CONTRIBUTION TO:
RED IBERICA MM5
WORKSHOP, MARCH, 11-12, 2004. LISBON (PORTUGAL)

ACTIVITIES DEVELOPED BY OUR RESEARCH GROUP DURING THE PERIOD: 2003-2004 WITH APPLICATIONS OF MM5

R. San José

Environmental Software and Modelling Group
Computer Science School – Technical University of Madrid
Campus de Montegancedo – 28660 Madrid (Spain)

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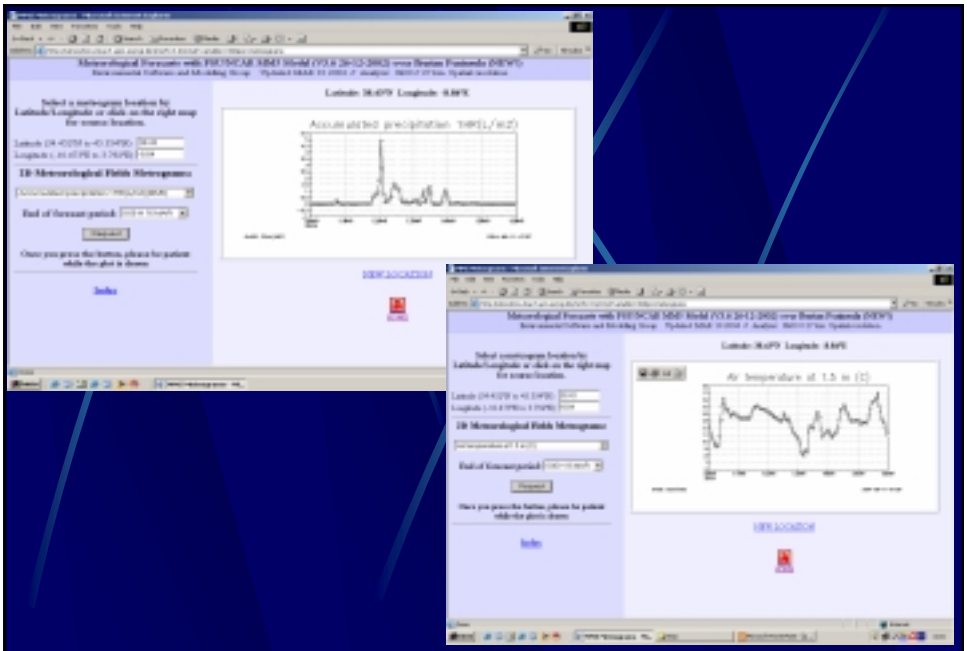

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AIR QUALITY APPLICATIONS

- INTEGRATION: MM5-CMAQ (2000)
- APPLICATIONS:
  - a) INDUSTRIAL EMISSION SOURCES
  - b) AIR QUALITY FORECASTS
  - c) MICROSCALE MODELS (CFD) INTEGRATION
- CLUSTER APPLICATIONS:
  - Control of industrial and mobile souces air quality impact in real-time and forecasting mode.

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CGRER CLUSTER (UIOWA)

MAIN NODE:

Pentium 4 2.4 Ghz processor / 533 Mhz FSB

4.0 GB DDR PC2100 ECC Registered System Memory

340 GB EIDE 7200 RPM Hard Drives

200 GB EIDE 7200 RPM Hard Drives

Controller 10/100/1000 BaseT Gigabit

Network Adapter 10/100 BaseT Fast Ethernet Network

Redhat Linux 7.3

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CGRER CLUSTER (UIOWA)

20 NODES:

- Pentium 4 2.4 Ghz processor / 533 Mhz FSB
- 1.024 GB DDR PC2100 System Memory
- 120 GB 7,200 RPM EIDE Hard Drive
- 10/100/1000 BaseT Gigabit Network Adapter
- Redhat Linux 7.3

NETWORK:

- 24 Port 10/100/1000 BaseT Gigabit Network Switch

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SOFTWARE

MPICH 1.2.5

- Freely portable implementation of MPI(Standard for message-passing libraries)

PGI COMPILERS 4.1-2

CMAQ 4.2.2 (Community multiscale air quality modeling system):

- CHEMICAL MECHANISM: cb4_ae3_aq
- CHEMICAL SOLVER: mebi

MM5 V3.6 (PSU/NCAR meteorological mesoscale model)

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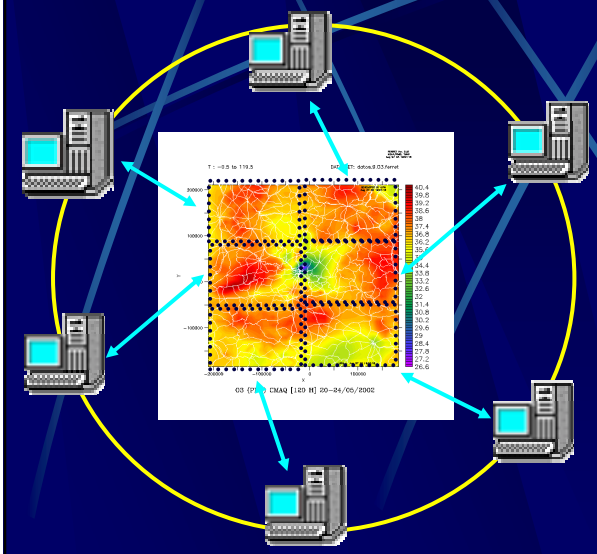
SPLITING DOMAINS



6 NODES

DOMAIN 45*45

SPLITING 2*3

COLS 1:23

24:45

ROWS 1:15

16:30

31:45

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MM5 & CMAQ DOMAINS

MM5 81 KM: 84*60

MM5 27 KM: 69*57

MM5 9 KM: 51*51

MM5 3 KM: 33*39

MM5 1 KM: 30*30

CMAQ 9 KM: 45*45

CMAQ 3 KM: 27*33

CMAQ 1 KM: 24*24

23 VERTICAL LAYER

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CMAQ CPU TIME CLUSTER vs SERIAL

CMAQ CLUSTER:

- 9 KM -> 52 Min.
- 3 KM -> 40 Min.
- 1 KM -> 44 Min.

TOTAL CMAQ 9-3-1 -> 2h:16

CMAQ SERIAL:

- 9 KM -> 629 Min.
- 3 KM -> 335 Min.
- 1 KM -> 356 Min.

TOTAL CMAQ 9-3-1 -> 22h:00

10 TIMES FASTER CLUSTER 20 NODES

&

NO DIFFERENCES IN THE OUTPUTS

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MM5 CPU TIME CLUSTER vs SERIAL

MM5 CLUSTER:

- 81-27 KM -> 11 Min.
- 9-3-1 KM -> 74 Min.

MM5 SERIAL:

- 81-27 KM -> 155 Min.
- 9-3-1 KM -> 811 Min.

TOTAL MM5 CLUSTER 81-27-9-3-1 -> 1h:25

TOTAL MM5 SERIAL 81-27-9-3-1 -> 16h:06

11 TIMES FASTER CLUSTER 20 NODES

&

NO DIFFERENCES IN THE OUTPUTS

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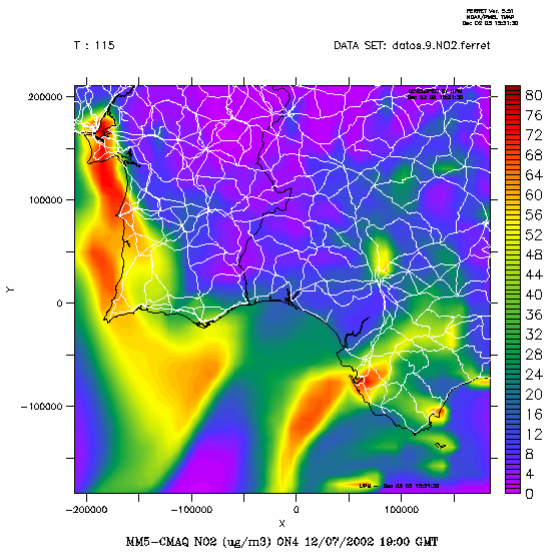
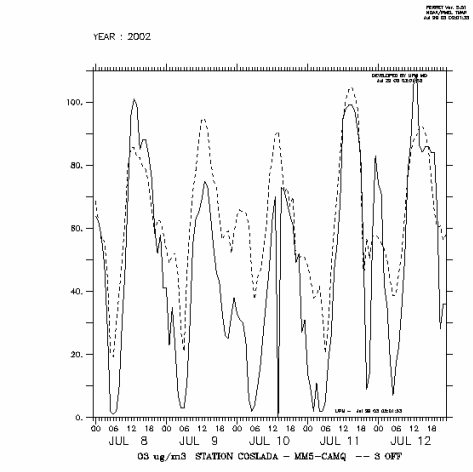


July, 12, 2002

NO2 concentrations Produced by MM5-CMAQ at 19h00 GMT over an area centered in the southwest of the Iberian Peninsula.

Used to evaluate the impact of a future power plant



Comparison between O3 observed values at Coslada air quality Monitoring station for July, 8-12, 2002 by Using MM5-CMAQ with 3 km spatial resolution

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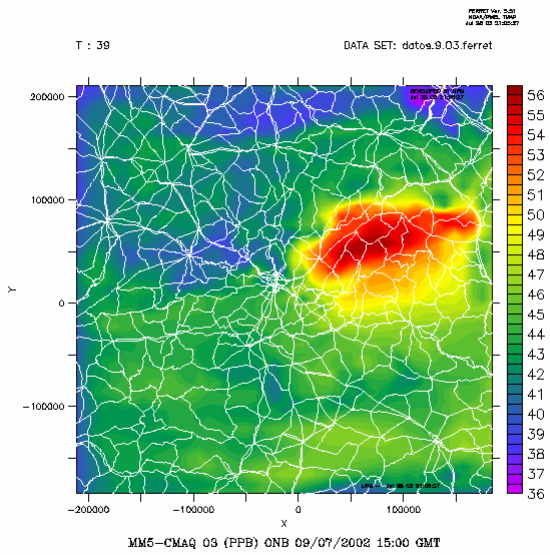
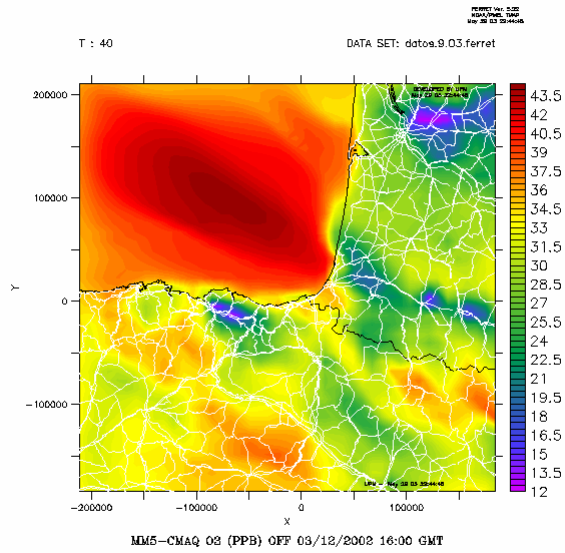


O3 concentrations At 15h00 GMT, July, 9, 2002

By using

MM5-CMAQ

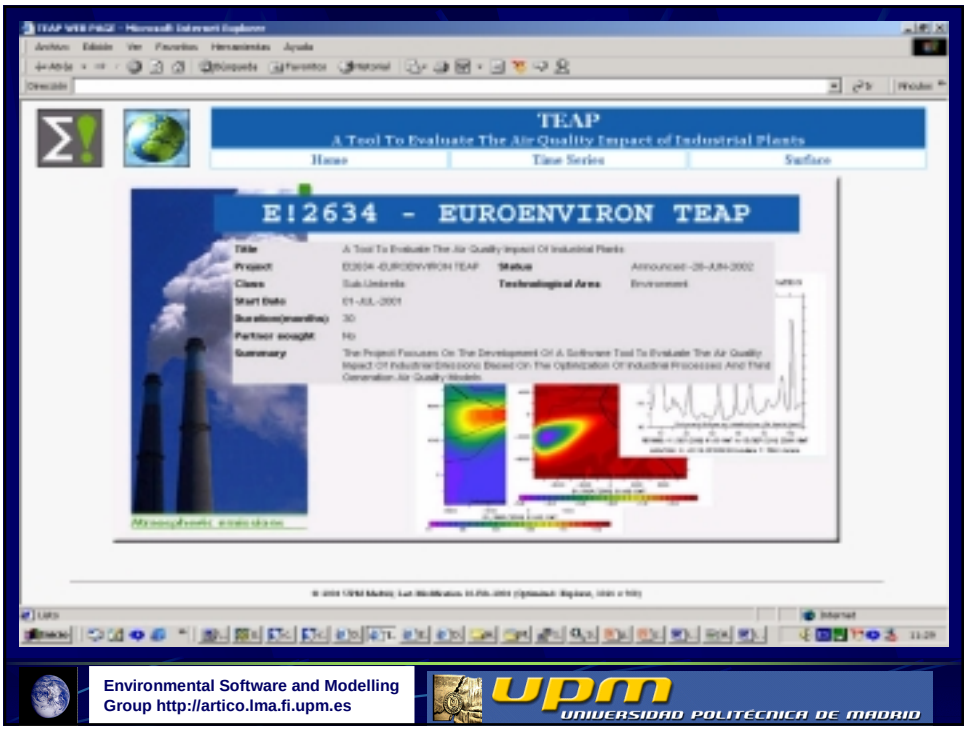
used to evaluate the air quality impact for a future power plant in the area.



O3 concentrations Produced by

MM5-CMAQ For December, 3, 2002 At 16h00 GMT

Used to evaluate The impact of a future Incinerator in the area


TEAP
A Tool To Evaluate The Air Quality Impact of Industrial Plants
Home
Time Series
Surface
E!2634 - EUROENVIRON TEAP
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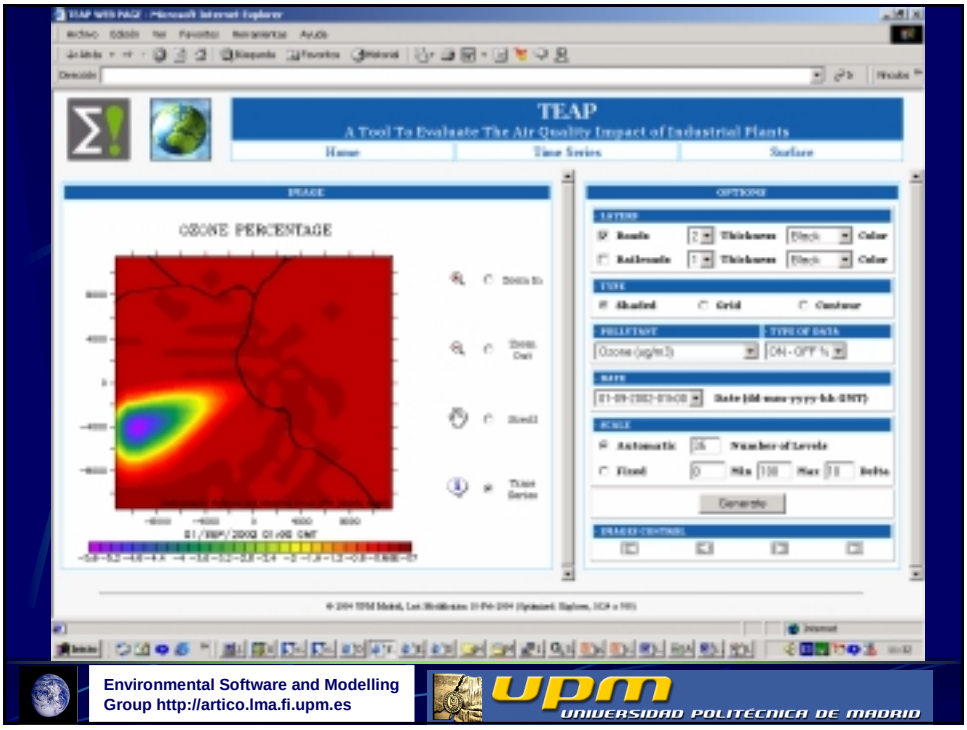
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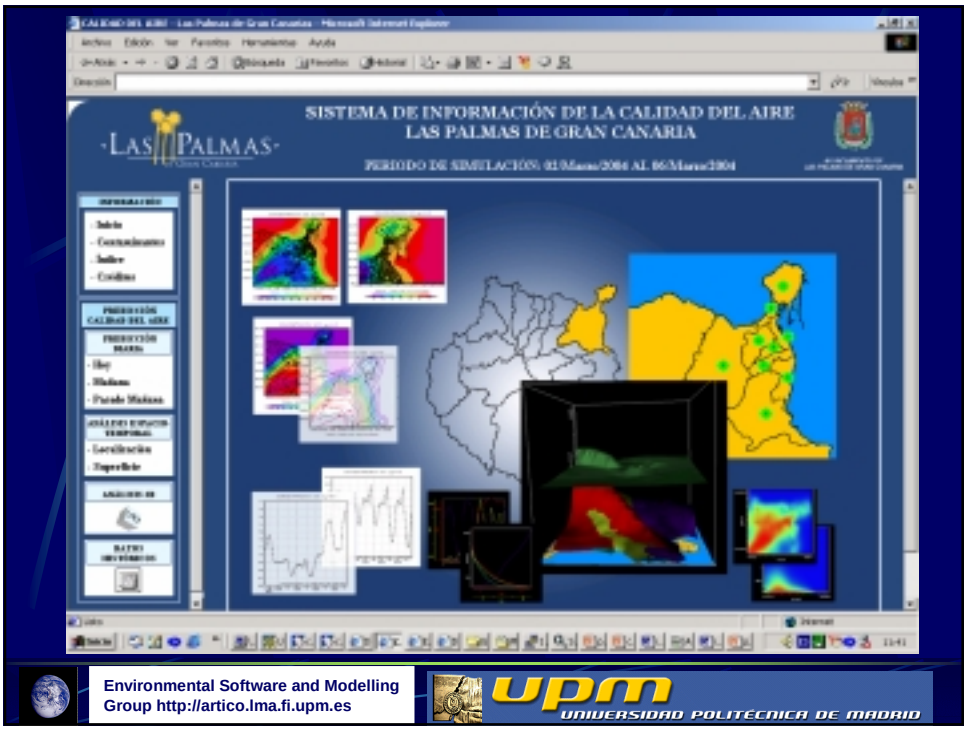

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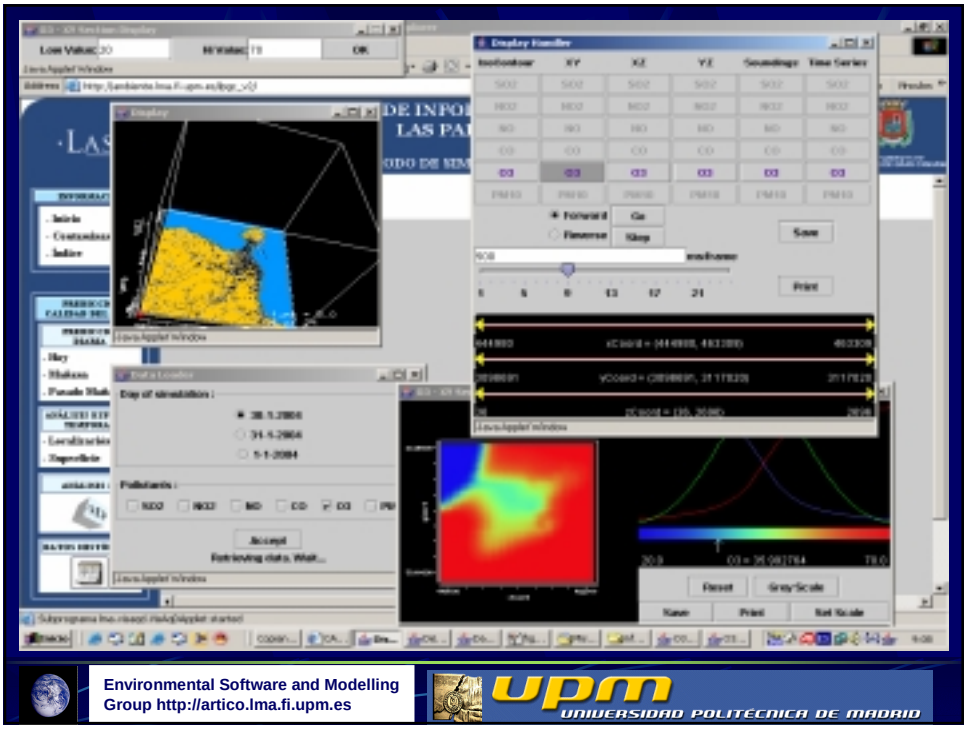

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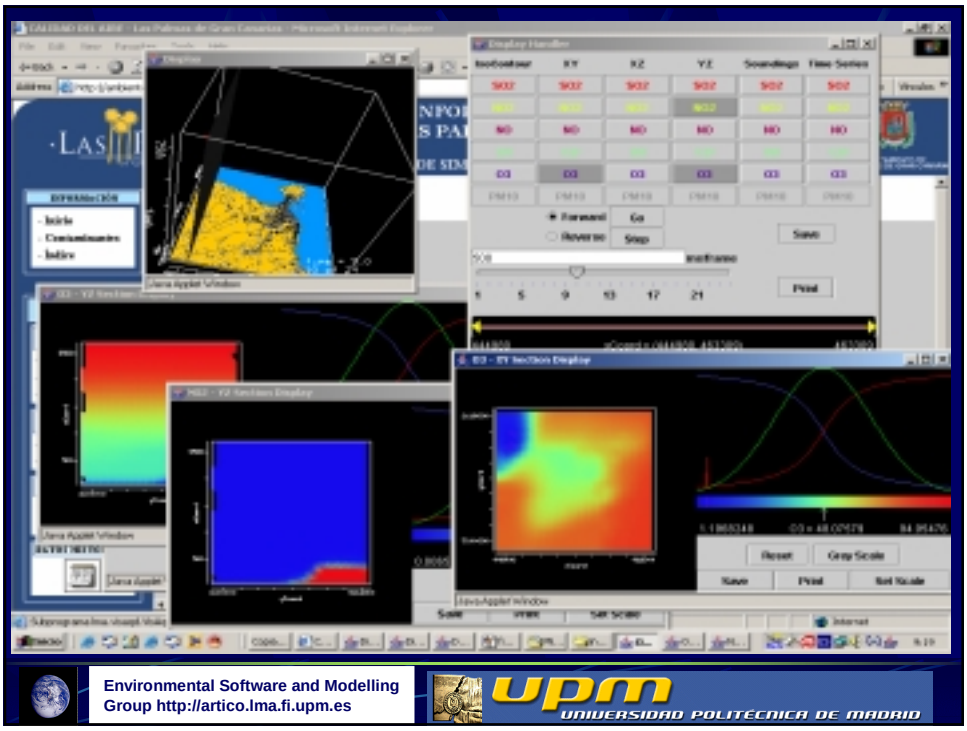

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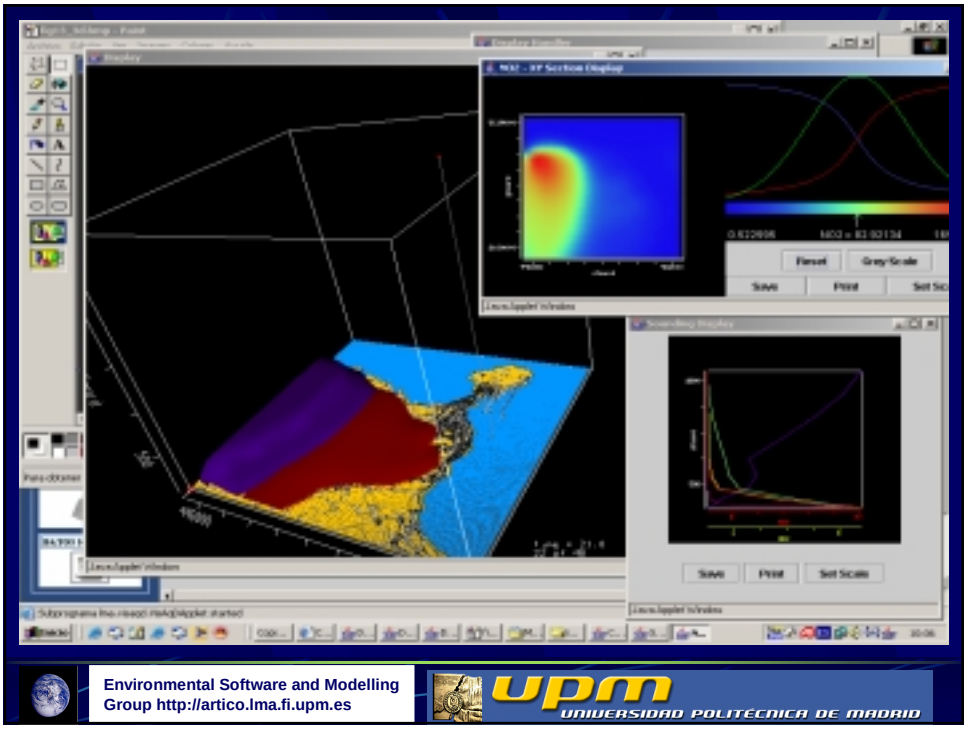

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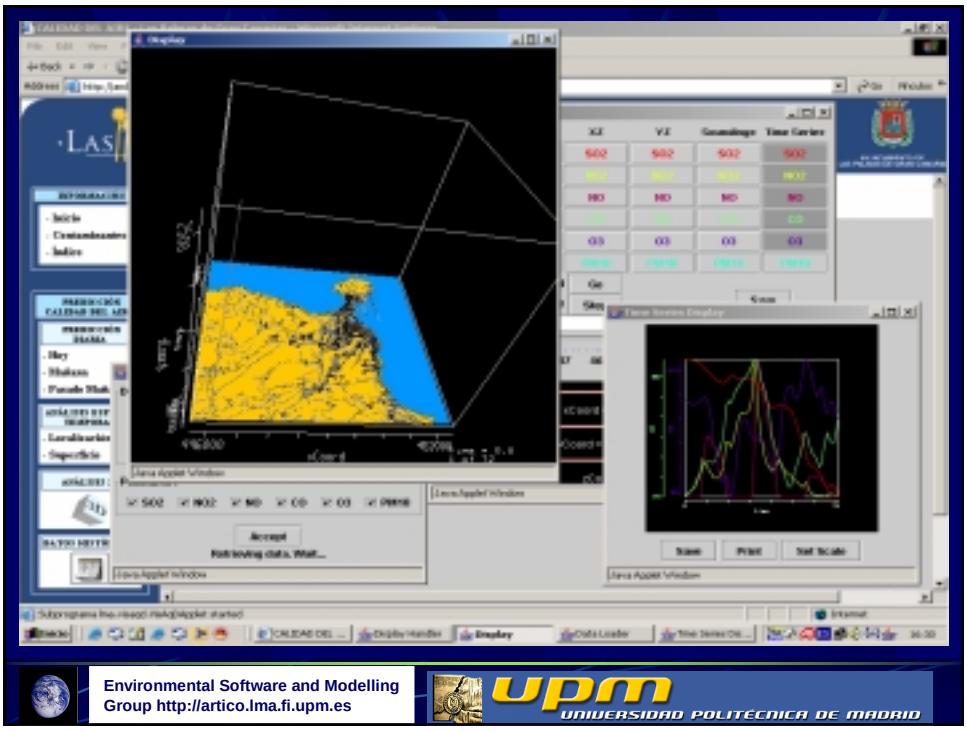
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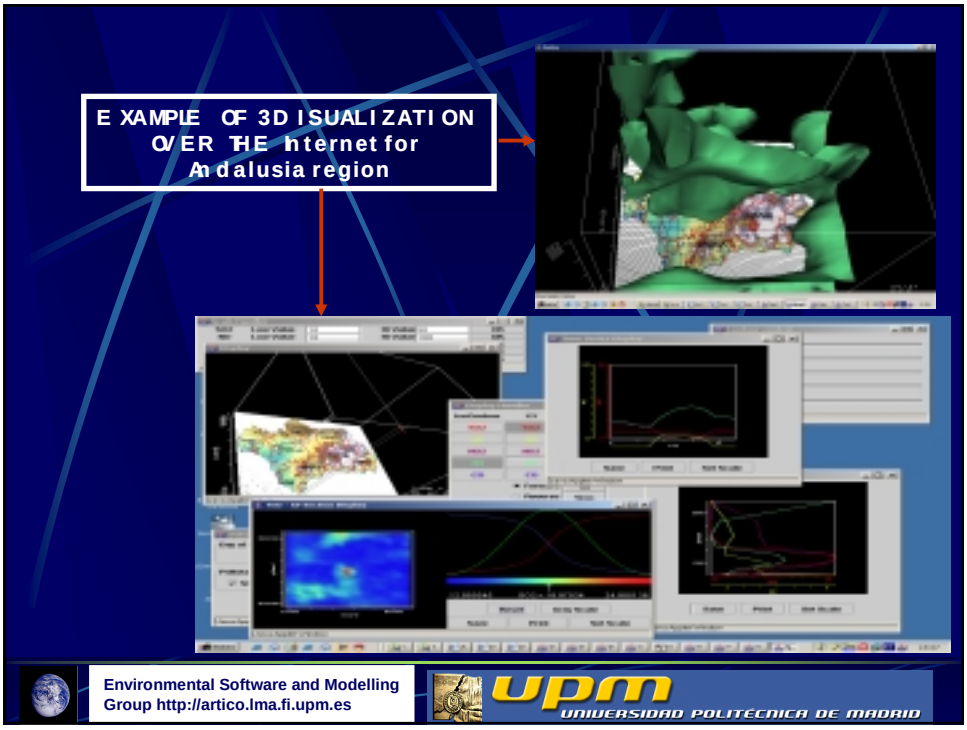
EXAMPLE OF 3D ISUALIZATION OVER THE Internet for Andalusia region
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CONCLUSIONS:

- ✓ The group has continue to work to produce reliable applications to run MM5 and MM5-CMAQ and another models such as WRF.
- ✓ The objectives cover:

1) A full real-time and forecasting system to control the impact on air quality concentrations of different industrial and large emission souces (traffic, domestic, etc.) by using CLUSTER approach.

2) WIND POWER application: Test to evaluate the impact on electric market of using MM5 forecasts for electric energy in wind power generators.

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