TerrAria s.r.l.

arpav

VALIDATION AND SOURCE APPORTIONMENT ANALYSES OF CAMx MODEL OVER THE VENETO REGION AND VENICE LAGOON

Fabio Dalan[1], Silvia Pillon[1], Giuseppe Maffeis[2], Francesca Liguori[1] and Alessandro Benassi[1]

[1] ARPAV - Environmental Protection Agency of the Veneto Region, Via Lissa, 30171 Mestre (VE), Italy - fliguori@arpa.veneto.it

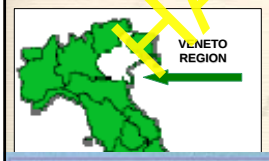
[2] TerrAria s.r.l., Via Zarotto 6, 20124 Milano, Italy – g.maffeis@terraria.com

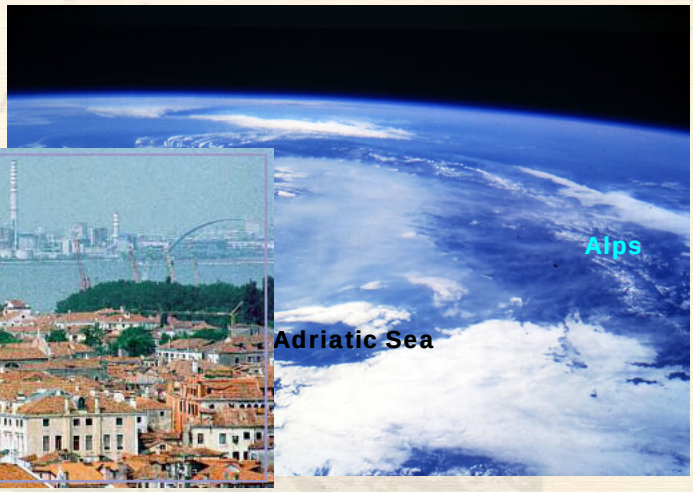
HARMO-10 Crete 2005

TerrAria s.r.l.

arpav

LIVING IN THE Po' VALLEY





MODEL SET-UP (1):

Photochemical model:

CAMx (version 4.0);

Meteorological input:

CALMET (version 5.5): temperature field, horizontal wind (u, v), vertical diffusivity;

pressure and water vapour concentration: interpolation of radio-soundings data;

Grid emissions:

TD approach at municipality level disaggregation. BU to be included.

HARMO-10 Crete 2005

MODEL SET-UP (2):

Boundary conditions: CHIMERE output of 0.5x0.5 degrees (Copyright (C) 2004 PREVAIR, Pierre-Simon Laplace Institute, INERIS, LISA, C.N.R.S.):

- initial: 3D variable in space (x,y,z);
- boundary: function of (z, t) for the four borders;
- top: one constant value for each specie

Other input:

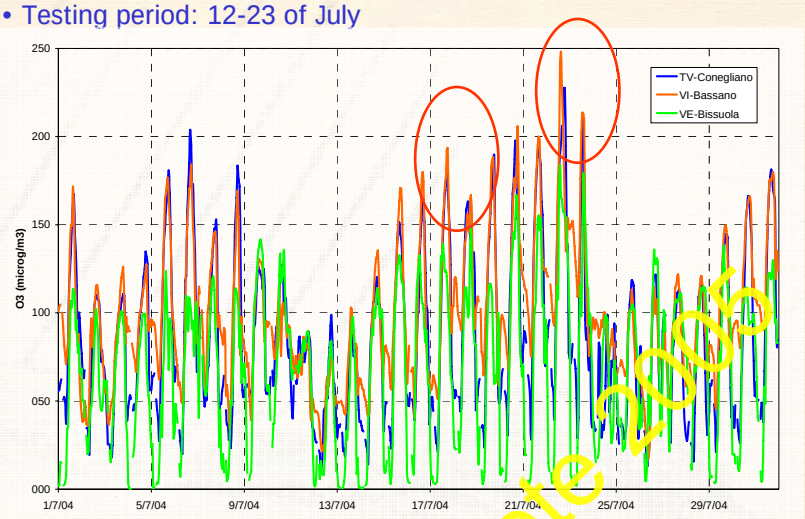
- landuse and albedo : CORINE LAND-COVER (0.5x0.5 Km^2);
- photolysis rate;
- haze (CNR - Venice), ozone column (TOMS – NASA) .

TerrAria s.r.l.

arpav

TESTING PERIOD:

- First run period: July 2004
- Testing period: 12-23 of July

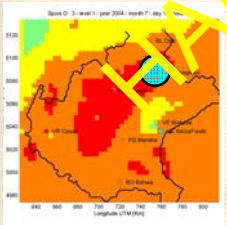


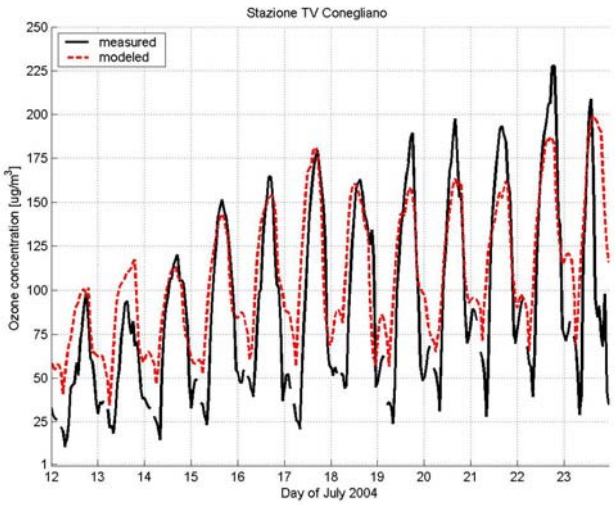
HARMO-10 Crete 2005

TerrAria s.r.l.

arpav

MODEL RESULTS: TV-Conegliano

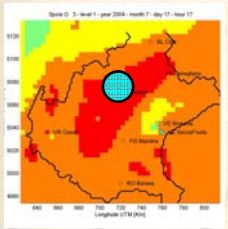


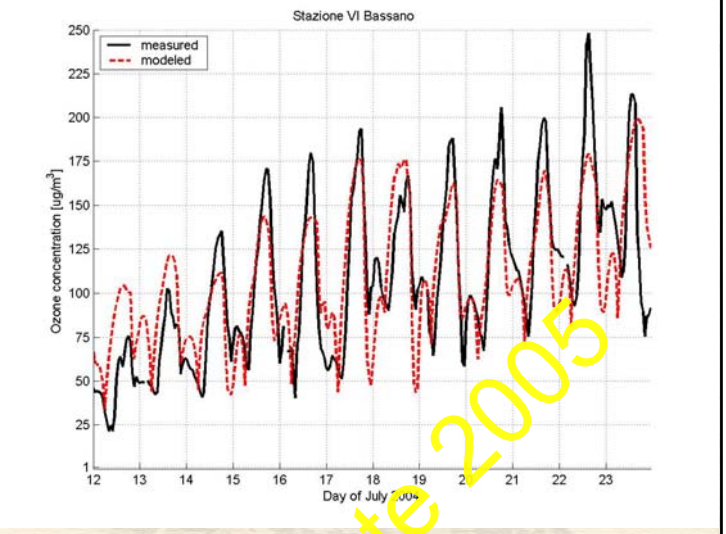


TerrAria s.r.l.

arpav

MODEL RESULTS: VI-Bassano



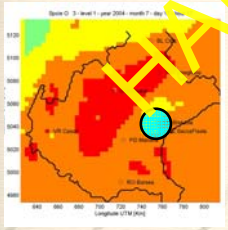


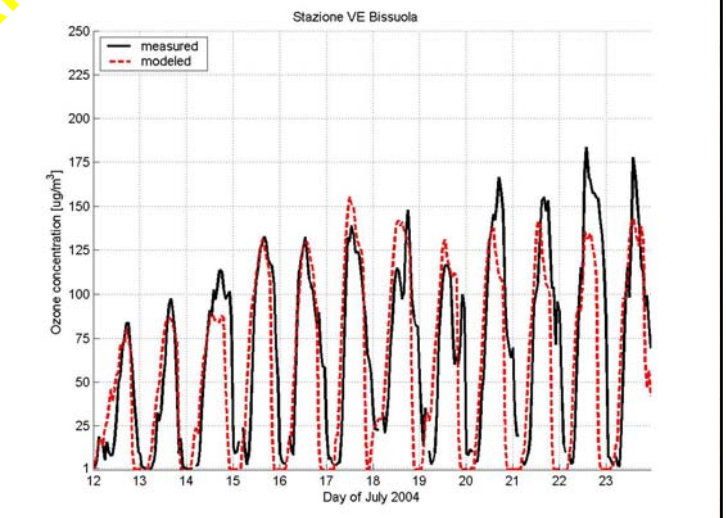
HARMO-10 Crete 2005

TerrAria s.r.l.

arpav

MODEL RESULTS: VE-Bissuola

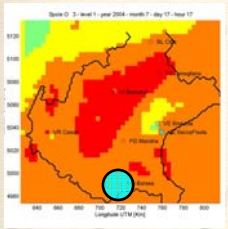


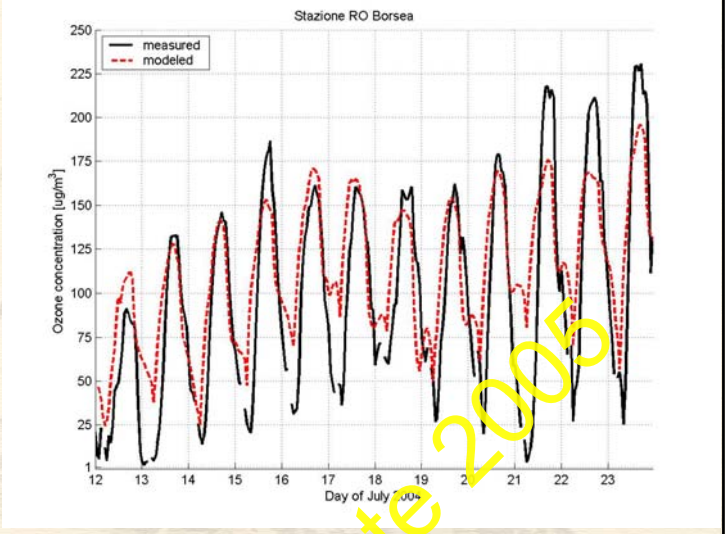


TerrAria s.r.l.

arpav

MODEL RESULTS: RO-Borsea



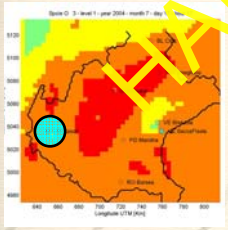


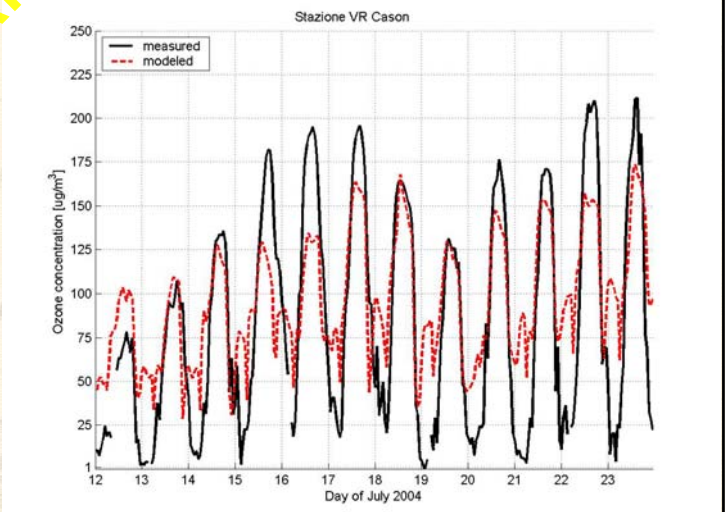
HARMO-10 Crete 2005

TerrAria s.r.l.

arpav

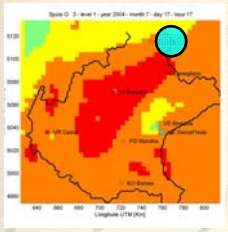
MODEL RESULTS: VR-Cason

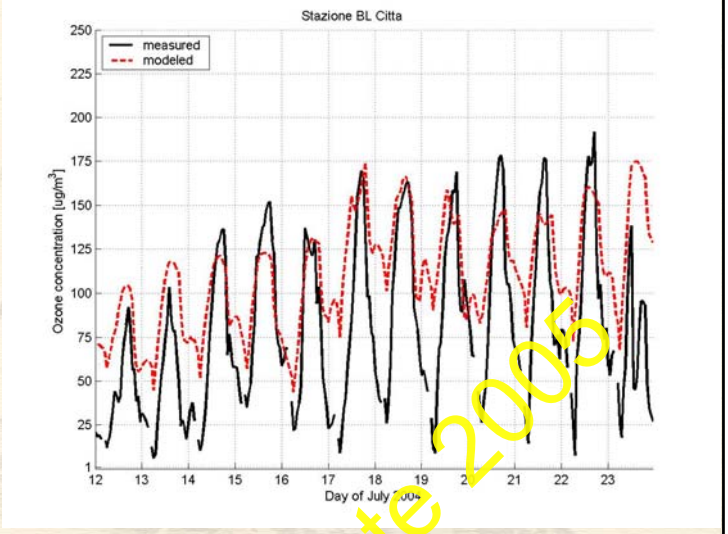




TerrAria s.r.l. arpav

MODEL RESULTS: BL-City





HARMO-10 Crete 2005

TerrAria s.r.l. arpav

MODEL RESULTS: 12-23 of July 2004

288 paired time step Ozone Model vs Measure

Statistycal parameter	VR_CASON	VI_BASSANO DEL GRAPPA	BL_CITTA'	TV_CONEGLIANO	VE_PARCO BISSUOLA	PD_MANDRIA	RO_BORSEA	VE_SACCA FISOLA	MEAN
Correlation	0.85	0.79	0.75	0.84	[illegible]	[illegible]	0.83	0.80	**0.81**
Hourly maximum	212	248	192	228	184	240	231	167	-
Average	82	107	78	91	68	83	97	69	**87**
ASPPA	-18%	-20%	-9%	[illegible]	[illegible]	[illegible]	[illegible]	2%	**-16%**
MeanBIASN	-15%	-3%	-40%	-19%	15%	0%	-14%	-22%	**-11%**
Gross-Error	13	3	31	17	10	0	14	15	**13**
Gross-ErrorN	15%	3%	40%	19%	15%	0%	14%	22%	**15%**
NMSE	0.21	0.08	0.26	0.14	0.38	0.08	0.15	0.24	**0.19**

a good timing

peak underestimation

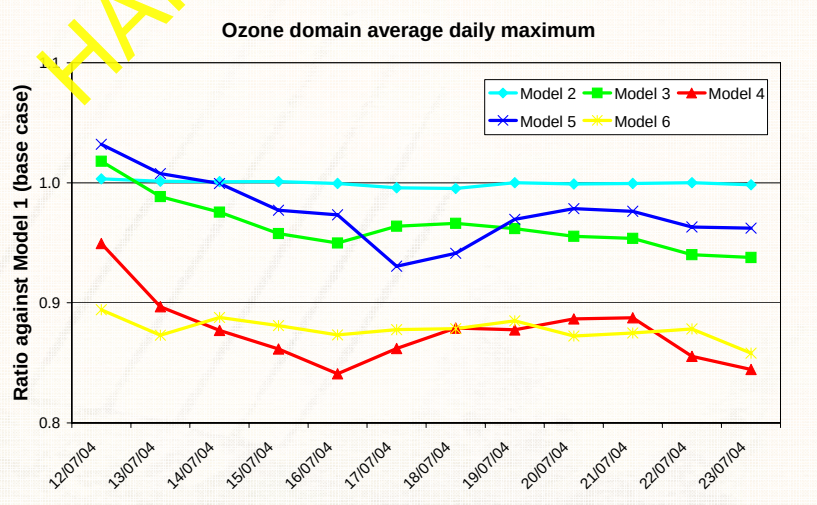
absolute error

SCENARIOS: local, regional and outer ozone formation contribution

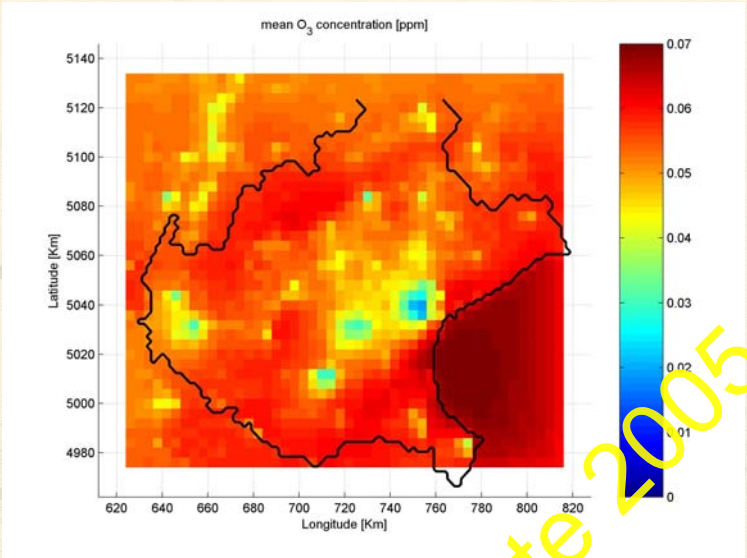
Scenarios	Description	NOx emission % reduction	VOC emission % reduction
Model 1 (black line)	M1: BASE CASE	-	-
Model 2 (azure line)	M2: LOCAL INDUSTRIAL	5.5%	7.2%
Model 3 (green line)	M3: REGION INDUSTRIAL	46.1%	48.7%
Model 4 (red line)	M4: REGION ALL HUMAN	100%	84.4%
Model 5 (blue line)	M5: REGION TRANSPORT	52.6%	33.7%
Model 6 (yellow line)	M6: OUTER	-	-

HARMO-10 Crete 2005

SCENARIOS: domain daily max

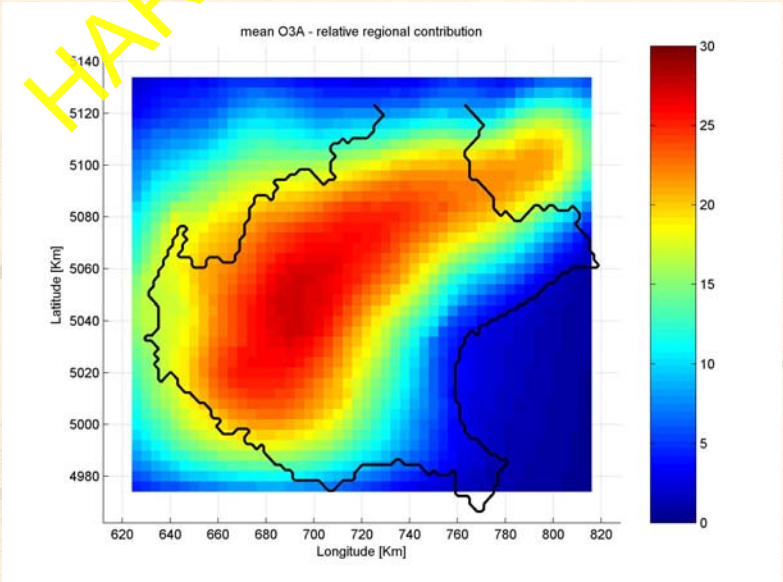


12th to 17th average ozone



HARMO-10 Crete 2005

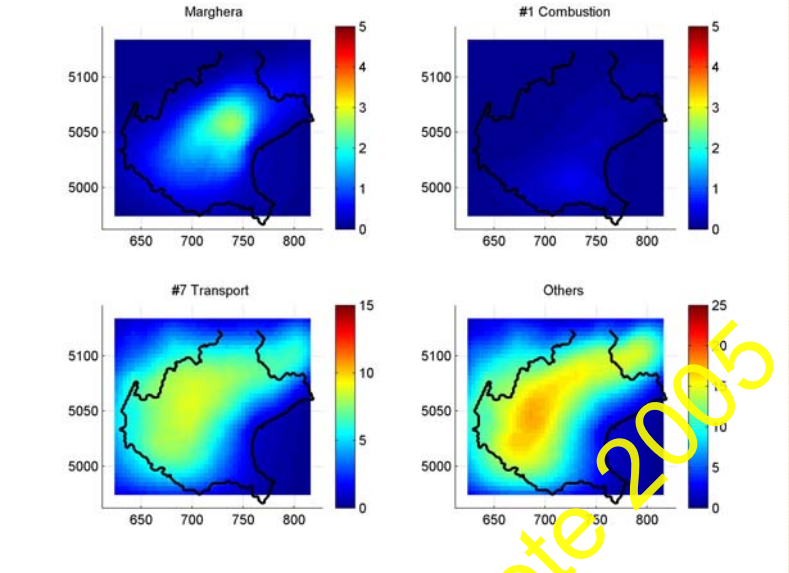
Percentage contribution of regional emissions



TerrAria s.r.l.

arpav

Percentage contribution of each main sector

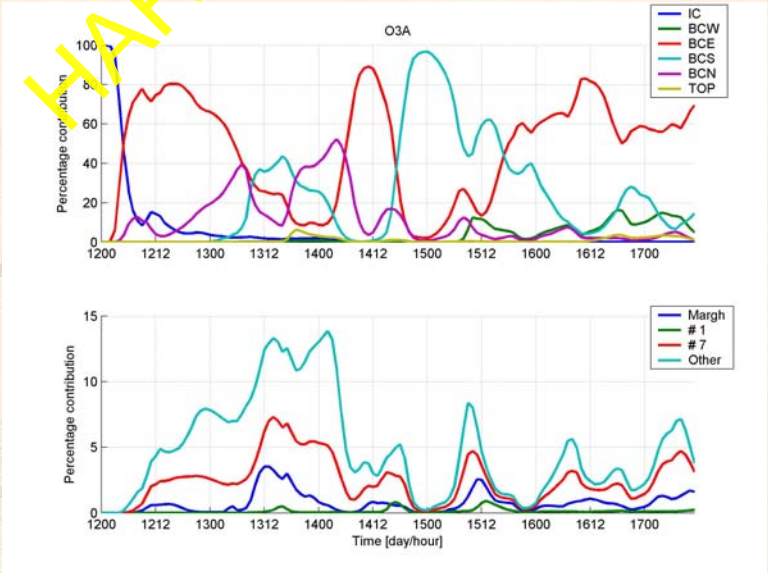


HARMO-10 Crete 2005

TerrAria s.r.l.

arpav

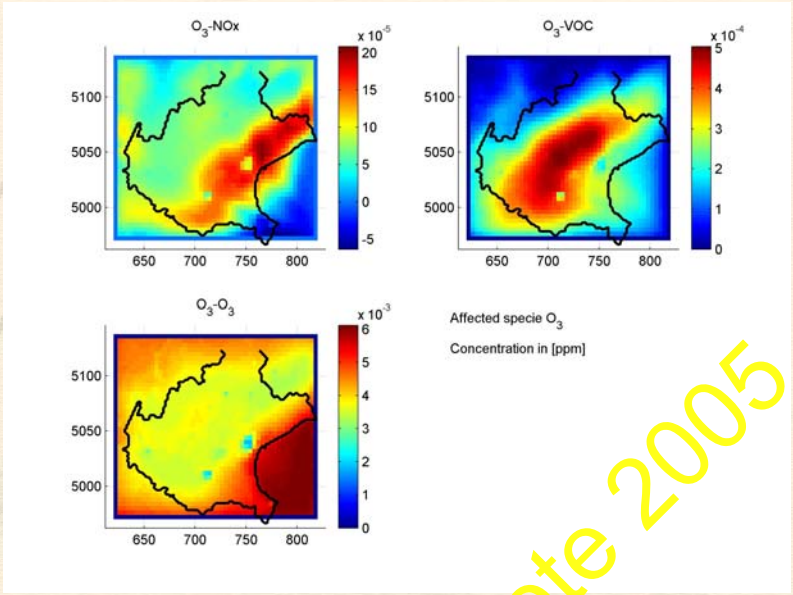
Porto Marghera cause attribution



TerrAria s.r.l.

arpav

Boundary Sensitivity

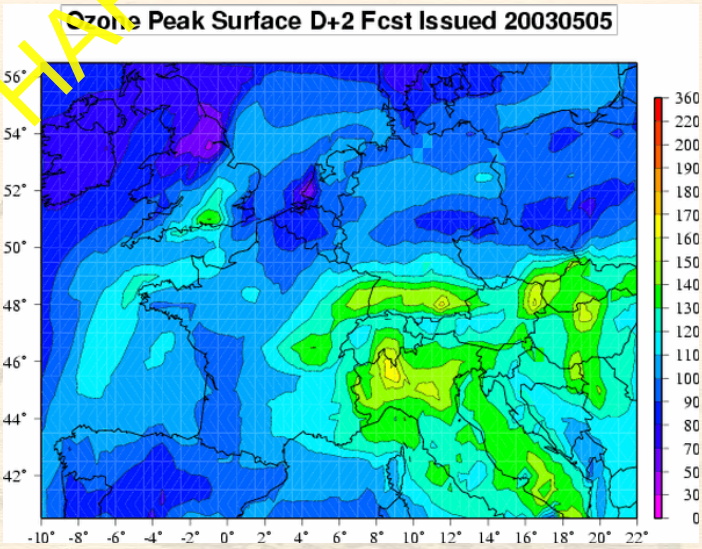


HARMO-10 Crete 2005

TerrAria s.r.l.

arpav

CHIMERE Boundary

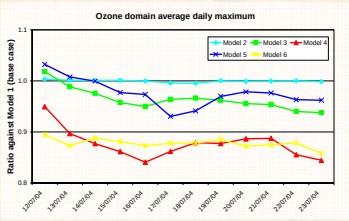


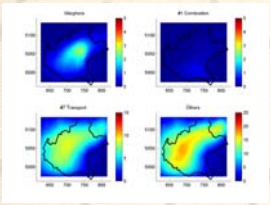
TerrAria s.r.l.

arpav

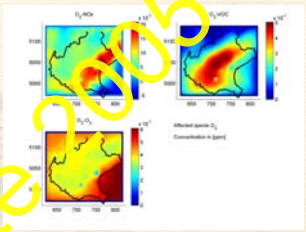
CONCLUSIONS and ...

traffic and production activities have a similar weight; also internal VS external ozone precursor contribution have similar weight





The best policy for Veneto in terms of O3 reduction is limiting VOC from solvents used in the leather production district



most of the ozone concentration inside the domain comes from the boundary

HARMO-10 Crete 2005

TerrAria s.r.l.

arpav

FURTHER STEPS

- Domain extension, cloud/rain input, elevated point sources;
- Simulation period extensions: 2004 summer;
- In-depth analysis of model sensitivity for abatement policies;
- Pollutant extension: particulate matter and wet pollutant deposition.

BIG PICTURE

- CAMx implementation effort
- Join forces with the neighbor Regional EPA

Acknowledgments
This work has been funded by the Veneto Region Authority (Project "SIMAGE I Lotto", 2002-2005).