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Dipartimento di Epidemiologia del Servizio Sanitario Regionale Regione Lazio

SISTEMA SANITARIO REGIONALE
ASL ROMA E

REGIONE LAZIO

CCM
Centro Nazionale per la Prevenzione ed il Controllo delle Malattie

Ministero della Salute

L'inquinamento atmosferico in Italia: il modello nazionale MINNI

Luisella Ciancarella – ENEA

Roma, 4 giugno 2015

CHI SIAMO

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responsabile UTVALAMB

LUISELLA CIANCARELLA
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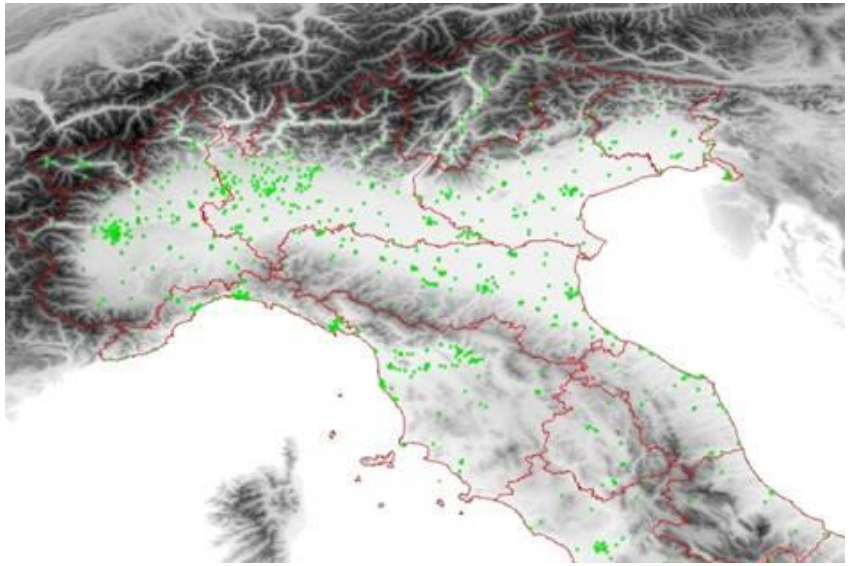
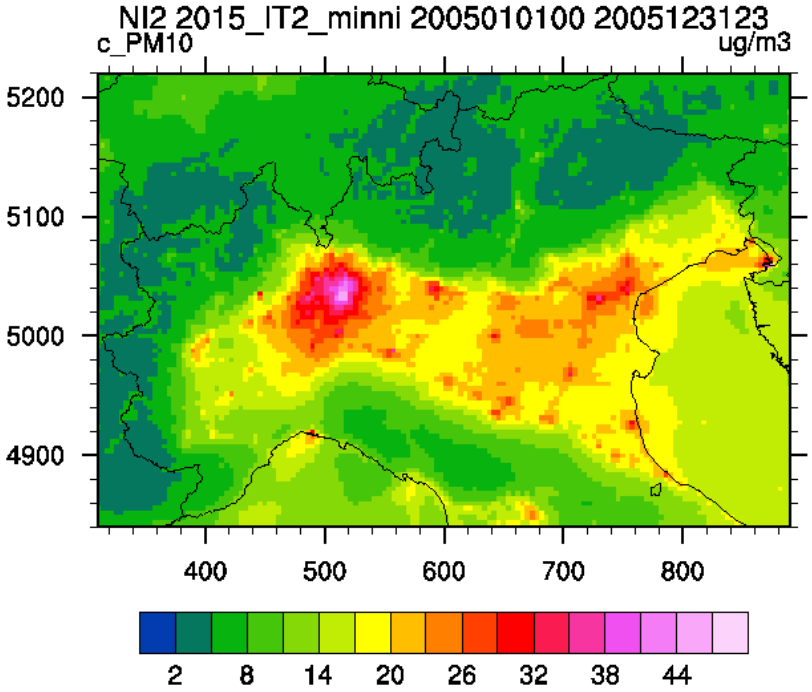
**** sede ENEA Pisa***

Inquinamento Atmosferico: modelli e misure

"The spatial coverage of monitoring is usually limited. Modelling can potentially provide complete spatial coverage of air quality.
Modelling can be applied prognostically. i.e. it can be used to predict the air quality as a result of changes in emissions or meteorological conditions.
Modelling provides an improved understanding of the sources, causes and processes that determine air quality.
Modelling is an important tool on which to base action plans, both short and long term."

(Guidance on the use of models for the European Air Quality Directive , ETC/ACC report)





Il Progetto MINNI

Modello Integrato Nazionale a supporto della Negoziazione Internazionale sui temi dell'inquinamento atmosferico

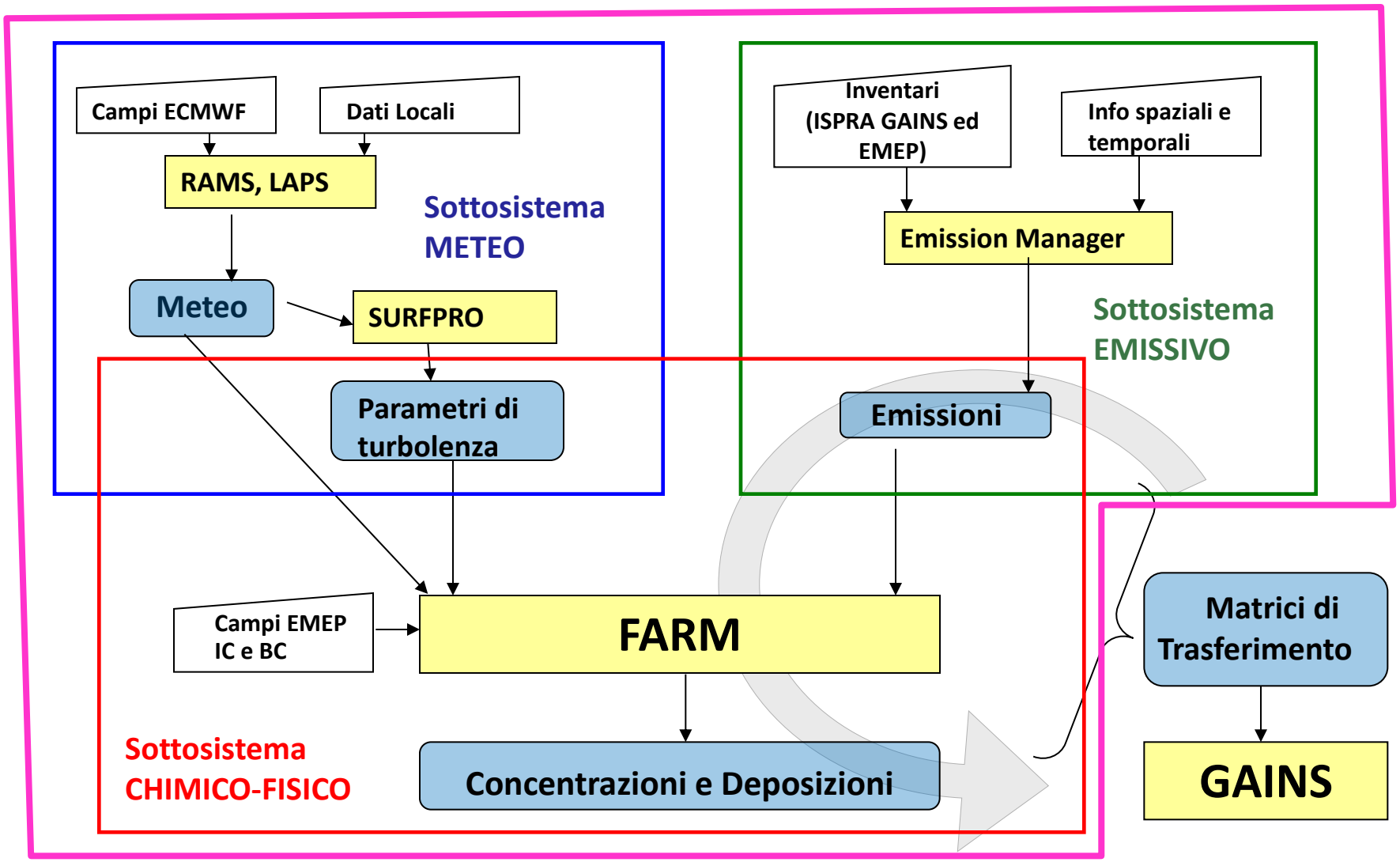
Responsabile del progetto: Gabriele Zanini

MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE

http://www.minni.org/

- ***Progetto ENEA finanziato dal 2002 al 2012 dal Ministero dell'Ambiente e della Tutela del Territorio e del Mare***
- ***Sviluppato da ENEA in collaborazione con Arianet s.r.l. (Milano) e IIASA (International Institute for Applied Systems Analysis - Vienna)***

IL SISTEMA MODELLISTICO ATMOSFERICO (SMA)



Le simulazioni modellistiche

ANNI SIMULATI: ***valutazione (1999, 2003, 2005*, 2007, 2010**)***
scenario (differenti proiezioni al 2015, 2020, 2030)

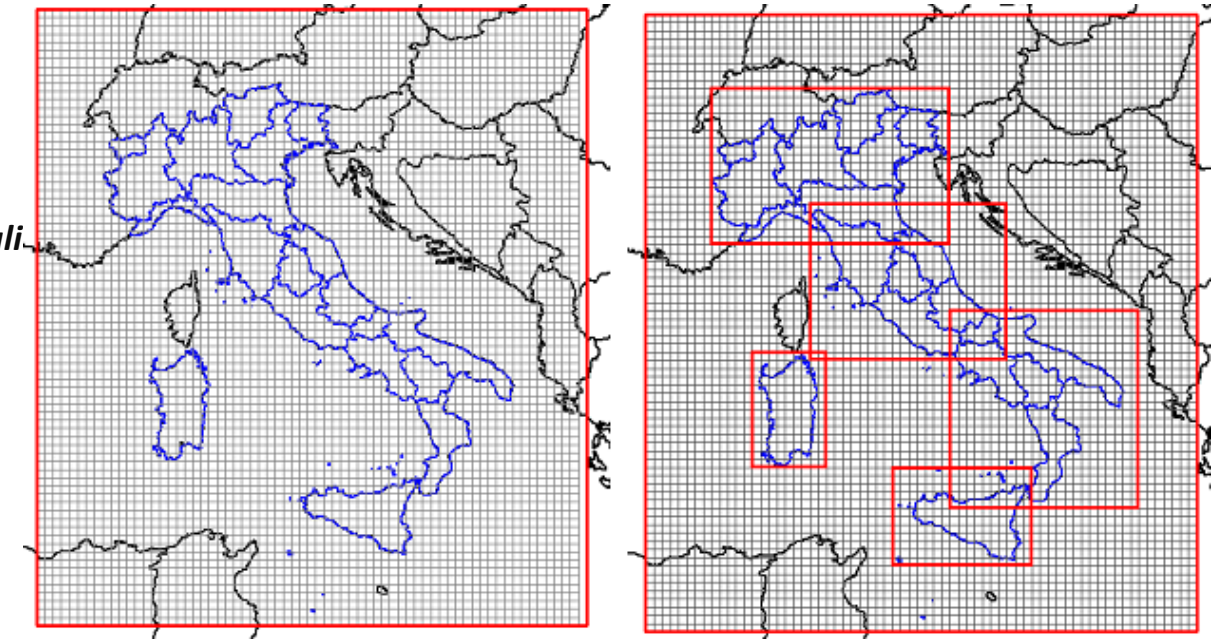
**** include HM and POPs a 20 km risoluzione orizzontale***
***** include HM and POPs a 4 e 20 km risoluzione orizzontale***

METEOROLOGIA:
1999, 2005:
20km ris. RAMS (nudging)
4km ris. LAPS (diagnostic)
2003, 2007, 2010:
RAMS (nudging) a 20km e 4km ris.

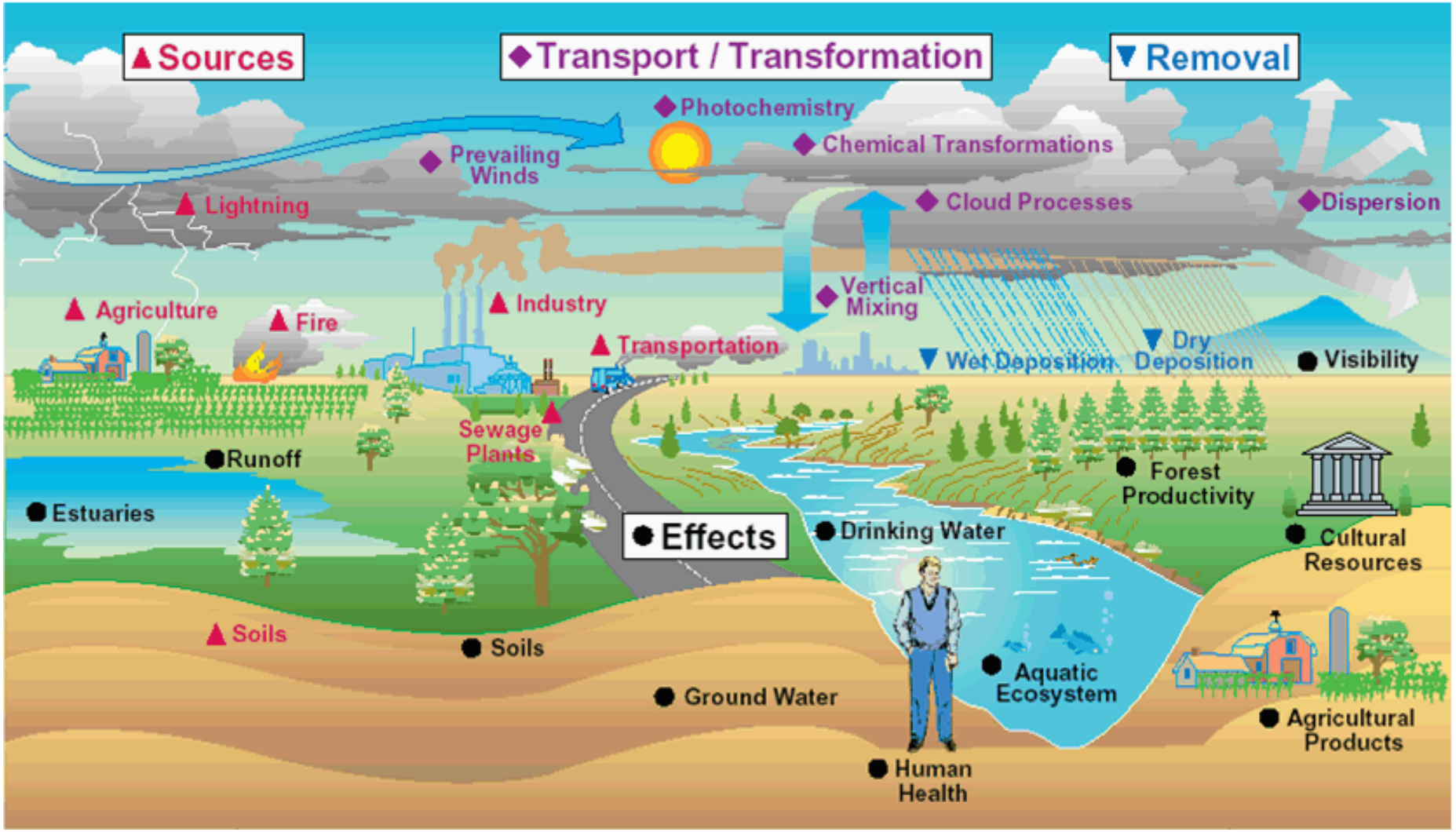
EMISSIONI:
EMEP + Inventario Nationale (ISPRA)
(approccio top-down)+ Inventari Regionali

IC/BC:
EMEP/MSC-W output con ris. temporale
di 3 ore per gas e aerosol;
EMEP W/MSC-E con ris. temporale
di 6 ore per HMs e POPs

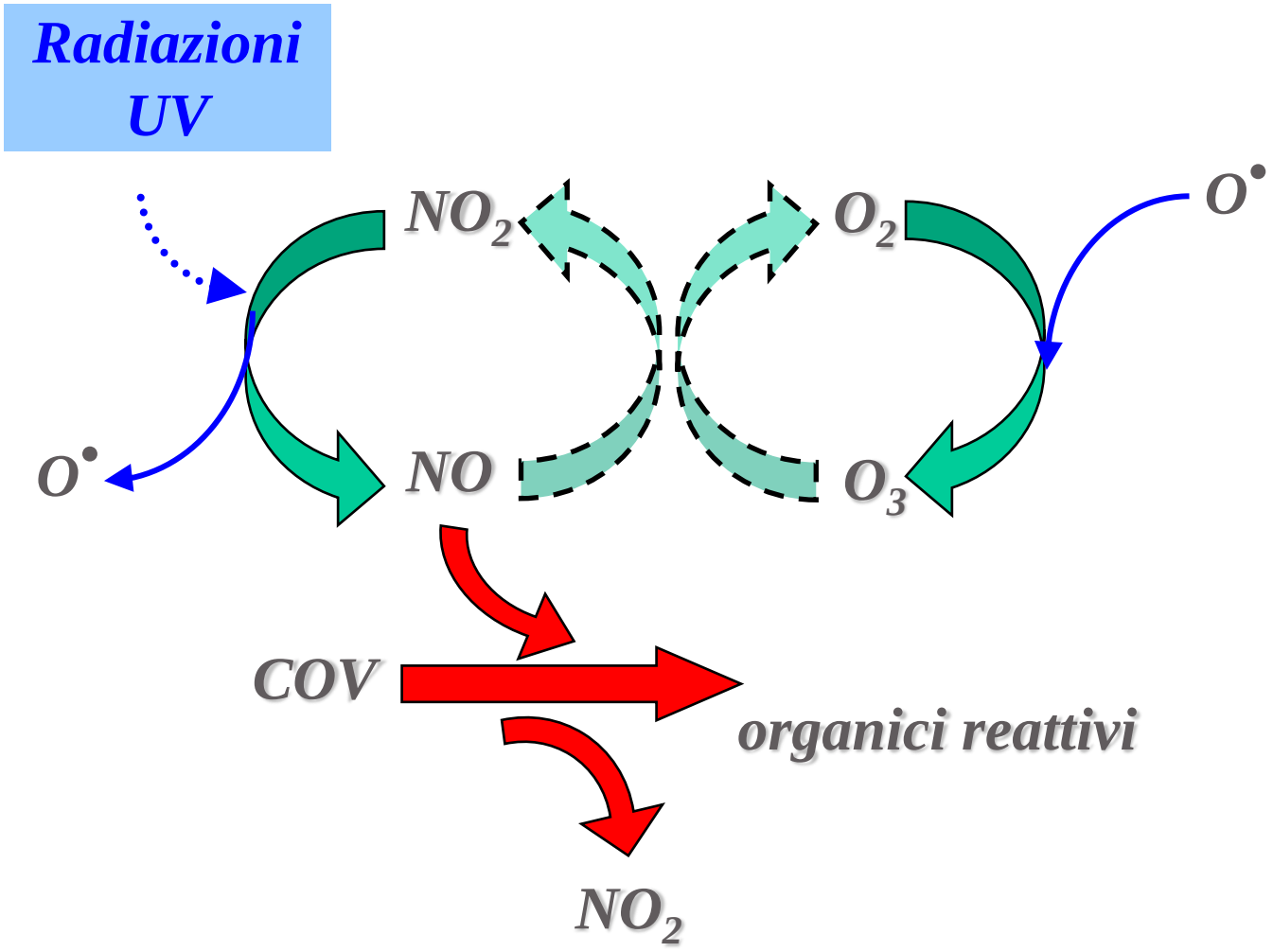
QUALITA' DELL'ARIA: FARM
20km e 4 km ris. orizzontale
12 livelli verticali (fino a 4 km) 1999
16 livelli verticali (fino a 10 km) 2005, 2003, 2007 , 2010
One-way nested



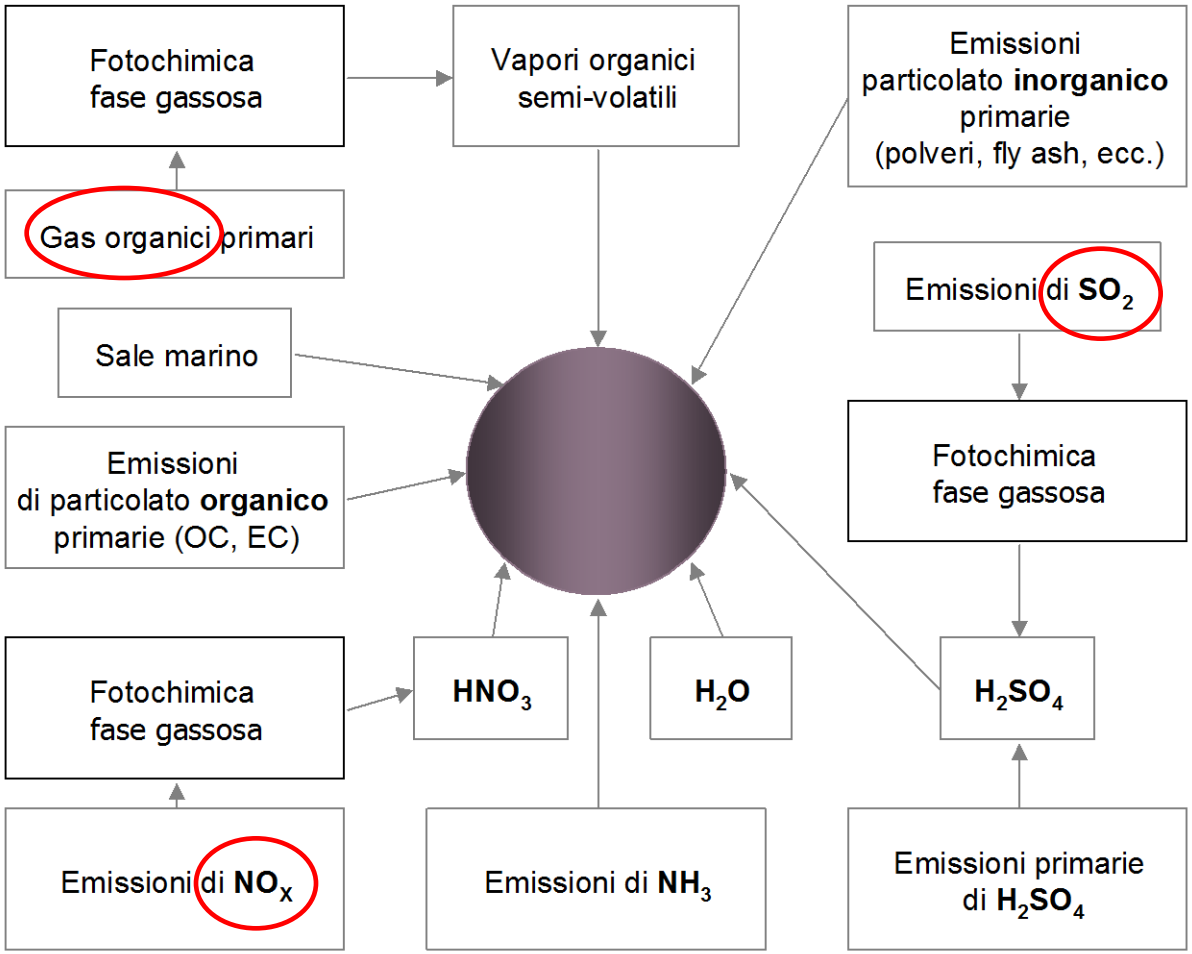
I processi atmosferici nei modelli di qualità dell'aria



Gli inquinanti secondari: l'Ozono



La componente secondaria del PM



FARM: Flexible Air quality Regional Model

http://air-climate.eionet.europa.eu/databases/MDS/

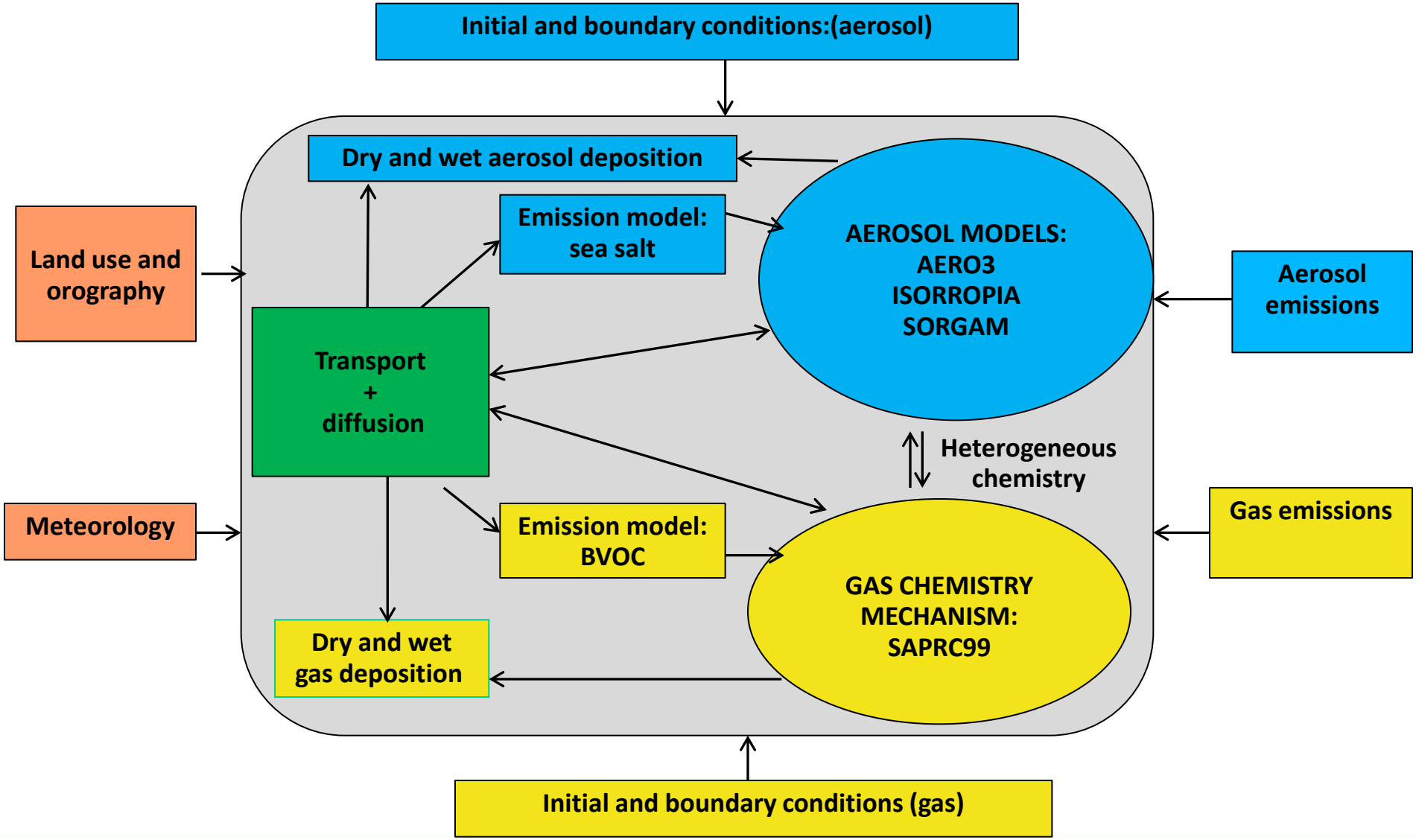


Table 4. List of typical model characteristics, formulations and processes, for the various scales and pollutants needed for air quality assessment.

	Area of assessment		
Description	**Local/hotspot (1 – 1000 m)**	**Urban/agglomerate (1 – 300 km)**	**Regional (25 – 10 000 km)**
Model type	Gaussian and non-Gaussian parameterised models Statistical models Obstacle resolving fluid dynamical models Lagrangian particle models	Gaussian and non-Gaussian parameterised models Eulerian chemical transport models Lagrangian particle models	Eulerian chemical transport models Lagrangian chemical models
Meteorology	Local meteorological measurements Obstacle resolving fluid dynamical models Diagnostic wind field models	Mesoscale meteorological models Localised meteorological measurements Diagnostic wind field models	Synoptic/mesoscale meteorological models
Chemistry	Parameterised or none	Ranging from none to comprehensive, depending on application	Comprehensive
Emission modelling	Bottom up traffic emissions Source specific emissions	Bottom up and/or top down emission modelling Emission process models	Top down emission modelling Emission process models

Compound	Local/hotspot	Urban/agglomerate	Regional/continental
PM_{10}	No chemical processes	Deposition Secondary inorganic particle formation	Deposition Primary (combustion) particles Secondary inorganic and organic particle formation Suspended dust Sea salt
$PM_{2.5}$	No chemical processes	Deposition Secondary inorganic particle formation	Deposition Secondary inorganic and organic particle formation
NO_2	Simple photo-oxidant chemistry Statistical/empirical relations	Limited photo-oxidant chemistry Photo-stationary scheme Statistical/empirical relations Deposition	Deposition Full photo-oxidant chemistry
NO_x	No chemical processes	No chemical processes Full photo-oxidant chemistry for larger scales	Full photo-oxidant chemistry
O_3	As in NO_2	As in NO_2	As in NO_2
SO_2	No chemical processes	Deposition Secondary inorganic particle formation	Deposition Secondary inorganic particle formation Full photo-oxidant chemistry
Pb	No chemical processes	Deposition No chemical processes	Deposition Specialised chemical schemes

GLI INDICATORI ELABORATI PER VIIAS

- NO_2 medie annuali
- PM2.5 medie annuali
- PM10 medie annuali
- Ozono media dei massimi giornalieri delle medie mobili su otto ore. E' stata calcolata sia la media sull'anno che sul periodo estivo aprile-settembre
- Ozono SOMO10 (somma dei massimi giornalieri delle medie mobili su otto ore che superano i 10 ppb). E' stata calcolata sia la media sull'anno che sul periodo estivo aprile-settembre
- Ozono SOMO35 E' stata calcolata sia la media sull'anno che sul periodo estivo aprile-settembre

Dati georiferiti sulla griglia del modello a risoluzione spaziale orizzontale di 4 km (20144 celle) per 3 annualità

VALORI LIMITE/OBIETTIVO PER INQUINANTE

RELATIVAMENTE ALLA PROTEZIONE DELLA SALUTE UMANA

(D.Lgs. 155/2010 Attuazione della Direttiva 2008/50/CE relativa alla qualità dell'aria ambiente)

	periodo mediazione	Valore Limite	data VL
SO_2	1 ora	350 (max 24)	2005
	24 ore	125 (max 3)	2005
	Anno	20	2001
NO_2	1 ora	200 (max 18)	2010
	anno	40	2010
PM_{10}	24 ore	50 (max 35)	2005
	anno	40	2005
$PM_{2,5}$	anno	25	2015

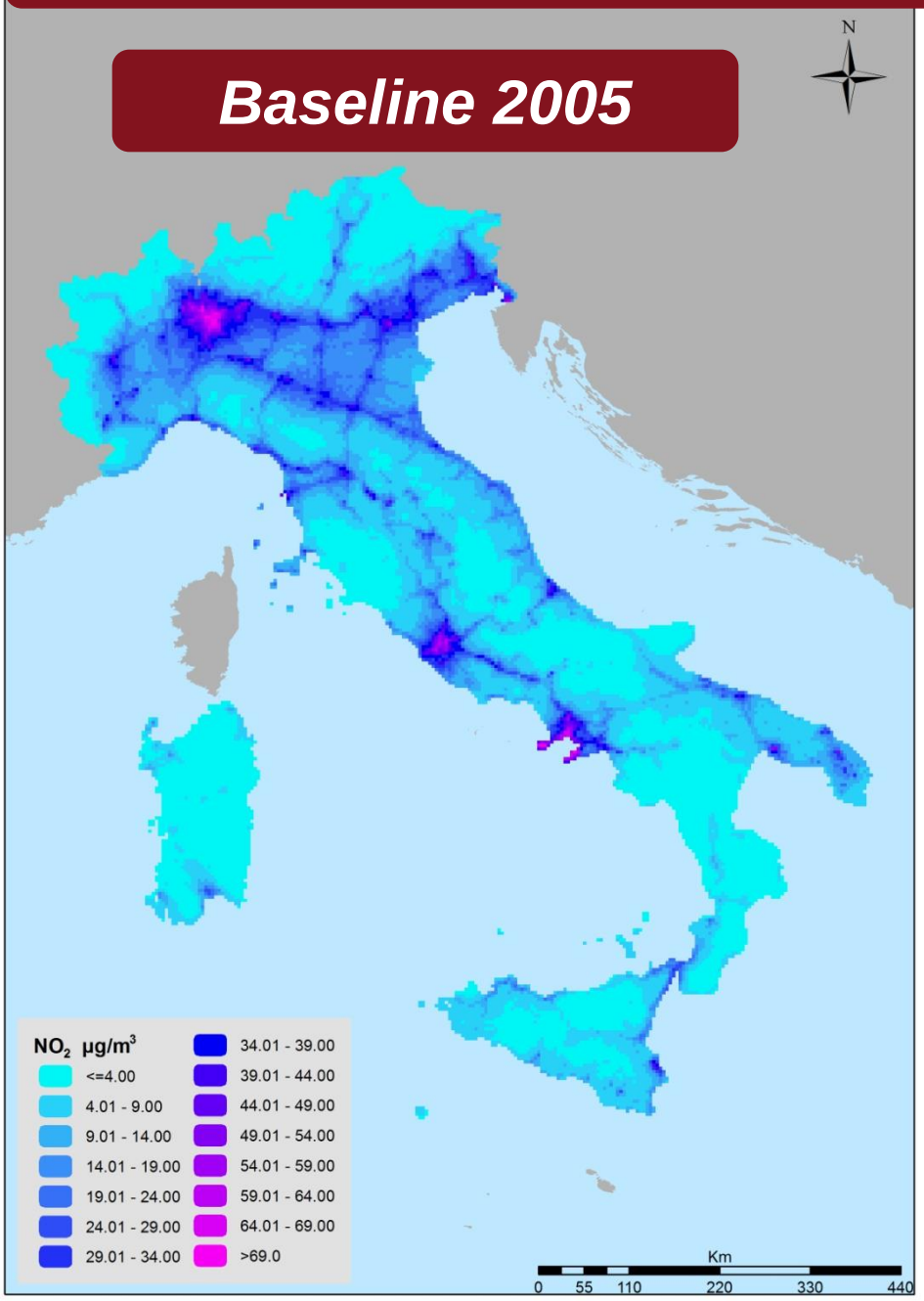
OZONO

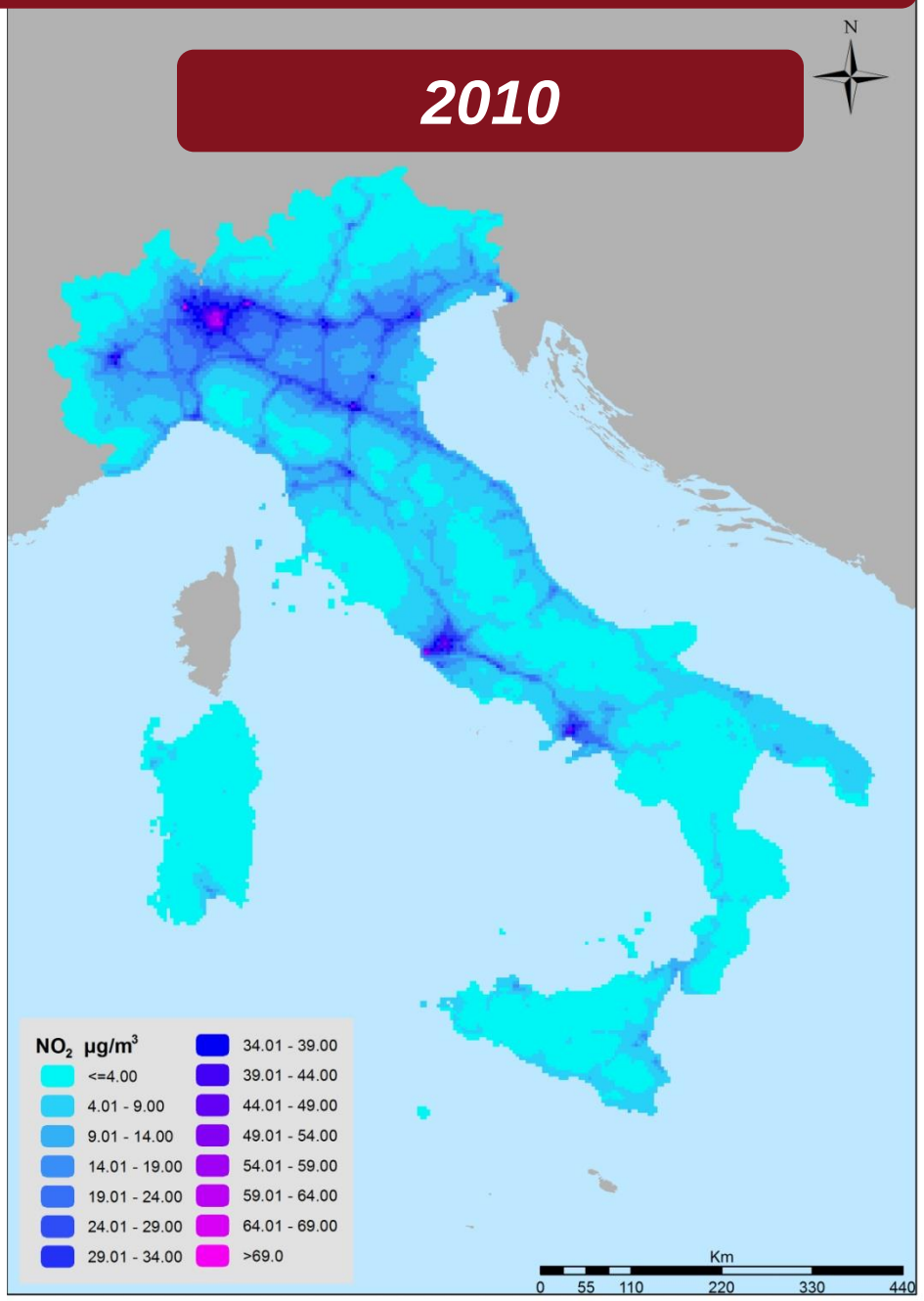
Valore Obiettivo	Parametro	Valore obiettivo per il 2010
Protezione della salute umana	Media massima giornaliera calcolata su 8 ore	120 $\mu g/m^3$ da non superare per più di 25 giorni per anno civile come media su 3 anni

Valore obiettivo	Parametro	Obiettivo a lungo termine
Protezione della salute umana	Media massima giornaliera calcolata su 8 ore nell'arco di 1 anno civile	120 $\mu g/m^3$

valori in $\mu g/m^3$,
tra parentesi il massimo numero di superamenti nell'anno

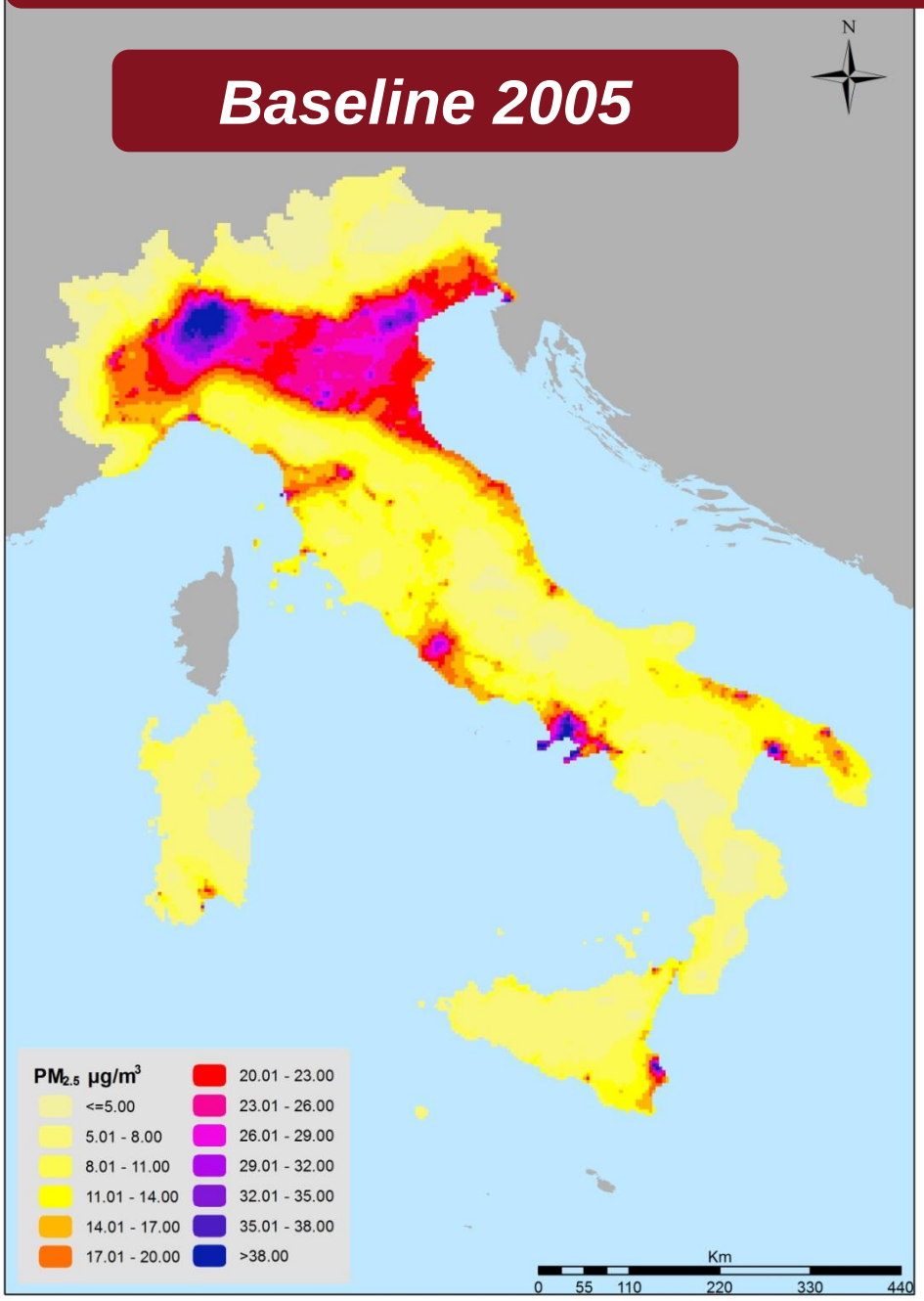
Concentrazioni medie annue di NO_2



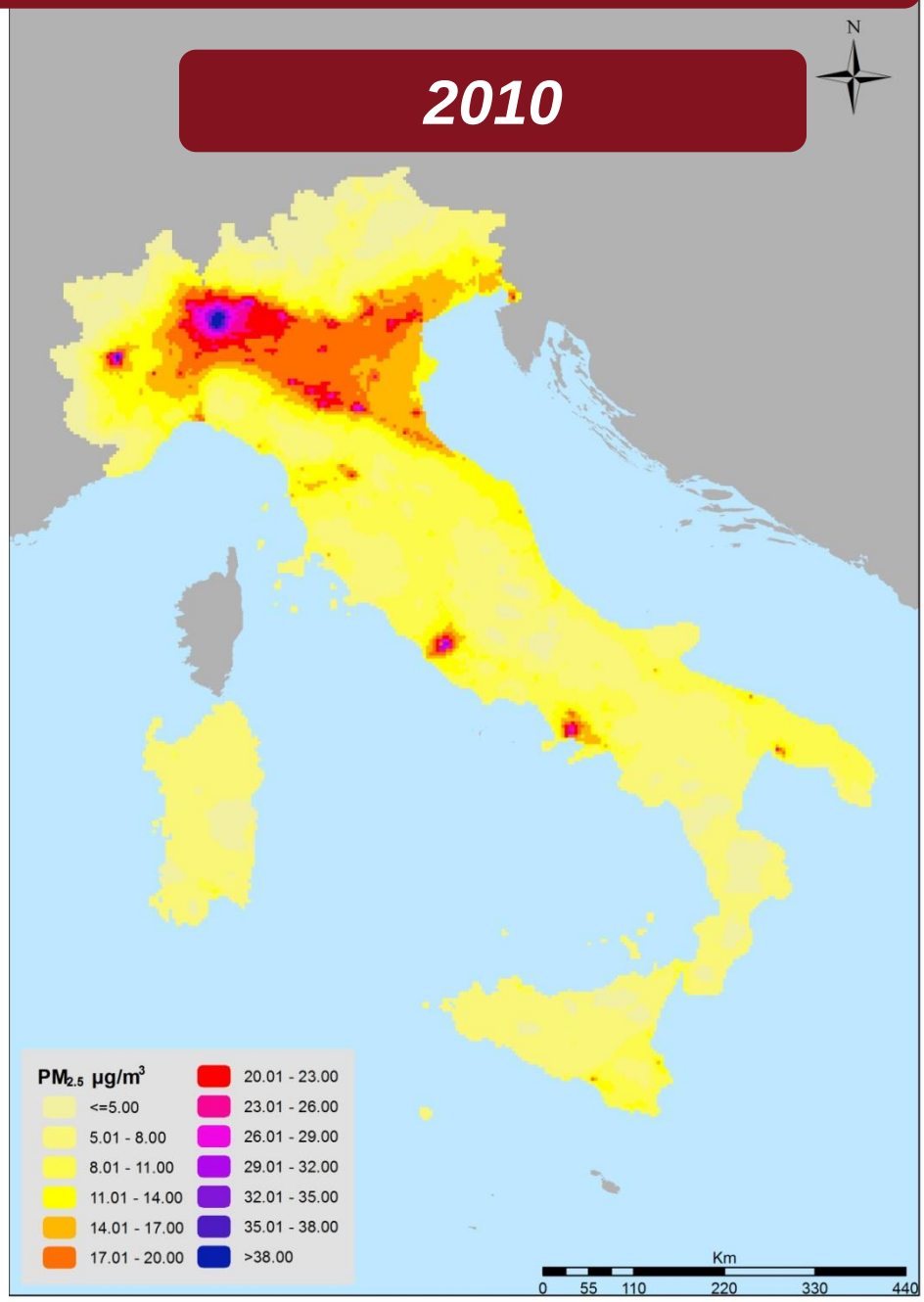


Concentrazioni medie annue di $PM_{2.5}$

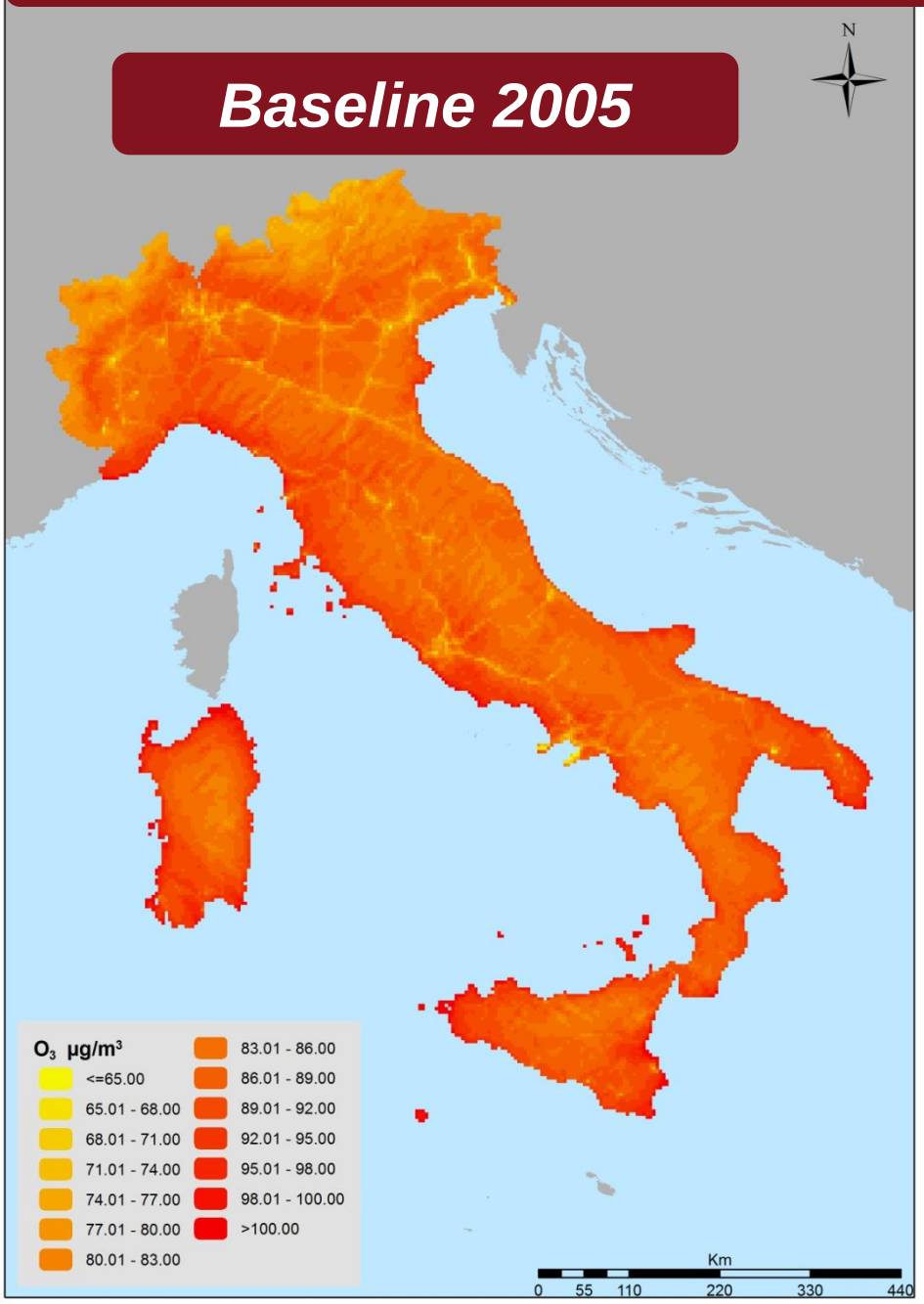
Baseline 2005

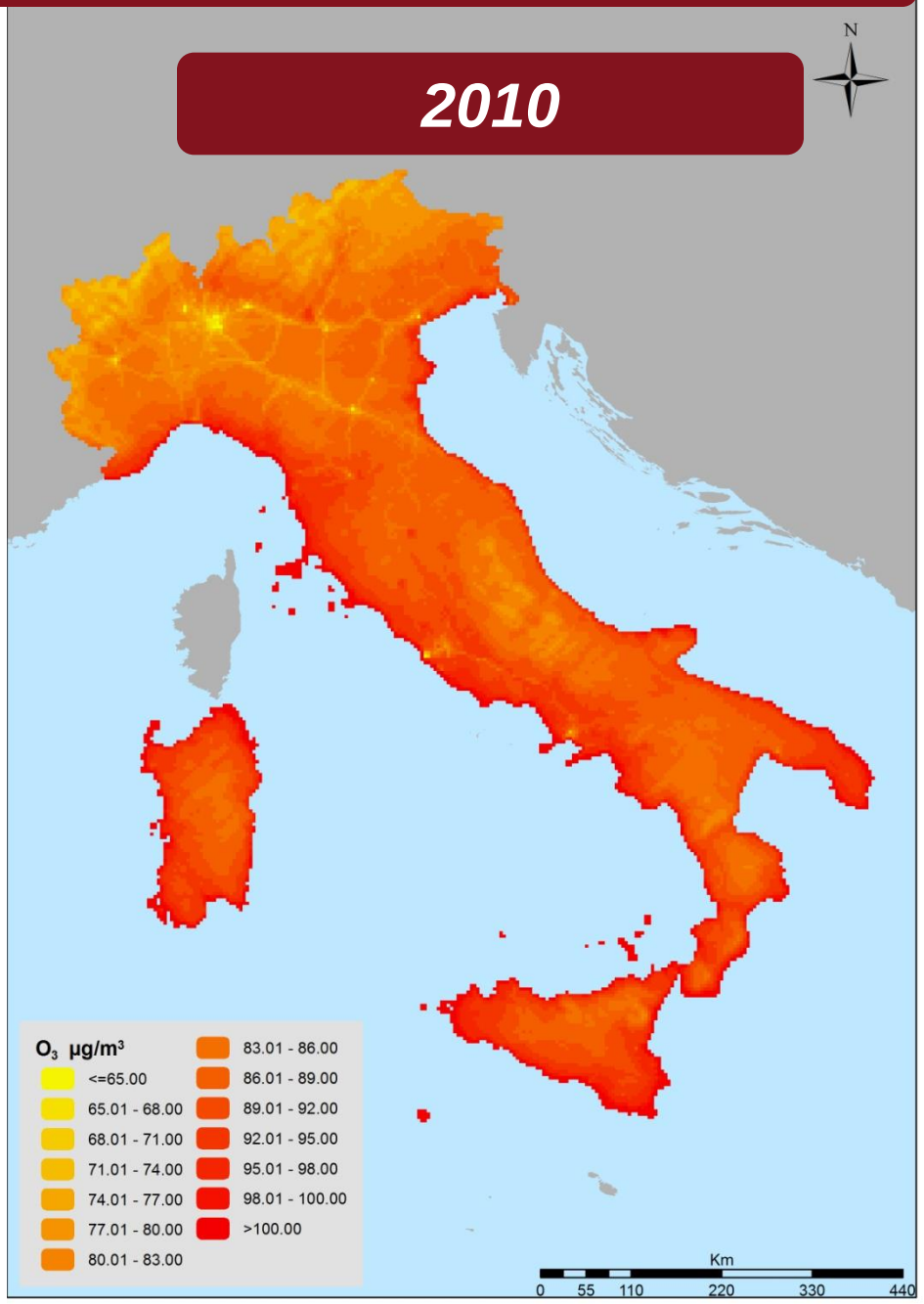


2010

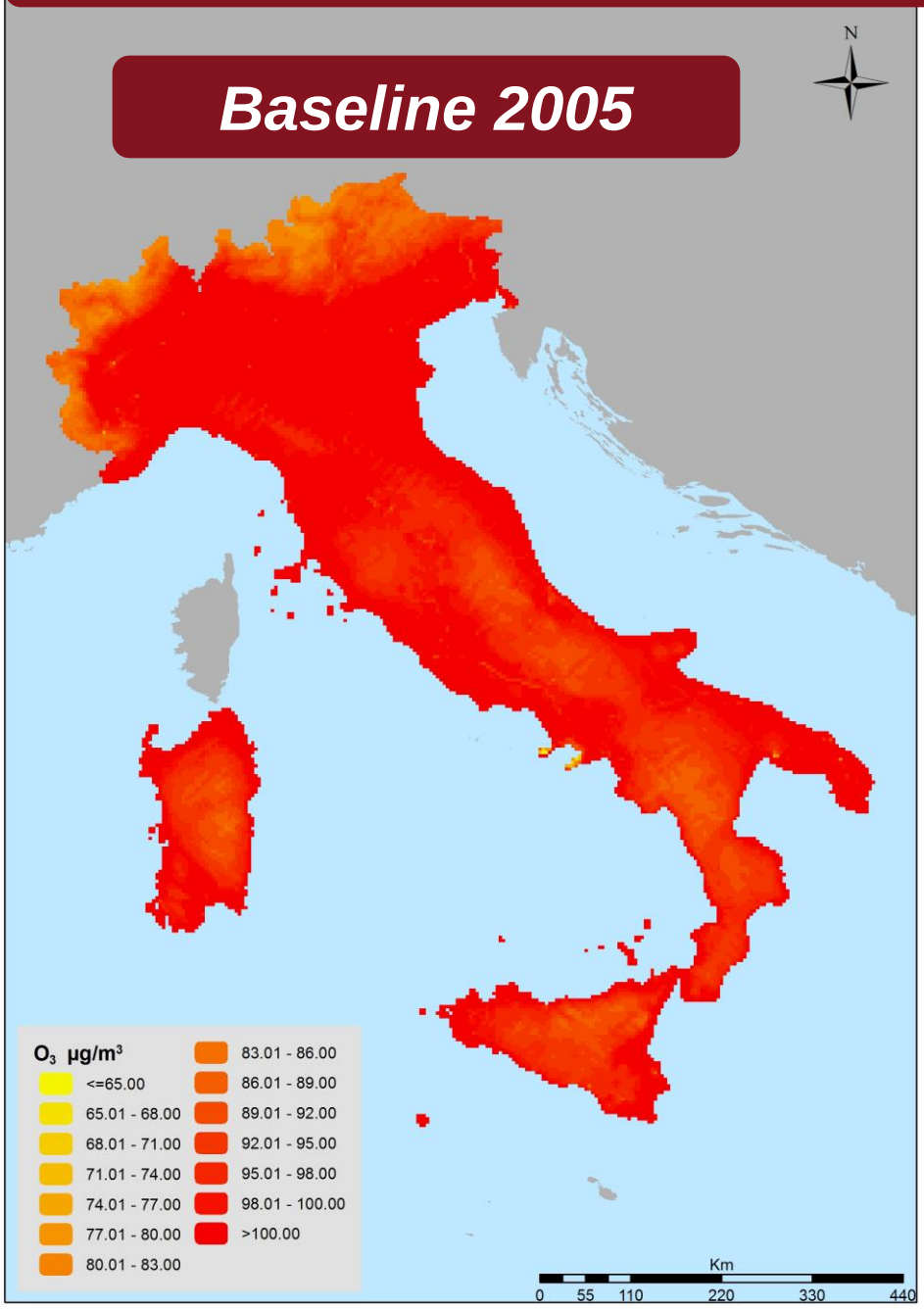


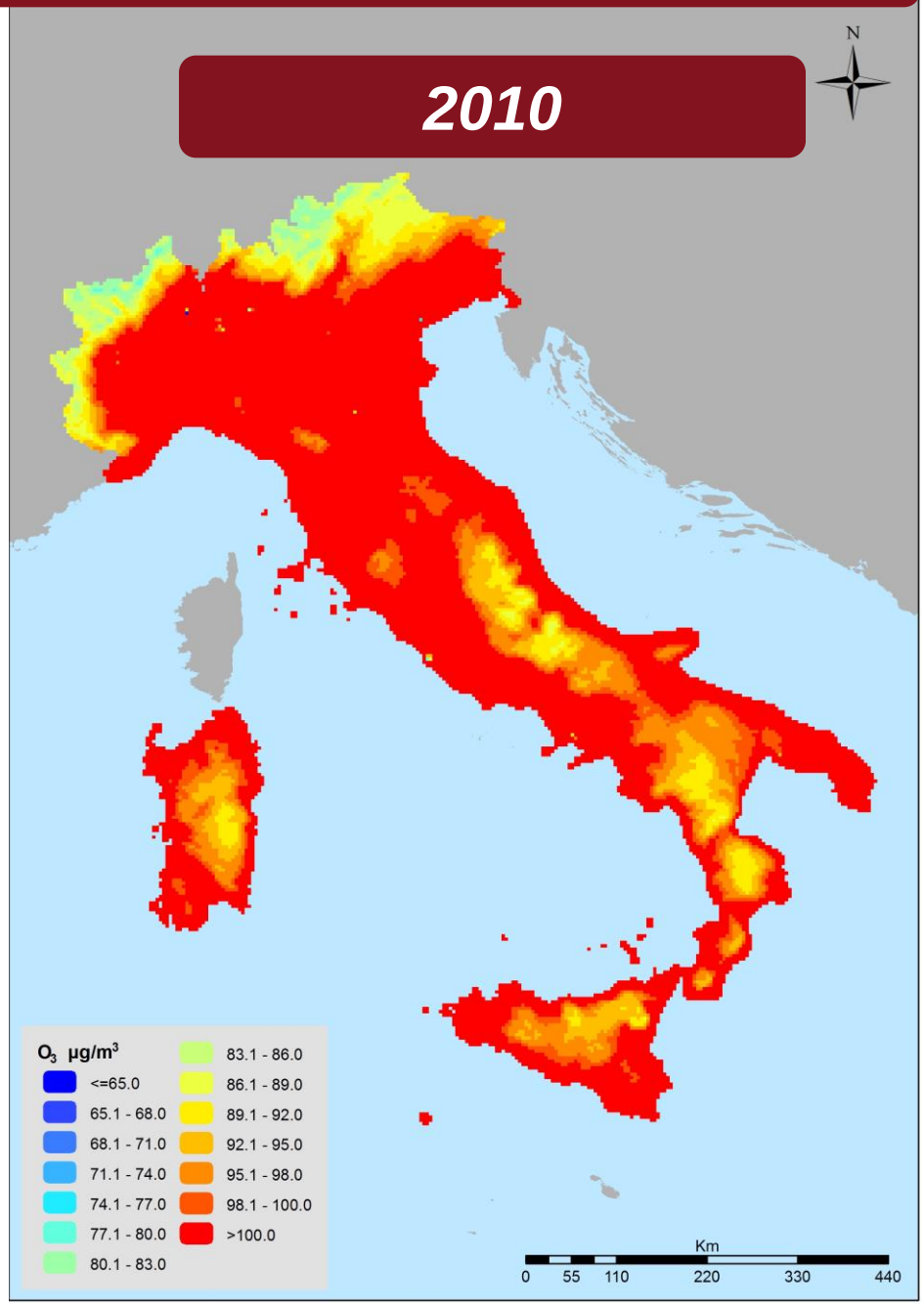
Concentrazioni medie annue di O_3 (max day 8 h)





Concentrazioni medie estive di O_3 (max day 8 h)



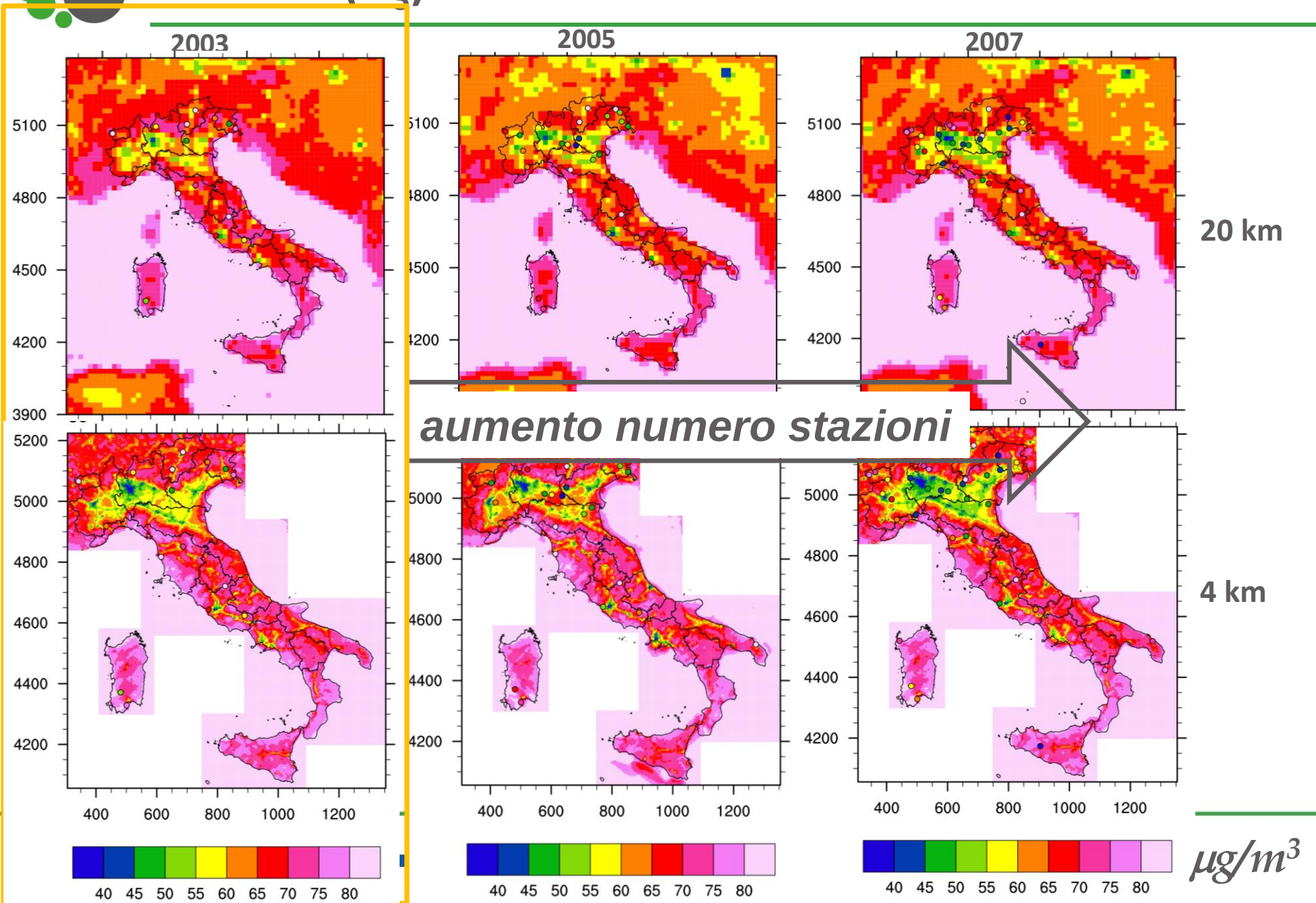


VALIDAZIONE DELLE SIMULAZIONI

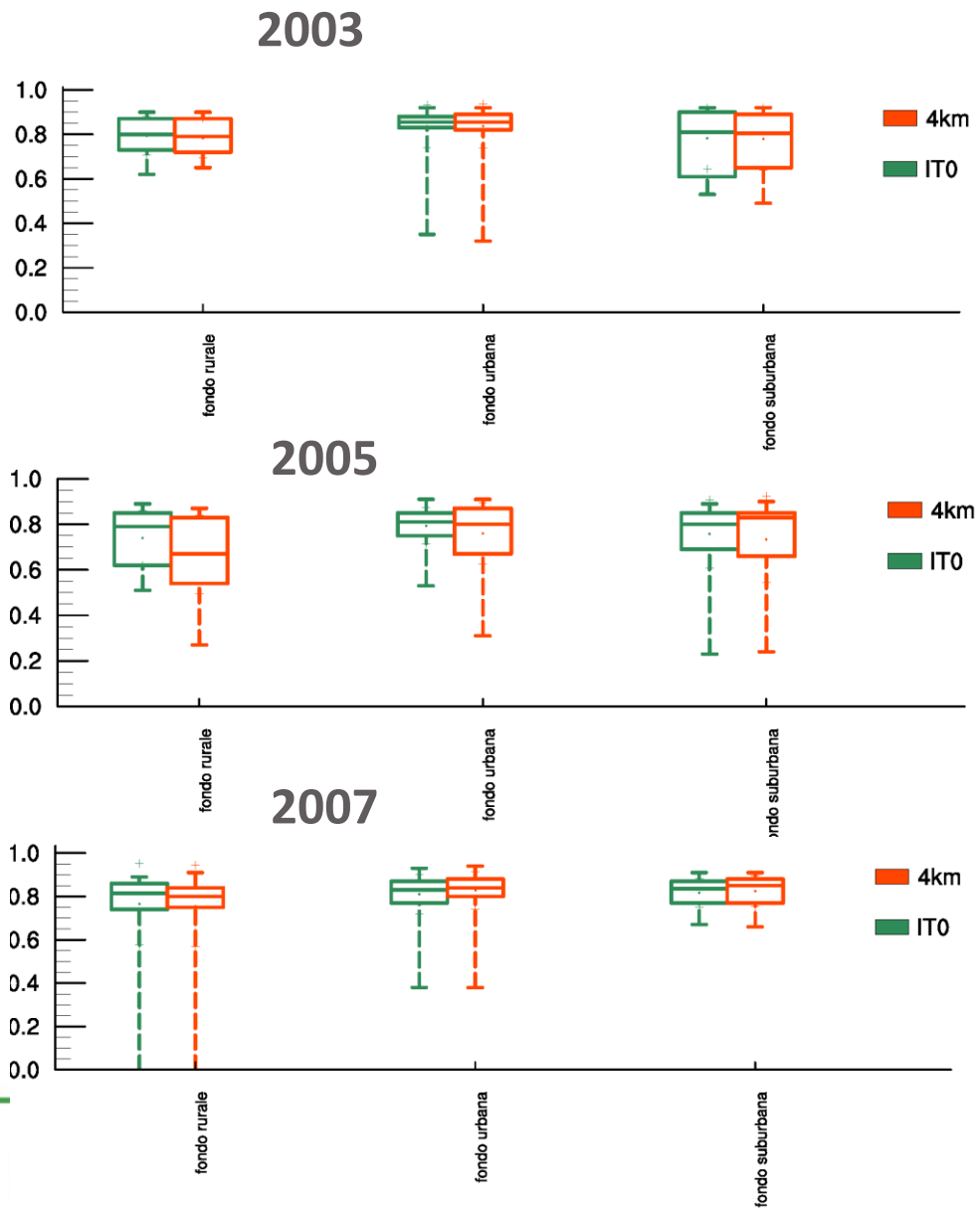
Le nostre simulazioni modellistiche sono sempre accompagnate da una validazione sia dei campi meteorologici che dei campi di qualità dell'aria seguendo le procedure « standard » identificate nelle linee guida di FAIRMODE (Forum for air quality modelling in Europe):

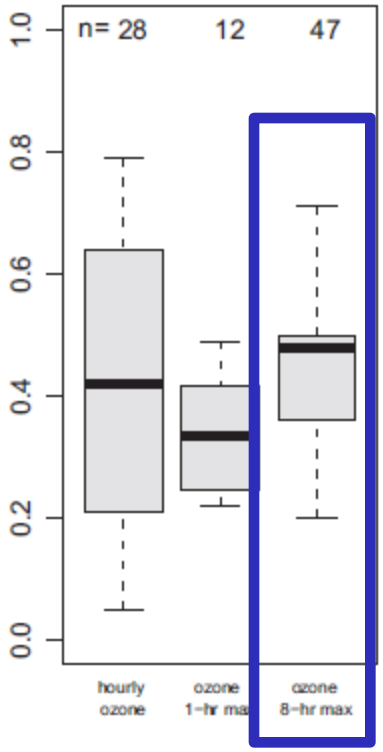
- *Estrazione dei dati simulati nei punti delle stazioni di monitoraggio (repository di ISPRA che raccoglie i dati delle Agenzie Regionali)*
- *Confronto tra dati simulati e dati misurati : calcolo degli scores e di diversi indici statistici*
- *I dati misurati devono rispettare specifici requisiti per il calcolo di diverse metriche:*
  - ➢ *e.s., per il calcolo di una media annuale:*
  - ✓ *giorni validi: > 75% di records orari validi in 1 giorno*
  - ✓ *mesi validi: > 90% di giorni validi in 1 mese*
  - ✓ *stagioni valide: > 75% di records validi in 1 stagione*
  - ✓ *anno valido: > 90% di records validi in 1 anno (O3: > 75% di dati validi sia nei 6 mesi estivi che nei 6 mesi invernali)*
- *L'incertezza viene stimata solo dove sono disponibili osservazioni e non in ogni punto o in ogni cella della griglia utilizzata dal modello*

Ozono (O_3): stazioni rurali



O_3: correlazione





Simon et al., 2012 (Atmos. Environ)

O_3: simulazione 2010

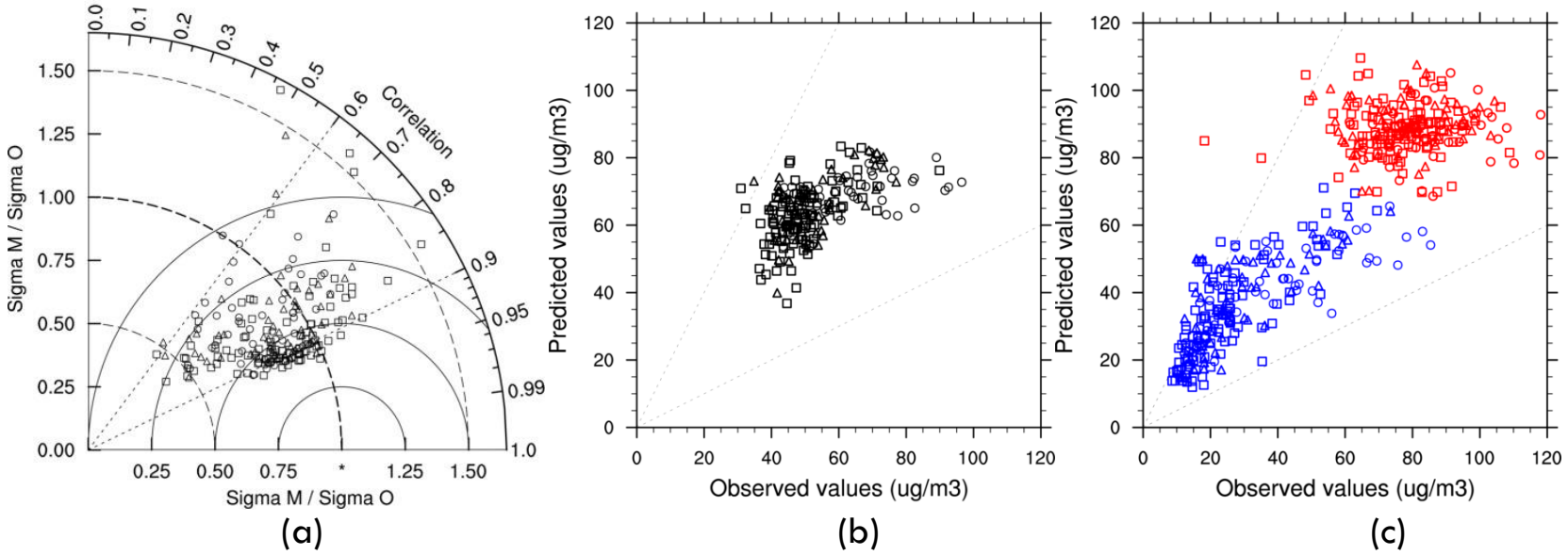
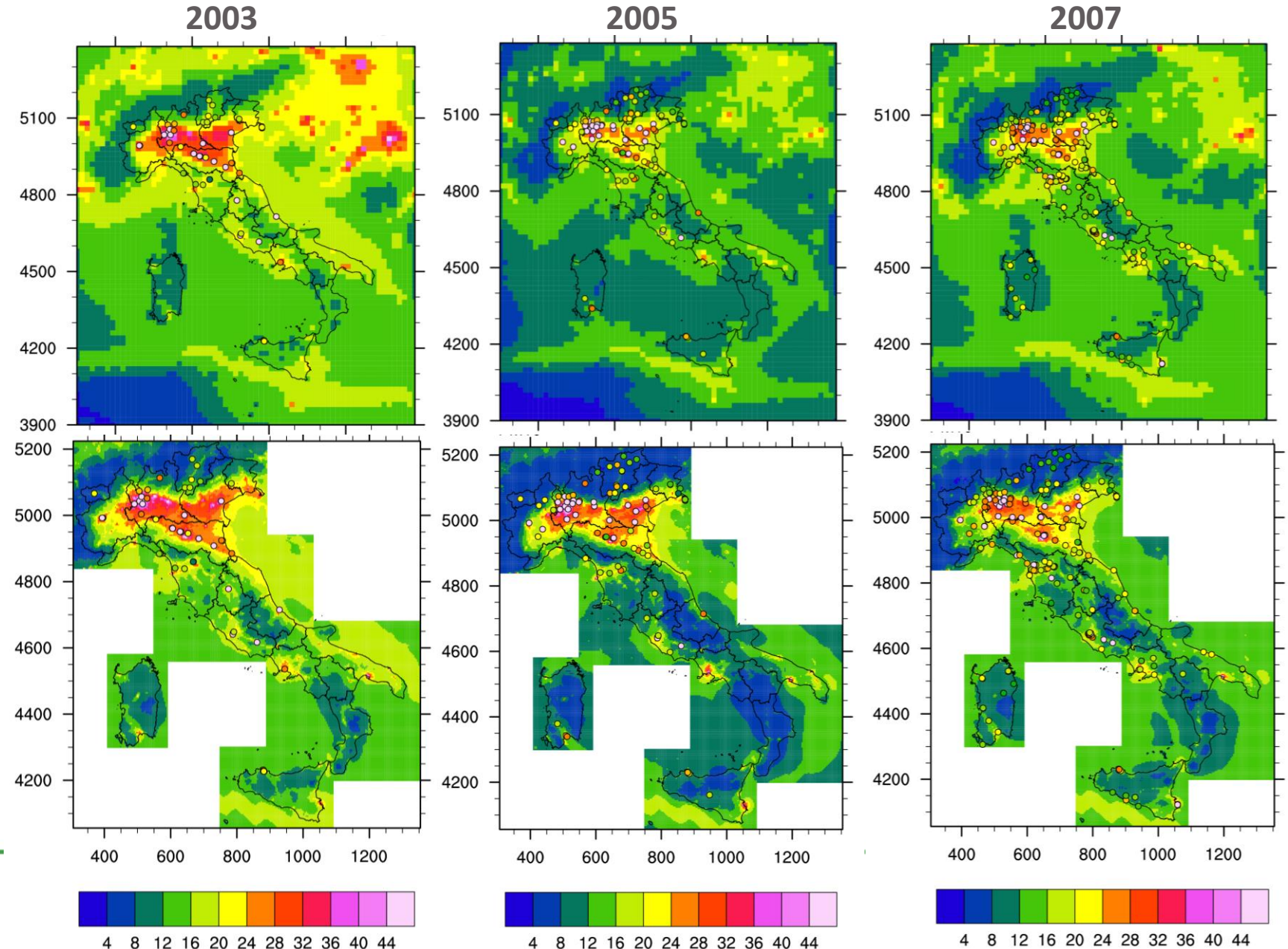
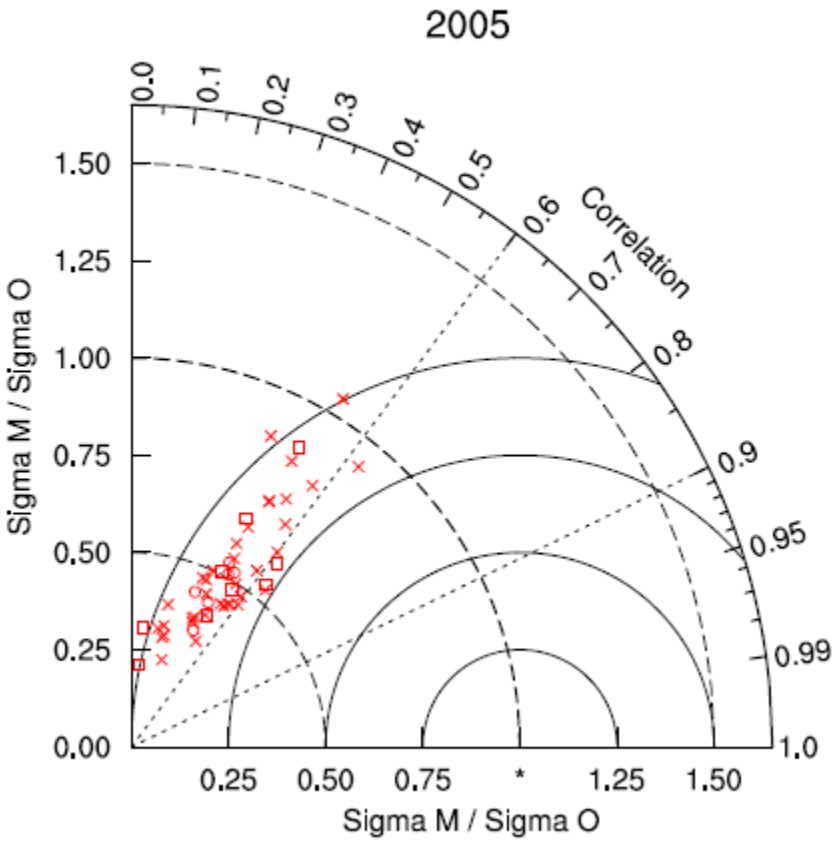


FIGURA 1 O3, MASSIMO GIORNALIERO DELLA MEDIA MOBILE SU 8 ORE. DIAGRAMMA DI TAYLOR ANNUALE (A), SCATTER PLOT ANNUALE (B), SCATTER PLOT STAGIONALE INVERNO (BLU) - ESTATE (ROSSO) (C). SONO RAPPRESENTATE LE STAZIONI: RURALI (CERCHI), URBANE (QUADRATI) E SUBURBANE (TRIANGOLI).

Materiale particolato (PM10): stazioni fondo urbano

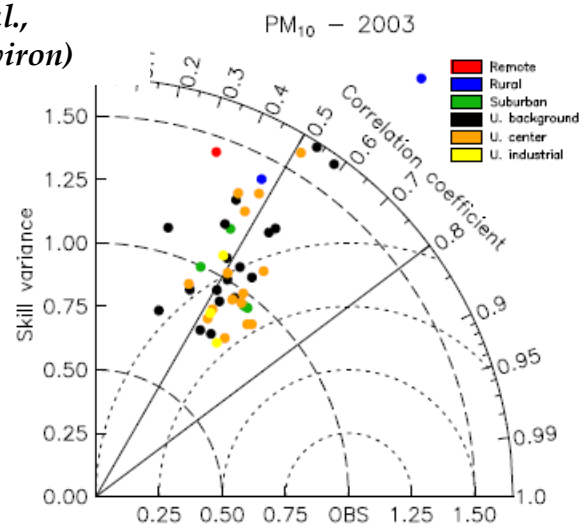


Materiale particolato (PM10): diagramma di Taylor

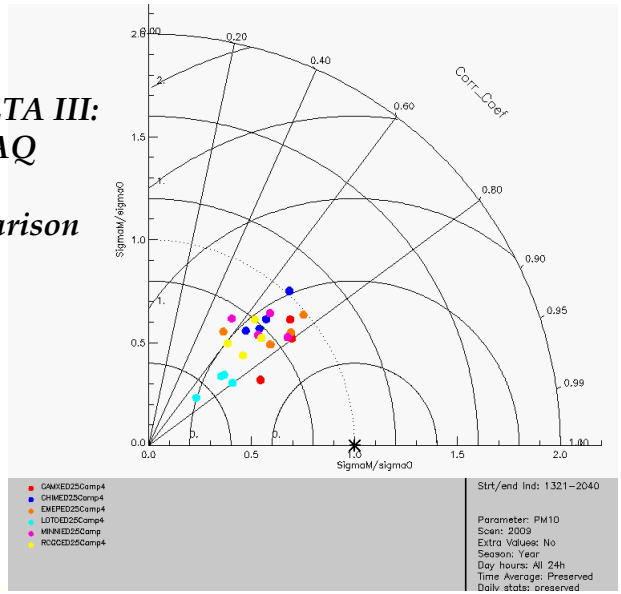


Cerchi: stazioni rurali
Crocette : stazioni urbane
Quadrati: stazioni suburbane

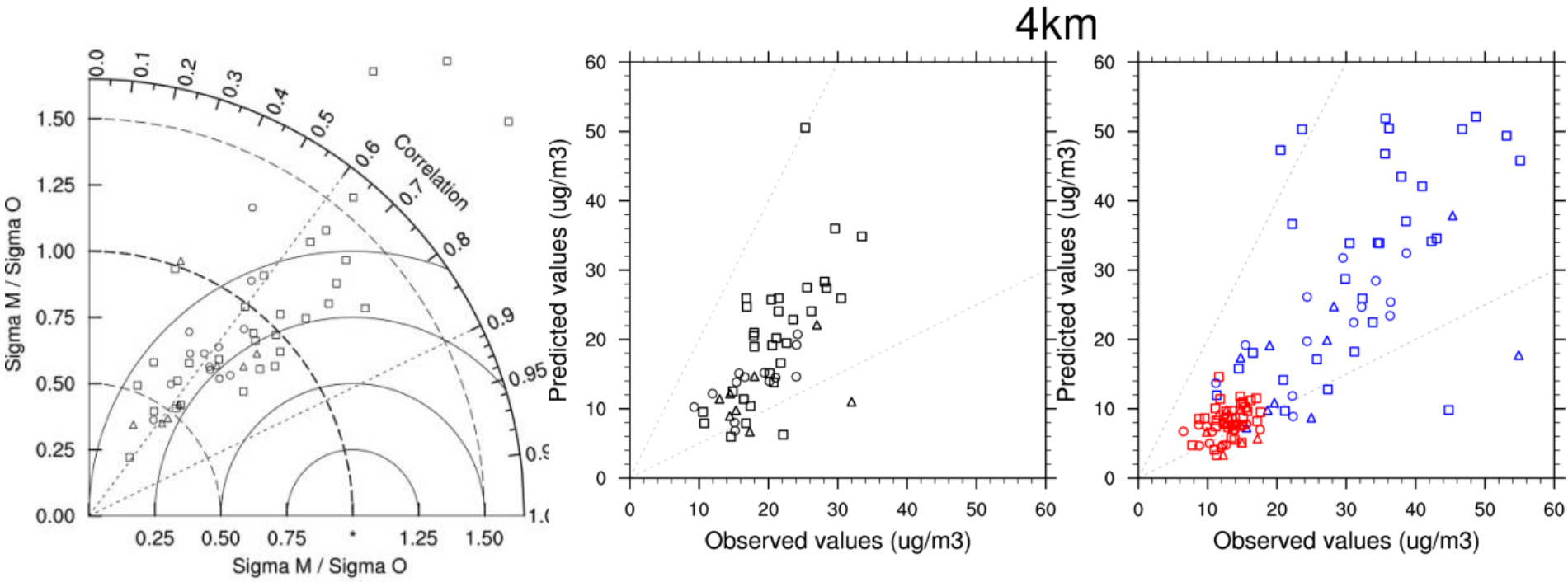
Chemel et al., (Atmos.Environ)



EURODELTA III: European AQ models intercomparison



Materiale particolato (PM2,5): anno 2010



PM2.5, MEDIE ANNUALI DEI VALORI ORARI.
DIAGRAMMA DI TAYLOR ANNUALE (a),
SCATTER PLOT ANNUALE (b), SCATTER PLOT STAGIONALE INVERNO (BLU) - ESTATE (ROSSO) (c).
SONO RAPPRESENTATE LE STAZIONI: RURALI (CERCHI), URBANE (QUADRATI) E SUBURBANE (TRIANGOLI)

La simulazione di scenario

GAINS Italy online - Windows Internet Explorer

http://gains-it.bologna.enea.it/gains/IT/index.login?logout=1

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GAINSITALY — Greenhouse Gas - Air Pollution Interactions and Synergies — IIASA

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Research program

IIASA Web site

ENEA

Welcome to the GAINS Model

The **G**reenhouse Gas and **A**ir Pollution **In**teractions and **S**ynergies (**GAINS**)-Model provides a consistent framework for the analysis of co-benefits reduction strategies from air pollution and greenhouse gas sources.

The model considers emissions of:

- Carbon dioxide (CO2)
- Methane (CH4)
- Nitrogen oxides (NOx)
- Nitrous oxide (N2O)
- Particulate matter (TSP, PM10, PM2.5 and PM1)
- Sulfur dioxide (SO2)
- Volatile organic compounds (VOC)

Certain versions of the **GAINS Model** also contain:

- Ammonia (NH3)
- Carbon monoxide (CO)
- Fluorinated greenhouse gases (F-Gases)

The **GAINS Model** consists of several screen options, which display information pertaining to:

- **Economic Activity Pathways**
  activities causing emissions (energy production & consumption, passenger & freight transport, industrial and agricultural activities, solvent use, etc.)
- **Emission Control Strategies**
  the evolution of emissions and control over a given time horizon
- **Emissions Scenarios**
  emissions are computed for a selected emissic
  strategy), emission factors, results displays, a
- **Emission Control Costs**
  displays emission control costs computed for a selected emissions scenario
- **Impacts**
  presents ecosystem sensitivities and human health impacts of air pollution
- **Data Management**
  provides an interactive interface where owner-specific data can be modified, updated, exported, and downloaded

http://gains-it.bologna.enea.it/gains/IT/index.login

The **GAINS Model** simultaneously addresses health and ecosystem impacts of particulate pollution, acidification, eutrophication and tropospheric ozone. Simultaneously, the **GAINS Model** considers greenhouse gas emission rates and the associated value per ton of CO2 equivalence. Historic emissions of air pollutants and GHGs are estimated for each country based on information collected by available international emission inventories and on national information supplied by individual countries. The GAINS Model assesses emissions on a medium-term time horizon, emission projections are specified in five year intervals through the year 2030.

Internet | 100%

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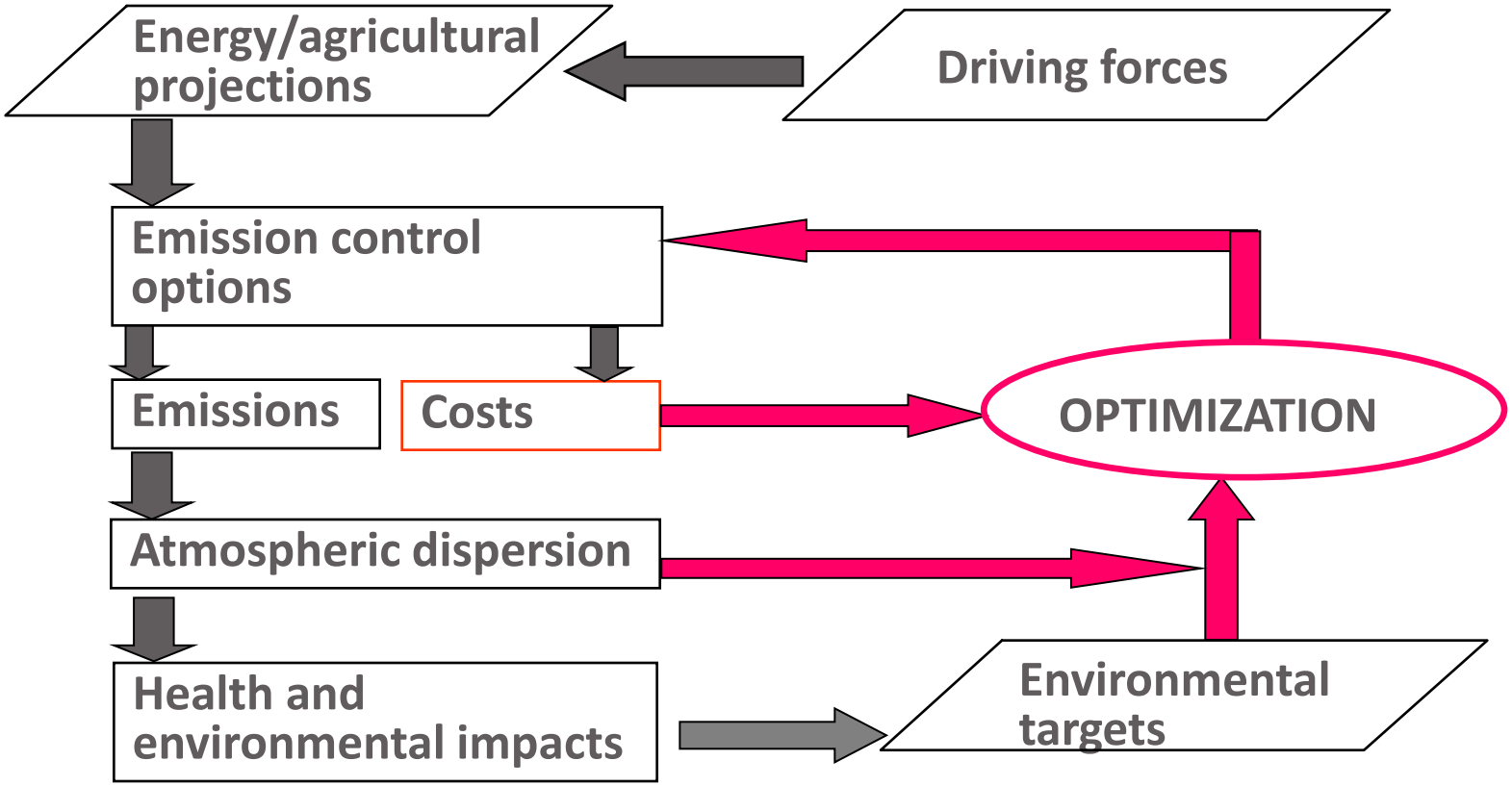
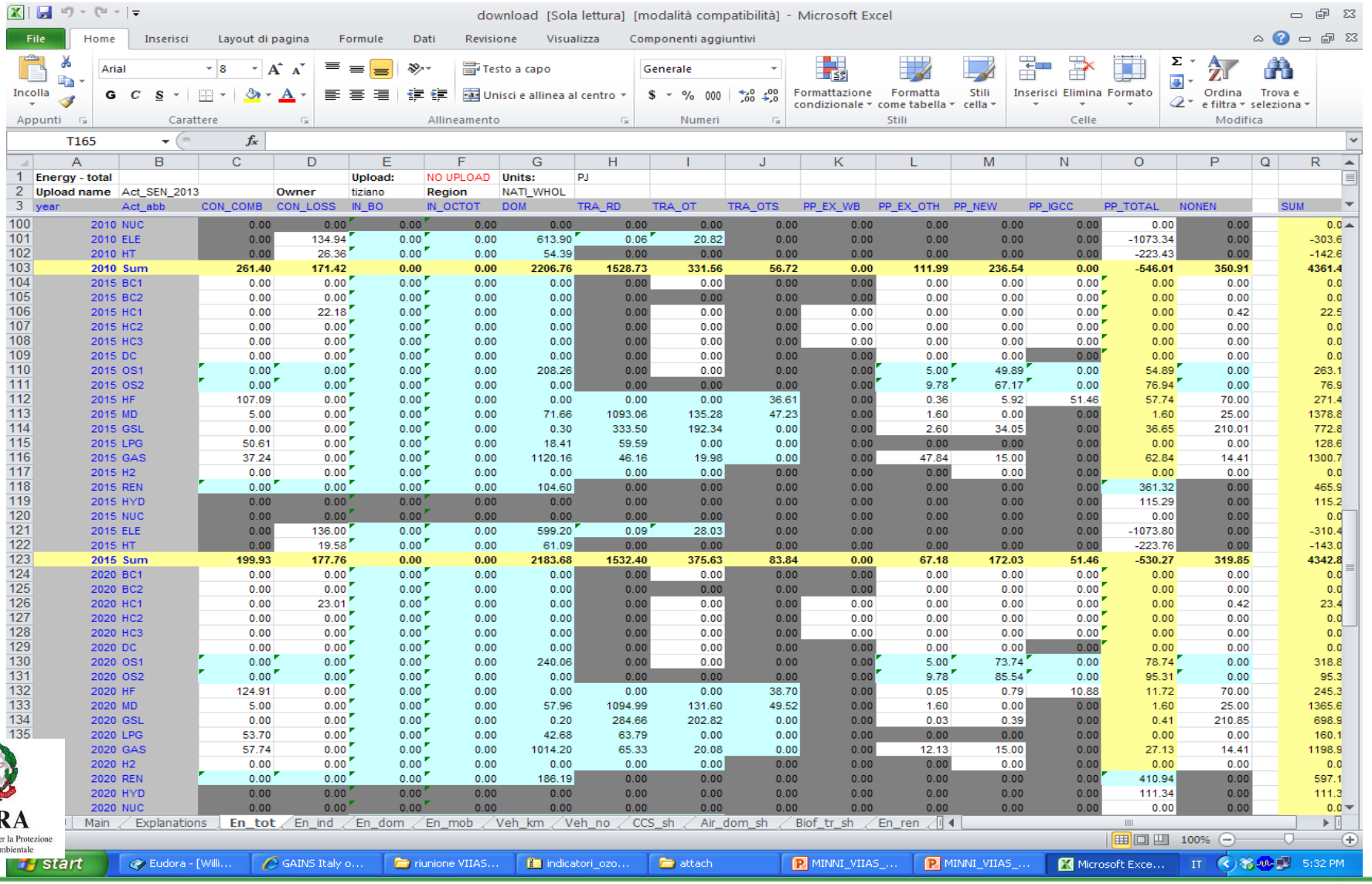
L'approccio degli Integrated Assessment Model (IAMs)

GAINS-Italia è stato sviluppato in collaborazione con IIASA in analogia al modello GAINS-Europe



IIASA International Institute for Applied Systems Analysis

Il primo input di GAINS-IT: lo scenario energetico di ISPRA



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1	Energy - total				Upload:	NO UPLOAD	Units:	PJ										
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100	2010	NUC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
101	2010	ELE	0.00	134.94	0.00	0.00	613.90	0.06	20.82	0.00	0.00	0.00	0.00	0.00	-1073.34	0.00		-303.6
102	2010	HT	0.00	26.36	0.00	0.00	54.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-223.43	0.00		-142.6
103	2010	Sum	261.40	171.42	0.00	0.00	2206.76	1528.73	331.56	56.72	0.00	111.99	236.54	0.00	-546.01	350.91		4361.4
104	2015	BC1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
105	2015	BC2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
106	2015	HC1	0.00	22.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42		22.5
107	2015	HC2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
108	2015	HC3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
109	2015	DC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
110	2015	OS1	0.00	0.00	0.00	0.00	208.26	0.00	0.00	0.00	0.00	5.00	49.89	0.00	54.89	0.00		263.1
111	2015	OS2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.78	67.17	0.00	76.94	0.00		76.9
112	2015	HF	107.09	0.00	0.00	0.00	0.00	0.00	0.00	36.61	0.00	0.36	5.92	51.46	57.74	70.00		271.4
113	2015	MD	5.00	0.00	0.00	0.00	71.66	1093.06	135.28	47.23	0.00	1.60	0.00	0.00	1.60	25.00		1378.8
114	2015	GSL	0.00	0.00	0.00	0.00	0.30	333.50	192.34	0.00	0.00	2.60	34.05	0.00	36.65	210.01		772.8
115	2015	LPG	50.61	0.00	0.00	0.00	18.41	59.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		128.6
116	2015	GAS	37.24	0.00	0.00	0.00	1120.16	46.16	19.98	0.00	0.00	47.84	15.00	0.00	62.84	14.41		1300.7
117	2015	H2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
118	2015	REN	0.00	0.00	0.00	0.00	104.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	361.32	0.00		465.9
119	2015	HYD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	115.29	0.00		115.2
120	2015	NUC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
121	2015	ELE	0.00	136.00	0.00	0.00	599.20	0.09	28.03	0.00	0.00	0.00	0.00	0.00	-1073.80	0.00		-310.4
122	2015	HT	0.00	19.58	0.00	0.00	61.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-223.76	0.00		-143.0
123	2015	Sum	199.93	177.76	0.00	0.00	2183.68	1532.40	375.63	83.84	0.00	67.18	172.03	51.46	-530.27	319.85		4342.8
124	2020	BC1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
125	2020	BC2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
126	2020	HC1	0.00	23.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42		23.4
127	2020	HC2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
128	2020	HC3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
129	2020	DC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
130	2020	OS1	0.00	0.00	0.00	0.00	240.06	0.00	0.00	0.00	0.00	5.00	73.74	0.00	78.74	0.00		318.8
131	2020	OS2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.78	85.54	0.00	95.31	0.00		95.3
132	2020	HF	124.91	0.00	0.00	0.00	0.00	0.00	0.00	38.70	0.00	0.05	0.79	10.88	11.72	70.00		245.3
133	2020	MD	5.00	0.00	0.00	0.00	57.96	1094.99	131.60	49.52	0.00	1.60	0.00	0.00	1.60	25.00		1365.6
134	2020	GSL	0.00	0.00	0.00	0.00	0.20	284.66	202.82	0.00	0.00	0.03	0.39	0.00	0.41	210.85		698.9
135	2020	LPG	53.70	0.00	0.00	0.00	42.68	63.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		160.1
	2020	GAS	57.74	0.00	0.00	0.00	1014.20	65.33	20.08	0.00	0.00	12.13	15.00	0.00	27.13	14.41		1198.9
	2020	H2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0
	2020	REN	0.00	0.00	0.00	0.00	186.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	410.94	0.00		597.1
	2020	HYD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	111.34	0.00		111.3
	2020	NUC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.0

Main | Explanations | En_tot | En_ind | En_dom | En_mob | Veh_km | Veh_no | CCS_sh | Air_dom_sh | Biof_tr_sh | En_ren

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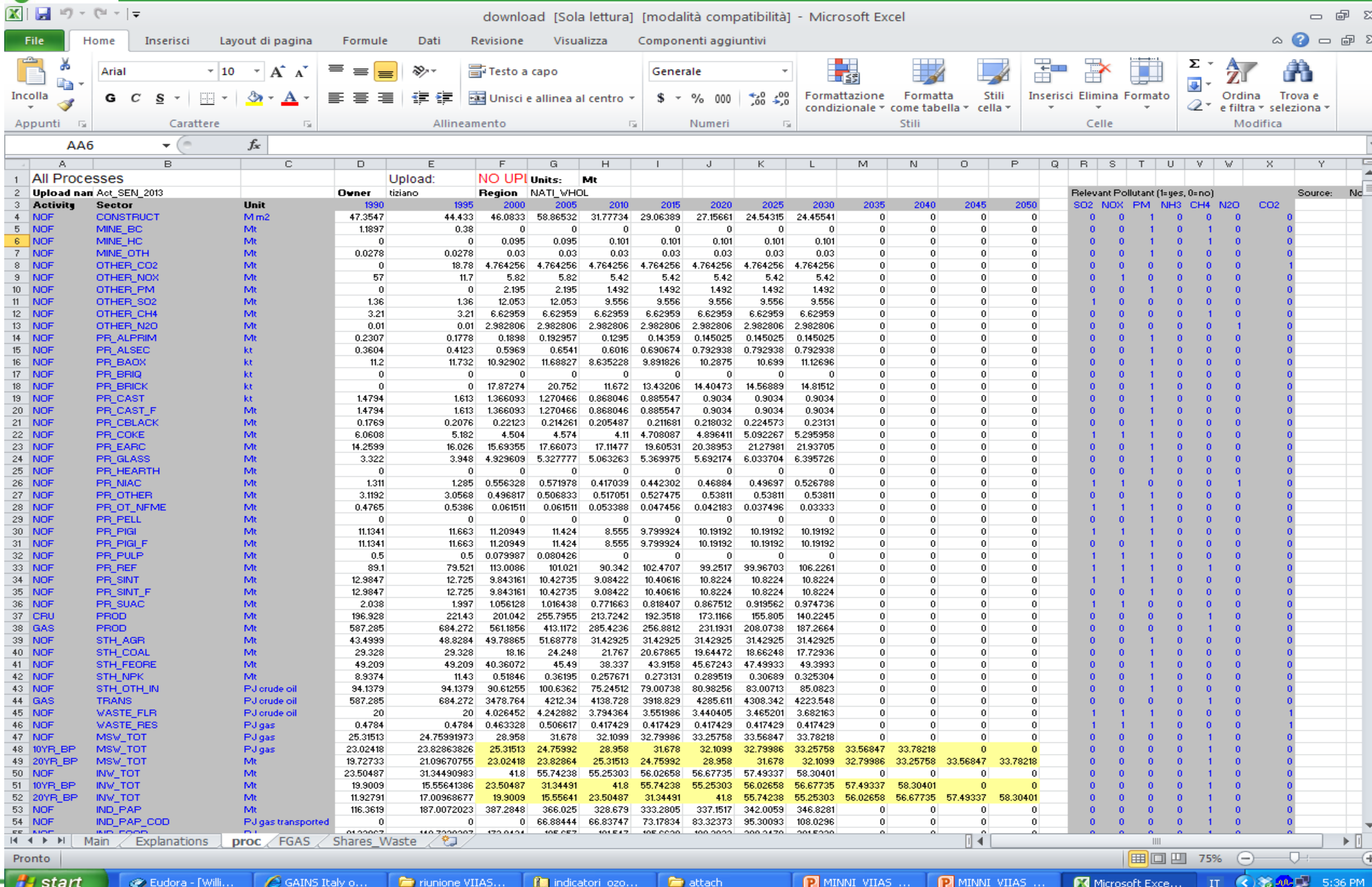
ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

DEP Lazio
Dipartimento di Epidemiologia del Servizio Sanitario Regionale Regione Lazio

SISTEMA SANITARIO REGIONALE
ASL ROMA E
REGIONE LAZIO

ccm
Centro Nazionale per la Prevenzione ed il Controllo delle Malattie

Il secondo input di GAINS-IT: lo scenario delle attività produttive (ISPRA ed ENEA)



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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	W	X	Y
1	All Processes				Upload:	NO UPl	Units:	Mt																
2	Upload nan	Act_SEN_2013		Owner	tiziano	Region	NATI_WHOL										Relevant Pollutant (1=yes, 0=no)							Source: Nc
3	Activity	Sector	Unit	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	SO2	NOX	PM	NH3	CH4	N2O	CO2	
4	NOF	CONSTRUCT	M m2	47.3547	44.433	46.0833	58.86532	31.77734	29.06389	27.15661	24.54315	24.45541	0	0	0	0	0	0	1	0	0	0	0	
5	NOF	MINE_BC	Mt	1.1897	0.38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	
6	NOF	MINE_HC	Mt	0	0	0.095	0.095	0.101	0.101	0.101	0.101	0.101	0	0	0	0	0	0	1	0	1	0	0	
7	NOF	MINE_OTH	Mt	0.0278	0.0278	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0	0	0	0	0	0	1	0	0	0	0	
8	NOF	OTHER_CO2	Mt	0	18.78	4.764256	4.764256	4.764256	4.764256	4.764256	4.764256	4.764256	0	0	0	0	0	0	0	0	0	0	1	
9	NOF	OTHER_NOX	Mt	57	11.7	5.82	5.82	5.42	5.42	5.42	5.42	5.42	0	0	0	0	0	1	0	0	0	0	0	
10	NOF	OTHER_PM	Mt	0	0	2.195	2.195	1.492	1.492	1.492	1.492	1.492	0	0	0	0	0	0	1	0	0	0	0	
11	NOF	OTHER_SO2	Mt	1.36	1.36	12.053	12.053	9.556	9.556	9.556	9.556	9.556	0	0	0	0	1	0	0	0	0	0	0	
12	NOF	OTHER_CH4	Mt	3.21	3.21	6.62959	6.62959	6.62959	6.62959	6.62959	6.62959	6.62959	0	0	0	0	0	0	0	0	1	0	0	
13	NOF	OTHER_N2O	Mt	0.01	0.01	2.982806	2.982806	2.982806	2.982806	2.982806	2.982806	2.982806	0	0	0	0	0	0	0	0	0	1	0	
14	NOF	PR_ALPRIM	Mt	0.2307	0.1778	0.1898	0.192957	0.1295	0.14359	0.145025	0.145025	0.145025	0	0	0	0	0	0	1	0	0	0	0	
15	NOF	PR_ALSEC	kt	0.3604	0.4123	0.5969	0.6541	0.6016	0.690674	0.792938	0.792938	0.792938	0	0	0	0	0	0	1	0	0	0	0	
16	NOF	PR_BAOX	kt	11.2	11.732	10.92902	11.68827	8.635228	9.891826	10.2875	10.699	11.12696	0	0	0	0	0	0	1	0	0	0	0	
17	NOF	PR_BRIQ	kt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
18	NOF	PR_BRICK	kt	0	0	17.87274	20.752	11.672	13.43206	14.40473	14.56889	14.81512	0	0	0	0	0	0	1	0	0	0	0	
19	NOF	PR_CAST	kt	1.4794	1.613	1.366093	1.270466	0.868046	0.885547	0.9034	0.9034	0.9034	0	0	0	0	0	0	1	0	0	0	0	
20	NOF	PR_CAST_F	Mt	1.4794	1.613	1.366093	1.270466	0.868046	0.885547	0.9034	0.9034	0.9034	0	0	0	0	0	0	1	0	0	0	0	
21	NOF	PR_CBLACK	Mt	0.1769	0.2076	0.22123	0.214261	0.205487	0.211681	0.218032	0.224573	0.23131	0	0	0	0	0	0	1	0	0	0	0	
22	NOF	PR_COKE	Mt	6.0608	5.182	4.504	4.574	4.11	4.708087	4.896411	5.092267	5.295958	0	0	0	0	1	1	1	0	0	0	0	
23	NOF	PR_EARC	Mt	14.2599	16.026	15.69355	17.66073	17.11477	19.60531	20.38953	21.27981	21.93705	0	0	0	0	0	0	1	0	0	0	0	
24	NOF	PR_GLASS	Mt	3.322	3.948	4.929609	5.327777	5.063263	5.369975	5.692174	6.033704	6.395726	0	0	0	0	0	0	1	0	0	0	0	
25	NOF	PR_HEARTH	Mt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
26	NOF	PR_NIAC	Mt	1.311	1.285	0.556328	0.571978	0.417039	0.442302	0.46884	0.49697	0.526788	0	0	0	0	1	1	0	0	0	1	0	
27	NOF	PR_OTHER	Mt	3.1192	3.0568	0.496817	0.506833	0.517051	0.527475	0.53811	0.53811	0.53811	0	0	0	0	0	0	1	0	0	0	0	
28	NOF	PR_OT_NFME	Mt	0.4765	0.5386	0.061511	0.061511	0.053388	0.047456	0.042183	0.037496	0.03333	0	0	0	0	1	1	1	0	0	0	0	
29	NOF	PR_PELL	Mt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
30	NOF	PR_PIGI	Mt	11.1341	11.663	11.20949	11.424	8.555	9.799924	10.19192	10.19192	10.19192	0	0	0	0	1	1	1	0	0	0	0	
31	NOF	PR_PIGI_F	Mt	11.1341	11.663	11.20949	11.424	8.555	9.799924	10.19192	10.19192	10.19192	0	0	0	0	0	0	1	0	0	0	0	
32	NOF	PR_PULP	Mt	0.5	0.5	0.079987	0.080426	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	
33	NOF	PR_REF	Mt	89.1	79.521	113.0086	101.021	90.342	102.4707	99.2517	99.96703	106.2261	0	0	0	0	1	1	1	0	1	0	0	
34	NOF	PR_SINT	Mt	12.9847	12.725	9.843161	10.42735	9.08422	10.40616	10.8224	10.8224	10.8224	0	0	0	0	1	1	1	0	0	0	0	
35	NOF	PR_SINT_F	Mt	12.9847	12.725	9.843161	10.42735	9.08422	10.40616	10.8224	10.8224	10.8224	0	0	0	0	0	0	1	0	0	0	0	
36	NOF	PR_SUAC	Mt	2.038	1.997	1.056128	1.016438	0.771663	0.818407	0.867512	0.919562	0.974736	0	0	0	0	1	1	0	0	0	0	0	
37	CRU	PROD	Mt	196.928	221.43	201.042	255.7955	213.7242	192.3518	173.1166	155.805	140.2245	0	0	0	0	0	0	0	0	1	0	0	
38	GAS	PROD	Mt	587.285	684.272	561.1856	413.1172	285.4236	256.8812	231.1931	208.0738	187.2664	0	0	0	0	0	0	0	0	1	0	0	
39	NOF	STH_AGR	Mt	43.4999	48.8284	49.78865	51.68778	31.42925	31.42925	31.42925	31.42925	31.42925	0	0	0	0	0	0	1	0	0	0	0	
40	NOF	STH_COAL	Mt	29.328	29.328	18.16	24.248	21.767	20.67865	19.64472	18.66248	17.72936	0	0	0	0	0	0	1	0	0	0	0	
41	NOF	STH_FEORE	Mt	49.209	49.209	40.36072	45.49	38.337	43.9158	45.67243	47.49933	49.3993	0	0	0	0	0	0	1	0	0	0	0	
42	NOF	STH_NPK	Mt	8.9374	11.43	0.51846	0.36195	0.257671	0.273131	0.289519	0.30689	0.325304	0	0	0	0	0	0	1	0	0	0	0	
43	NOF	STH_OTH_IN	PJ crude oil	94.1379	94.1379	90.61255	100.6362	75.24512	79.00738	80.98256	83.00713	85.0823	0	0	0	0	0	0	1	0	0	0	0	
44	GAS	TRANS	PJ crude oil	587.285	684.272	3478.764	4212.34	4138.728	3918.829	4285.611	4308.342	4223.548	0	0	0	0	0	0	0	0	1	0	0	
45	NOF	WASTE_FLR	PJ crude oil	20	20	4.026452	4.242882	3.794364	3.551986	3.440405	3.465201	3.682163	0	0	0	0	1	1	1	0	0	0	1	
46	NOF	WASTE_RES	PJ gas	0.4784	0.4784	0.463328	0.506617	0.417429	0.417429	0.417429	0.417429	0.417429	0	0	0	0	1	1	1	0	0	0	1	
47	NOF	MSW_TOT	PJ gas	25.31513	24.75991973	28.958	31.678	32.1099	32.79986	33.25758	33.56847	33.78218	0	0	0	0	0	0	0	0	1	0	0	
48	10YR_BP	MSW_TOT	PJ gas	23.02418	23.82863826	25.31513	24.75992	28.958	31.678	32.1099	32.79986	33.25758	33.56847	33.78218	0	0	0	0	0	0	1	0	0	
49	20YR_BP	MSW_TOT	Mt	19.72733	21.09670755	23.02418	23.82864	25.31513	24.75992	28.958	31.678	32.1099	32.79986	33.25758	33.56847	33.78218	0	0	0	0	1	0	0	
50	NOF	INW_TOT	Mt	23.50487	31.34490983	41.8	55.74238	55.25303	56.02658	56.67735	57.49337	58.30401	0	0	0	0	0	0	0	0	1	0	0	
51	10YR_BP	INW_TOT	Mt	19.9009	15.55641386	23.50487	31.34491	41.8	55.74238	55.25303	56.02658	56.67735	57.49337	58.30401	0	0	0	0	0	0	1	0	0	
52	20YR_BP	INW_TOT	Mt	11.92791	17.00968677	19.9009	15.55641	23.50487	31.34491	41.8	55.74238	55.25303	56.02658	56.67735	57.49337	58.30401	0	0	0	0	1	0	0	
53	NOF	IND_PAP	Mt	116.3619	187.0072023	387.2848	366.025	328.679	333.2805	337.1517	342.0059	346.8281	0	0	0	0	0	0	0	0	1	0	0	
54	NOF	IND_PAP_COD	PJ gas transported	0	0	0	66.88444	66.83747	73.17834	83.32373	95.30093	108.0296	0	0	0	0	0	0	0	0	1	0	0	

Main | Explanations | proc | FGAS | Shares_Waste

Pronto

Il terzo input di GAINS-IT: le tecnologie di riduzione (ISPRA ed ENEA)

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A1: Control strategy - MOB_RD

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Control strategy - MOB_RD																	
2	Uploadname	NAT_CLE_2013	Owner	tiziano			Upload:	NO UPLOAD		Unit:	% of total activity (fuel use) by controlled vehicles							
3	Activity	Sector	Technology	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050		
4	GAS	TRA_RD_HDB	NSC_TRA	0	0	0	0	0	0	0	0	0	0	0	0	0		
5	GAS	TRA_RD_HDB	HDSEI	0	0	9.827774	24.20641	12.29697	5.568717	2.484082	0.694003	0.116782	0	0	0	0		
6	GAS	TRA_RD_HDB	HDSEII	0	0	20.15038	74.03408	49.89045	38.55536	23.12904	4.95492	0.551405	0	0	0	0		
7	GAS	TRA_RD_HDB	HDSEIII	0	0	0	0	36.46534	52.54763	73.75951	94.27203	99.33181	0	0	0	0		
8	GSL	TRA_RD_HDB	NSC_TRA	0	0	0	0	0	0	0	0	0	0	0	0	0		
9	GSL	TRA_RD_HDB	HDSEI	0	0	0	0	0	0	0	0	0	0	0	0	0		
10	GSL	TRA_RD_HDB	HDSEII	0	0	0	0	0	0	0	0	0	0	0	0	0		
11	GSL	TRA_RD_HDB	HDSEIII	0	0	0	0	0	0	0	0	0	0	0	0	0		
12	LPG	TRA_RD_HDB	NSC_TRA	0	0	0	0	0	0	0	0	0	0	0	0	0		
13	LPG	TRA_RD_HDB	HDSEI	0	0	9.827774	9.064755	7.498913	5.568717	2.484082	0.694003	0.116782	0	0	0	0		
14	LPG	TRA_RD_HDB	HDSEII	0	0	20.15038	23.07324	20.67041	18.55536	13.12904	4.95492	0.551405	0	0	0	0		
15	LPG	TRA_RD_HDB	HDSEIII	0	0	0	27.37182	55.10486	72.54763	83.75951	94.27203	99.33181	0	0	0	0		
16	MD	TRA_RD_HDB	NSC_TRA	0	0	0	0	0	0	0	0	0	0	0	0	0		
17	MD	TRA_RD_HDB	HDEUI	0	16	9.827774	8.514648	6.911525	4.801193	0	6.7	0	0	0	0	0		
18	MD	TRA_RD_HDB	HDEUII	0	0	20.15038	30.59176	22.78803	22.47696	10.06566	0	6.581729	0					
19	MD	TRA_RD_HDB	HDEUIII	0	0	0	24.77402	44.1396	25.80999	22.94612	9.528465	0	0					
20	MD	TRA_RD_HDB	HDEUIV	0	0	0	0	0.497313	9.382991	8.66845	6.6006	0	0					
21	MD	TRA_RD_HDB	HDEUV	0	0	0	0	3.723562	21.14087	18.77487	17.17852	12.69281	0					
22	MD	TRA_RD_HDB	HDEUVI	0	0	0	0	1.299579	9.633132	33.01226	59.97163	80.72546	0	0	0	0		
23	MD	TRA_RD_HDB	HDEUVII	0	0	0	0	0	0	0	0	0	0	0	0	0		
24	GAS	TRA_RD_HDT	NSC_TRA	0	0	0	0	0	0	0	0	0	0	0	0	0		
25	GAS	TRA_RD_HDT	HDSEI	0	0	6.645386	4.236346	2.930979	0.44712	0.074983	0.028574	0	0	0	0	0		
26	GAS	TRA_RD_HDT	HDSEII	0	0	15.35918	25.45447	23.19512	11.32873	2.449711	0.375585	0.164907	0	0	0	0		
27	GAS	TRA_RD_HDT	HDSEIII	0	0	0	33.65653	59.63496	85.90257	96.84742	99.54187	99.83509	0	0	0	0		
28	GSL	TRA_RD_HDT	NSC_TRA	0	0	0	0	0	0	0	0	0	0	0	0	0		
29	GSL	TRA_RD_HDT	HDSEI	0	0	6.645386	4.236346	2.930979	0.44712	0.074983	0.028574	0	0	0	0	0		
30	GSL	TRA_RD_HDT	HDSEII	0	0	15.35918	25.45447	23.19512	11.32873	2.449711	0.375585	0.164907	0	0	0	0		
31	GSL	TRA_RD_HDT	HDSEIII	0	0	0	33.65653	59.63496	85.90257	96.84742	99.54187	99.83509	0	0	0	0		
32	LPG	TRA_RD_HDT	NSC_TRA	0	0	0	0	0	0	0	0	0	0	0	0	0		
33	LPG	TRA_RD_HDT	HDSEI	0	0	6.645386	4.236346	2.930979	0.44712	0.074983	0.028574	0	0	0	0	0		
34	LPG	TRA_RD_HDT	HDSEII	0	0	15.35918	25.45447	23.19512	11.32873	2.449711	0.375585	0.164907	0	0	0	0		
35	LPG	TRA_RD_HDT	HDSEIII	0	0	0	33.65653	59.63496	85.90257	96.84742	99.54187	99.83509	0	0	0	0		
36	MD	TRA_RD_HDT	NSC_TRA	0	0	0	0	0	0	0	0	0	0	0	0	0		
37	MD	TRA_RD_HDT	HDEUI	0	16	6.645386	5.826983	4.715027	4.468726	1.97251	12.91604	0	0	0	0	0		
38	MD	TRA_RD_HDT	HDEUII	0	0	15.35918	27.34225	20.59231	14.78794	7.712355	0	12.44564	0	0	0	0		
39	MD	TRA_RD_HDT	HDEUIII	0	0	0	28.75059	33.60513	18.66826	11.30059	6.76469	0	0	0	0	0		

TOTAL = 100 %

Main | Explanations | MOB_RD | MOB_OT | NH3 | NOX | DOM_COAL | DOM_BIOM | PM | SO2 | VOC | N2O | CH4 | FGAS

Pronto

La denominazione Current LEgislation CLE dello scenario

Lo scenario nazionale CLE può contenere o meno misure di miglioramento della Qualità dell'Aria ma sempre di tipo normativo o regolamentare

La "regionalizzazione" dello scenario nazionale può non rispecchiare la reale distribuzione regionale di questo tipo di misure

Non sono comprese misure di livello locale e regionale non riconducibili a norme o regolamenti

GLI SCENARI EMISSIVI

- Scenario attività produttive
- Scenario energetico

GAINS Italia

- Scenari emissivi
- Mappe di deposizione
- Mappe di concentrazione
- Impatto sull'ambiente e sulla salute

- Strategia di controllo (Tecnologie di abbattimento)

WORK IN PROGRESS… E SCELTE DA EFFETTUARE

1. *Pronto nuovo scenario energetico con 2010 a consuntivo (e non come anno di scenario) e nuovi trend*
2. *Pronto inventario nazionale 2010*
3. *Pronta l'armonizzazione all'interno di GAINS delle precedenti basi informative (1. input; 2 output)*
4. *Non era disponibile una regionalizzazione dello scenario energetico di cui al punto 1*

TUTTAVIA ….

I CAMBIAMENTI SONO CONTINUI

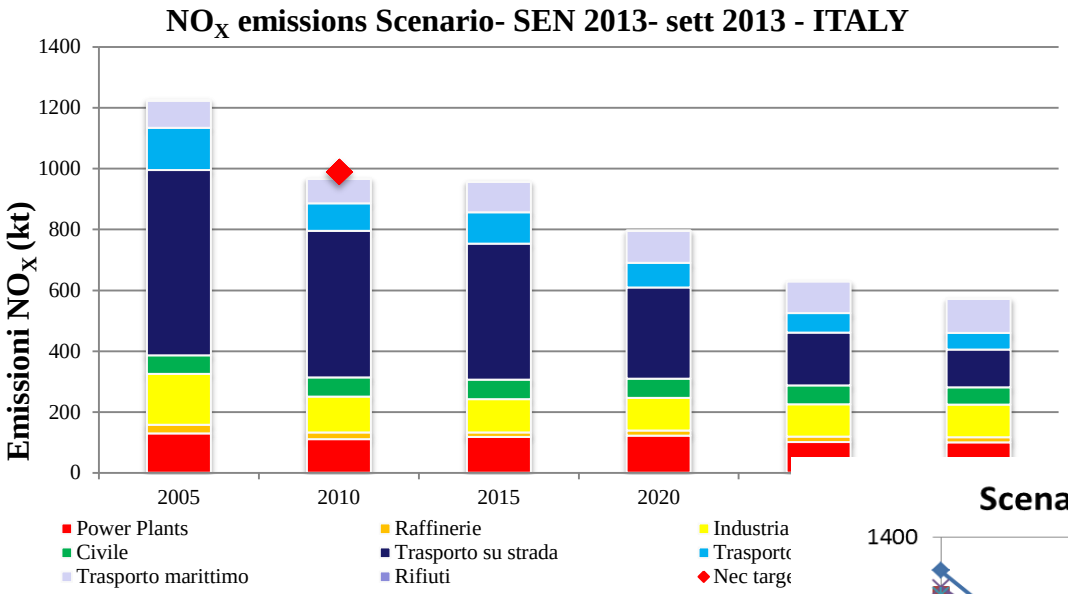
1. SIA SULLE PROIEZIONI ENERGETICHE/PRODUTTIVE

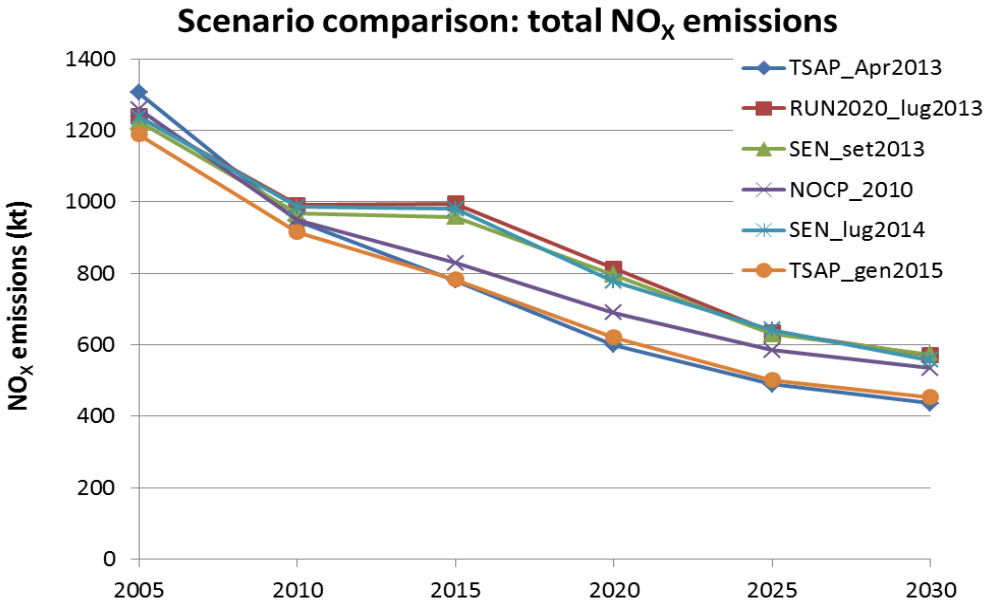
2. SIA SULLE SERIE STORICHE DELLE EMISSIONI CHE VENGONO PERIODICAMENTE RIALLINEATE

LO SCENARIO DI QUALITA' DELL'ARIA 2020 PER VIIAS

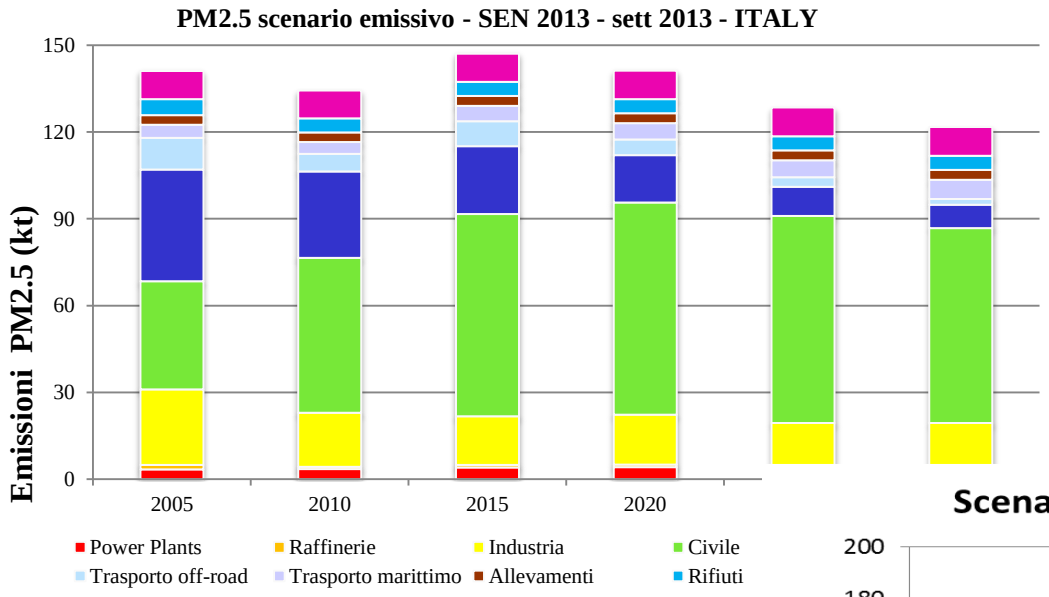
- Scenario emissivo identificato in GAINS_Italia come TEST RUN 2020 (Scenario energetico: Strategia Energetica Nazionale SEN di Luglio 2013)
- Downscale Regionale con le medesime proxies del precedente scenario energetico denominato no_CP
- Downscale Provinciale con le medesime proxies dell'inventario nazionale 2005 (previo un controllo di coerenza con le proxies dell'inventario 2010 all'epoca solo parzialmente disponibili)
- Meteorologia 2005 per coerenza con la simulazione di riferimento 2005
- Simulazione dell'intero anno 2020 con AMS a 4 km di ris. spaziale
- Boundary Conditions derivate dalla simulazione EMEP per il 2020 denominata "central baseline scenario" per la Revisione del Protocollo di Gothenburg con anno meteorologico 2005

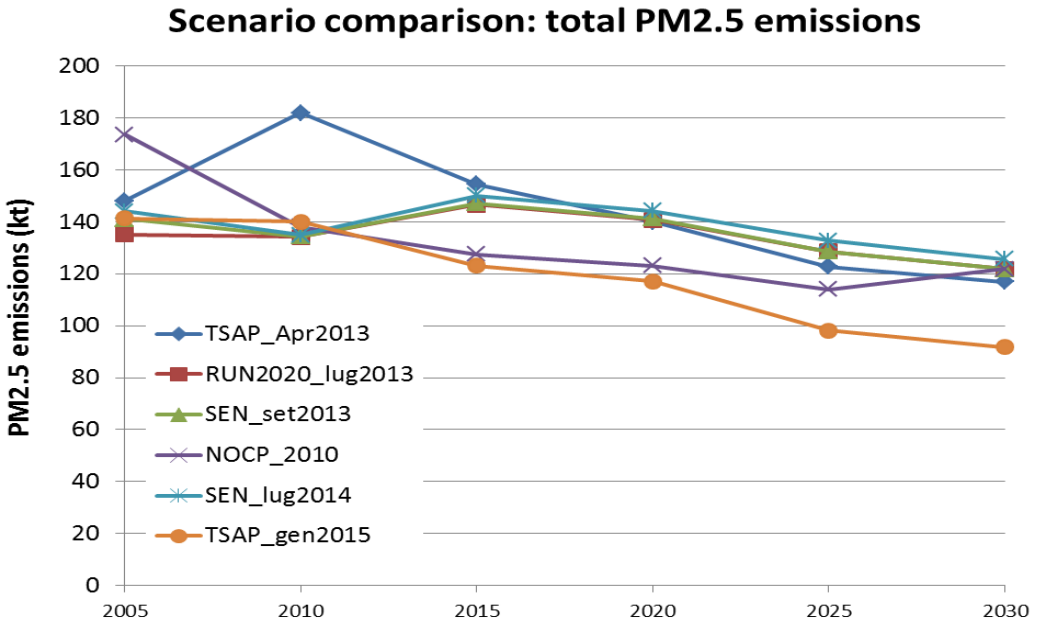
Lo scenario emissivo per gli NOx



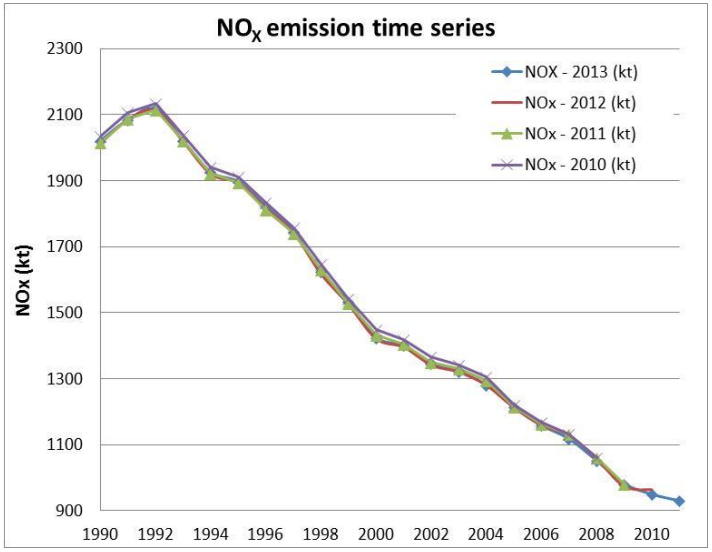


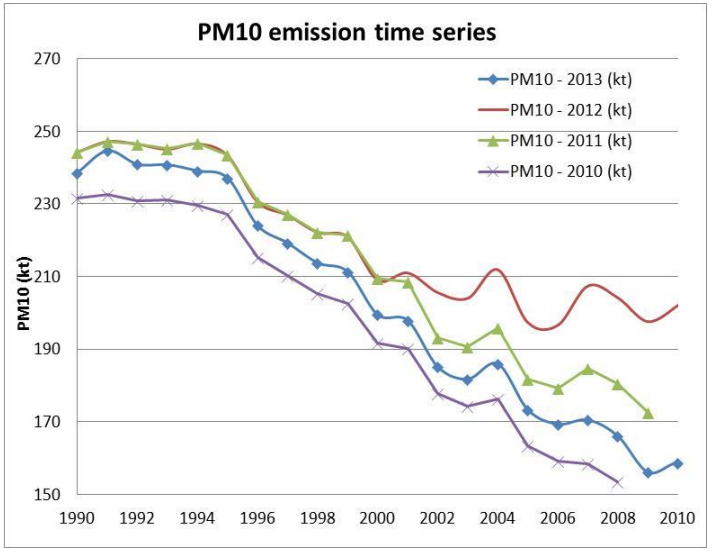
Lo scenario emissivo per il $PM_{2.5}$

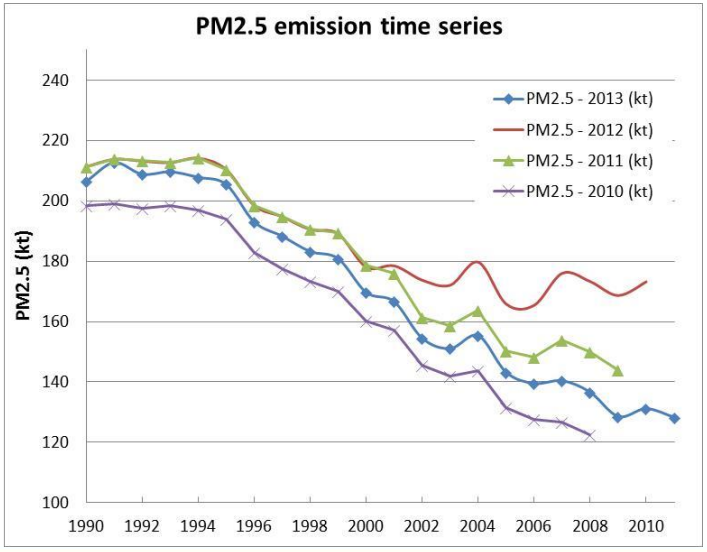


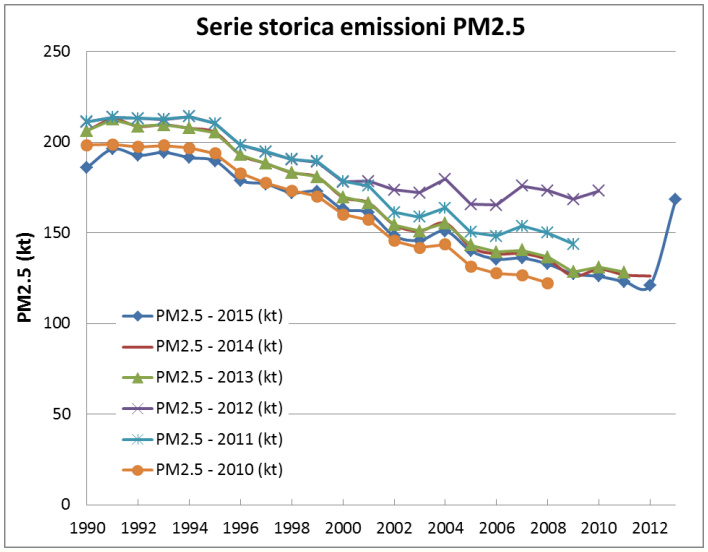


I RIALLINEAMENTI DELLE SERIE STORICHE DELLE EMISSIONI









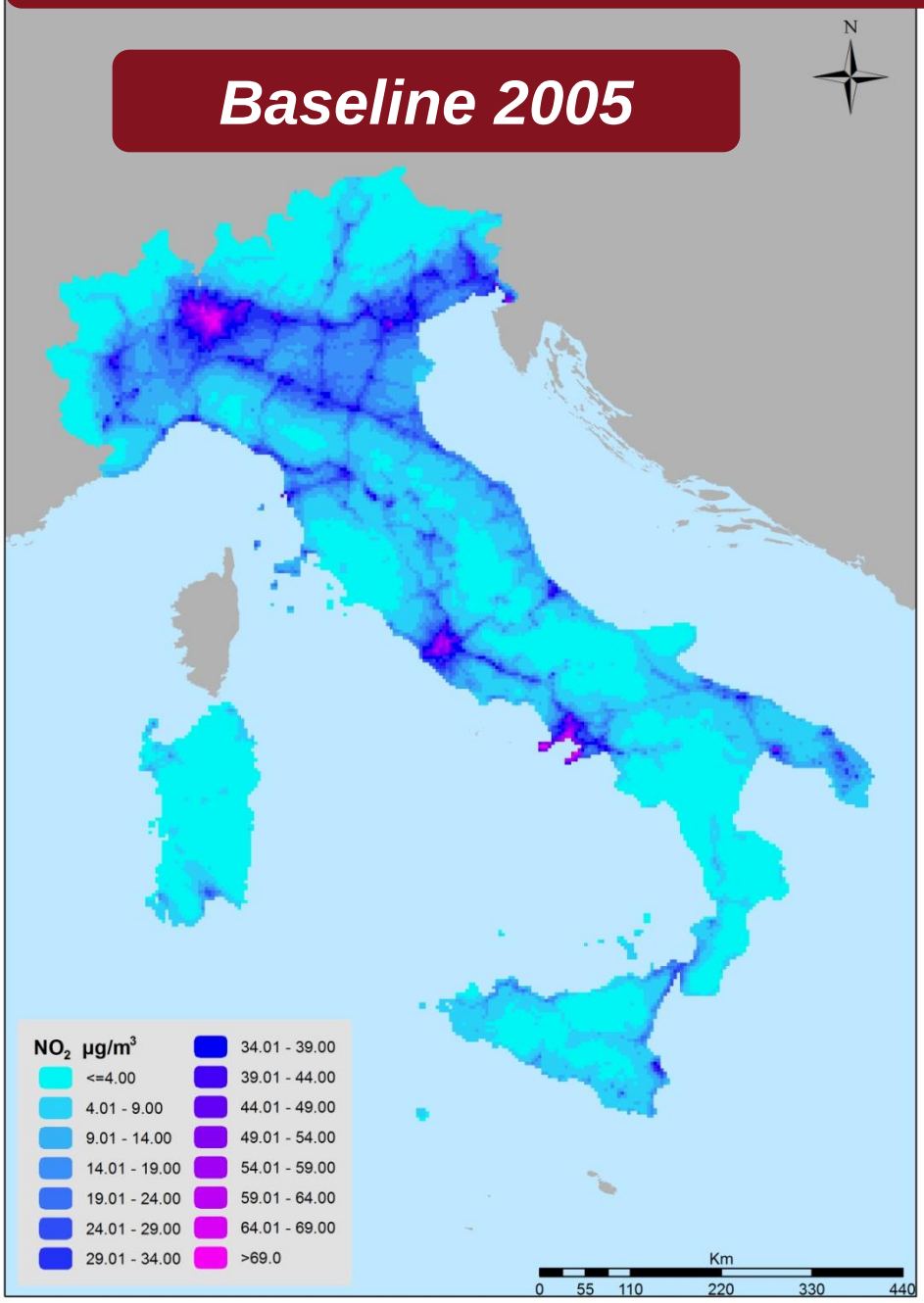
ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

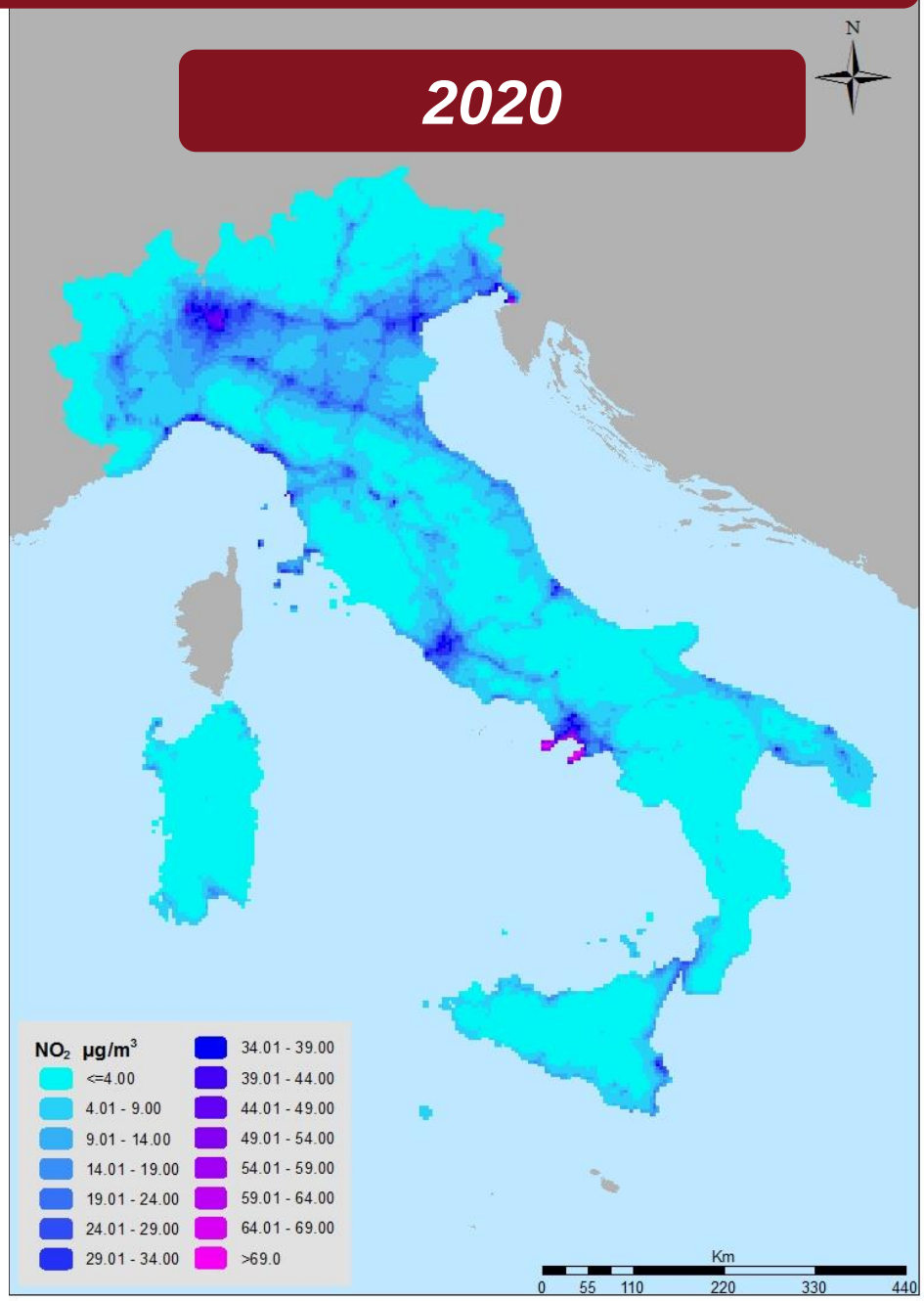
DEP Lazio
Dipartimento di Epidemiologia del Servizio Sanitario Regionale Regione Lazio

SISTEMA SANITARIO REGIONALE
ASL ROMA E
REGIONE LAZIO

CCM
Centro Nazionale per la Prevenzione ed il Controllo delle Malattie

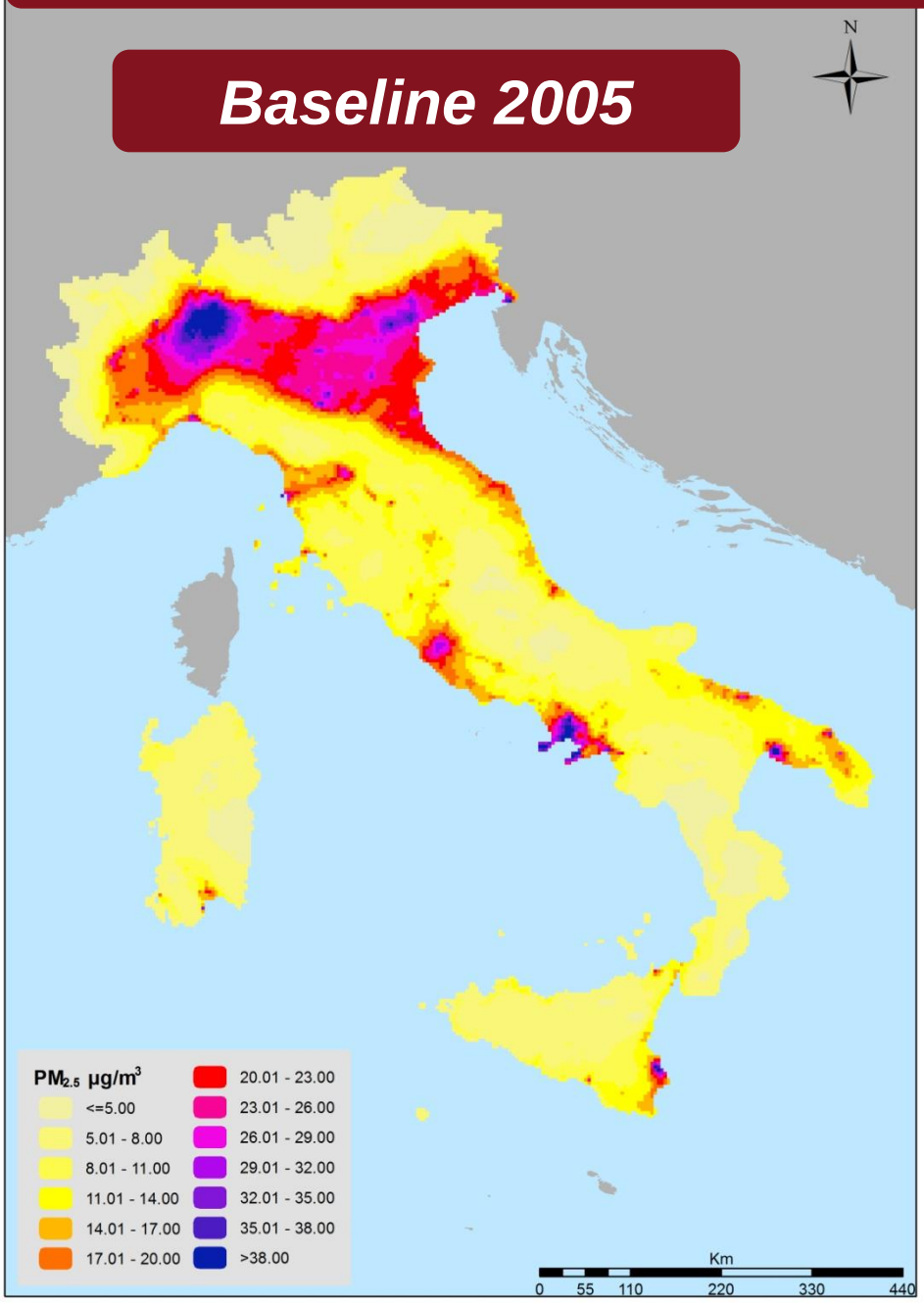
Concentrazioni medie annue di NO_2



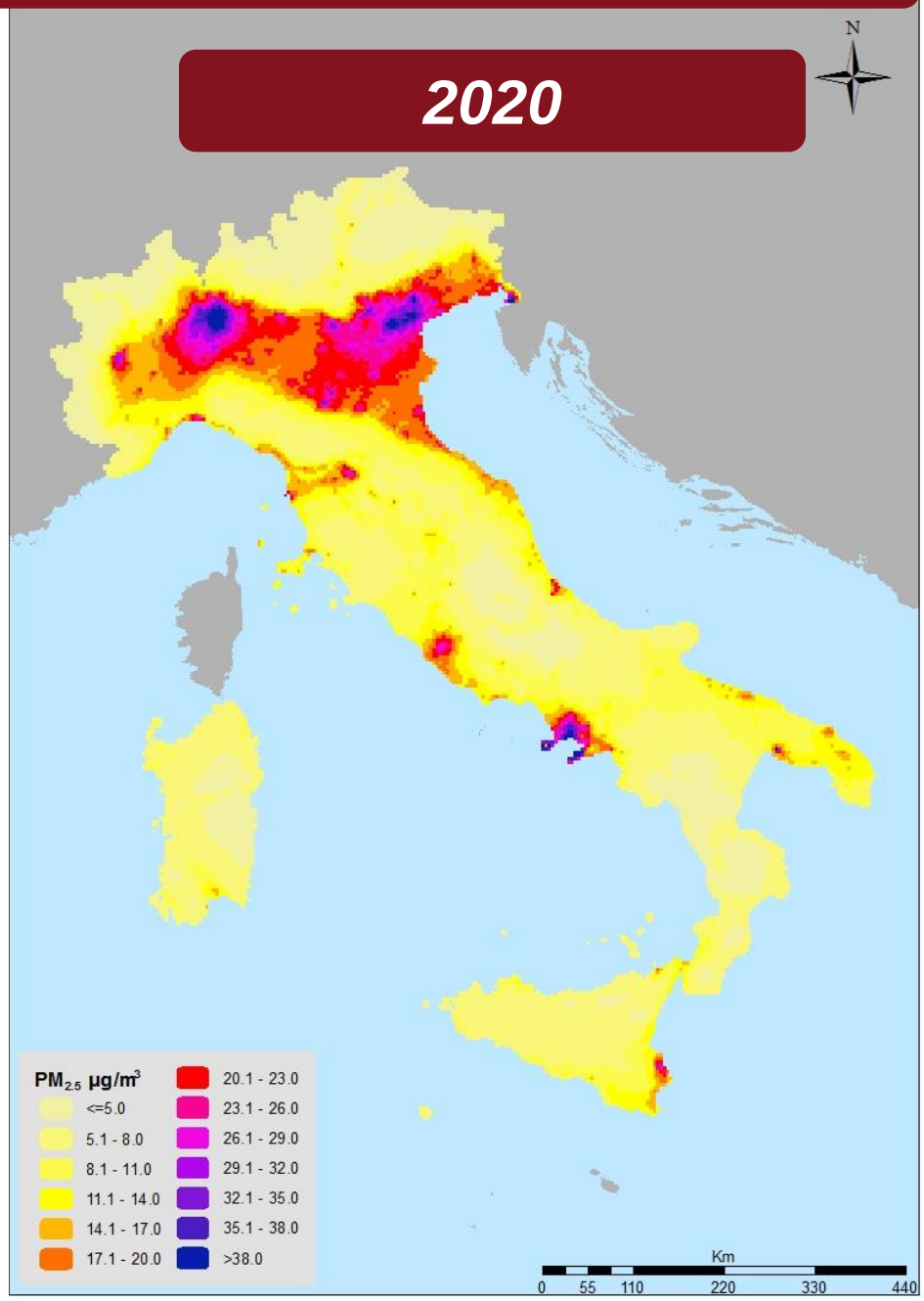


Concentrazioni medie annue di $PM_{2.5}$

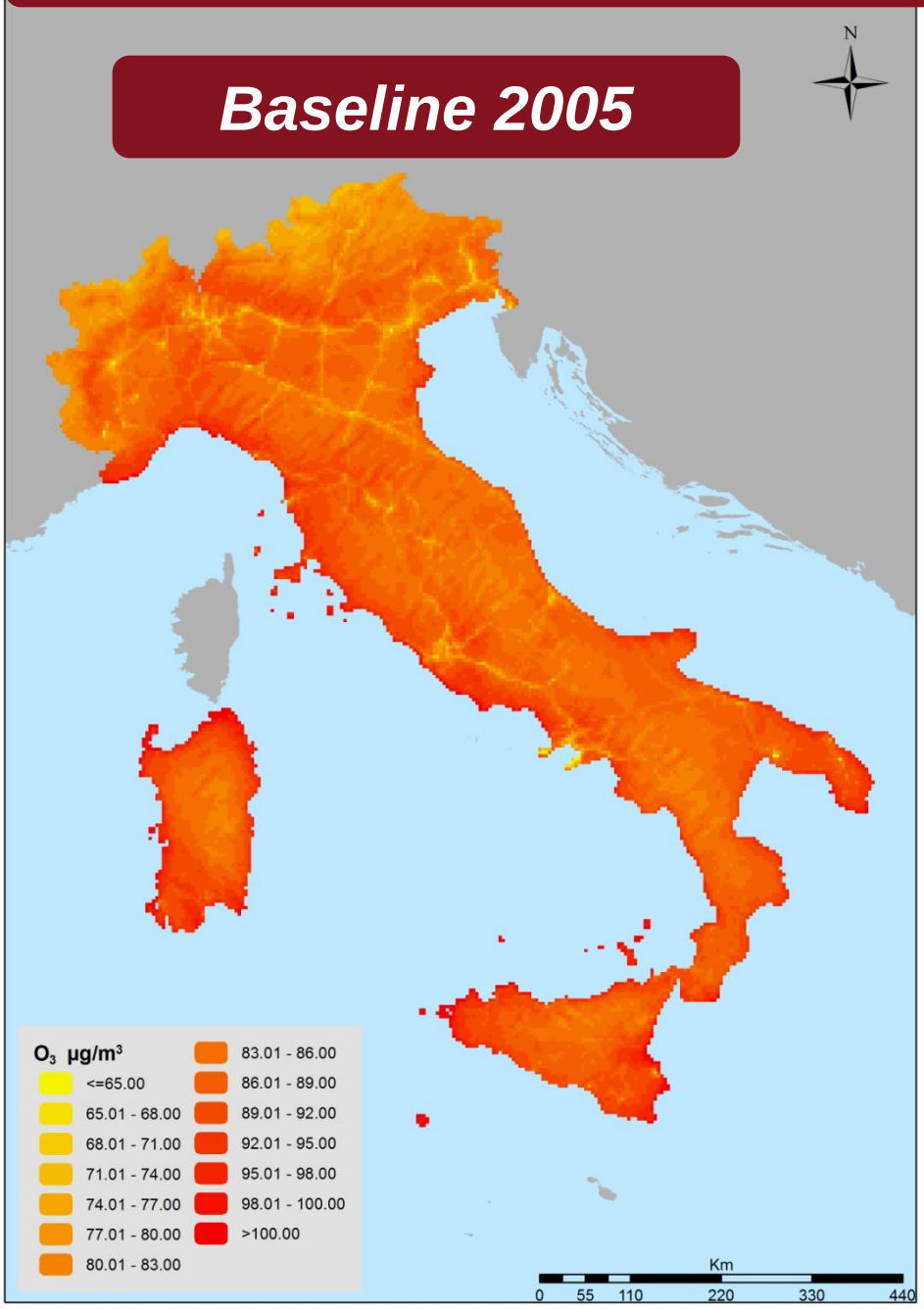
Baseline 2005

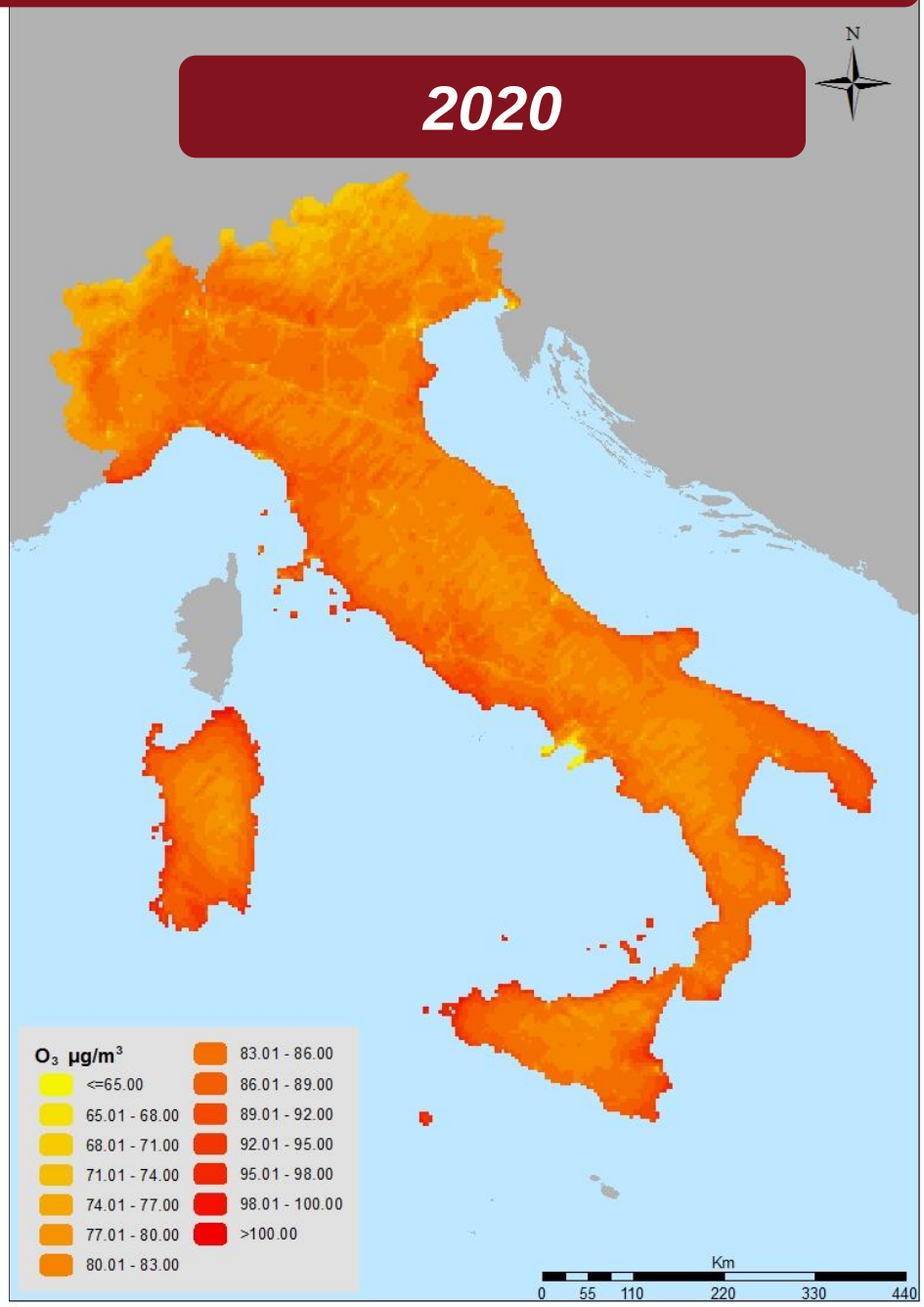


2020



Concentrazioni medie annue di O_3 (max day 8 h)





Concentrazioni medie estive di O_3 (max day 8 h)