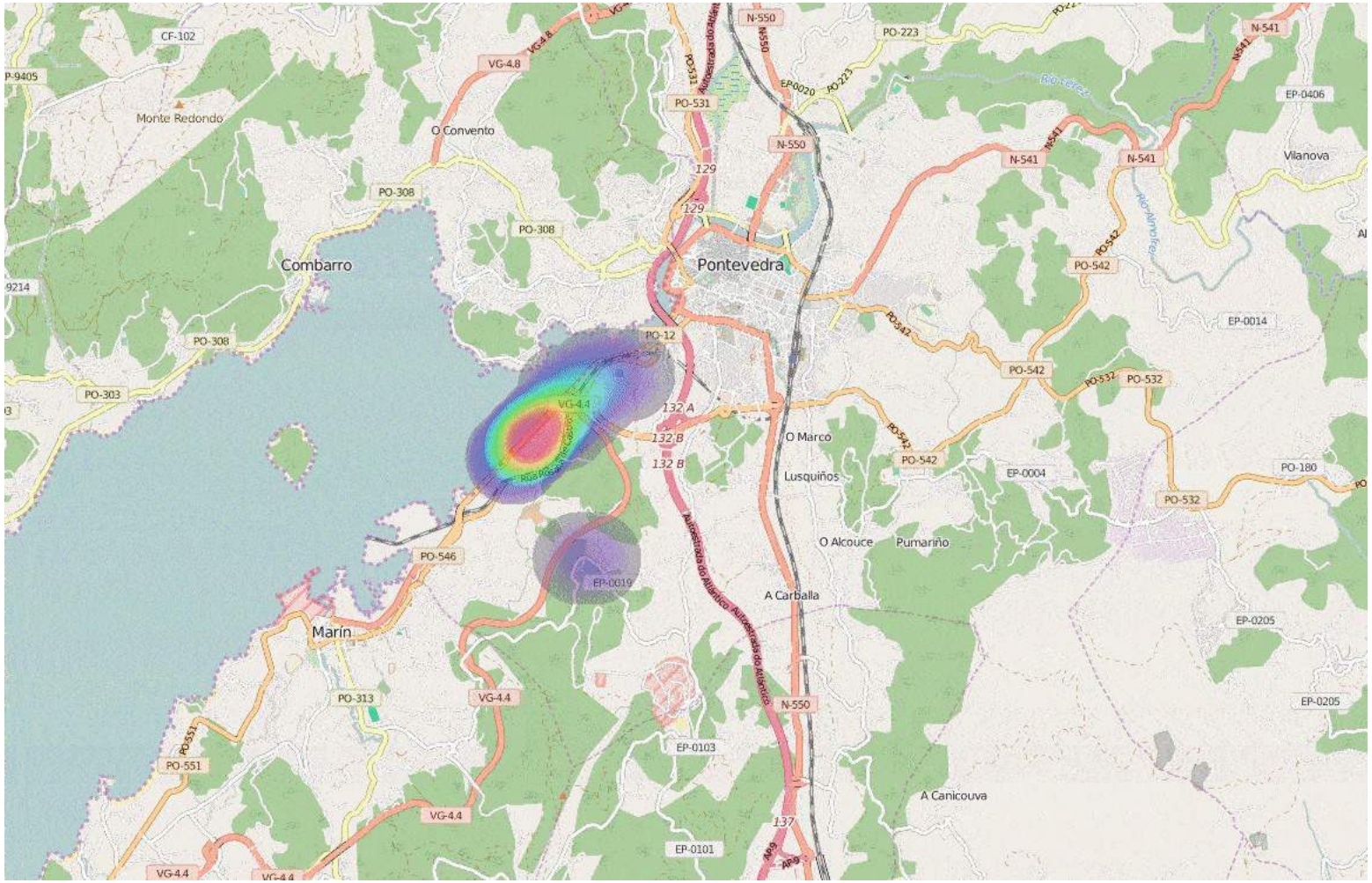
TG7. Tracers.


Localização dos jurados
Floresta
USAT
T1P1
T1P2
T1P3
T1P4
T1P5
T1P6
T2P1
T2P2
T2P3
T2P4
T2P5
T2P6
Transversal 2
Transversal 1
Edifícios
Chaminé
Direção do Vento
Anemômetro de mastro (local fixo)
N
5333700
5333600
5333500
5333400
5333300
3548500
3548550
3548600
3548650
3548700
3548750
3548800
3548850
3548900
3548950
3549000

TG7. Online calculation of odour impact (real-time, forecasting).



TG7. Role of Instrumental Odour Monitoring Systems

[Links]

VS

Odorant vs odour

[Links]

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Conclusions

- **50+** international **experts from 17 countries.**
- Monthly meetings. **22 meetings** so far
- **7 Task Groups (TG)**: TG1 Terms & Definitions TG2 Meteorology, TG3 Odor Emissions and Source Characterization, TG4 Dispersion Algorithms, TG5 Odor Dose Response, TG6 Reporting TG7 Other Approaches.
- **First draft was released in August**. Not public, only internal revision.
- **Second draft** will be **publicly** available for **comments.**
- **Expected** publication in **2023**
- **Volunteers are** more than **welcomed**.

OBRIGADO!

21st International Conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes

27-30 September 2022 | Aveiro, Portugal

PERGUNTAS?

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AMBIENTE ET — ODORA S.L. —