附件1　會議議程

CONFERENCE PROGRAMME

2nd International Conference on
Environmental & Economic Impact
on Sustainable Development

Environmental Impact 2014

NOTES TO CHAIRMEN AND PRESENTERS

- *Chairmen must be in their respective rooms 10 minutes before the start of their session to meet with the presenting authors.*
- *Authors must meet with the Chairman of their session 10 minutes before the start of the session.*
- *Authors must keep strictly to the time allocated for their presentation to ensure the smooth running of the programme.*
- *This programme is subject to last-minute alterations, please refer to the conference noticeboard for the most up-to-date information.*

14 - 16 May, 2014

Ancona, Italy

Organised by:
Wessex Institute, UK
Università Politecnica delle Marche, Italy
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Sponsored by:
WIT Transactions on Ecology and the Environment

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International Journal of Sustainable Development & Planning
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CONFERENCE PROGRAMME

Environmental Impact 2014

14 - 16 May, Ancona

AULA MAGNA - POLITECHNIC UNIVERSITY DELLE

Wednesday, 14th May 2014

08.30 Bus from Hotel to Politechnic University delle Marche
09.00 Openning Remarks

Session 1
Chairman:C. Brebbia

09.20 **Invited:**
Reputation asset and environmental liability
R. Sjöblom & S. Lindskog — 467

09.40 **Invited:**
Sustainable energy production
G. Genon — Oral

10.00 **Invited:**
Genetically modified food and its impact on the environment
S. Wunderlich & M. Vecchione — 445

10.20 **Invited:**
Optimal management of renewable and fossil fuel energy systems in a smart community
C. Brandoni, A. Arteconi, G. Ciriachi & F. Polonara — 255

REFRESHMENT BREAK

Session 2
Joint Session with Waste Management Conference
Chairman: C. Brebbia

11.10 **Invited:**
The recent trend of e-waste recycling and rare metal recovery in Japan
H. Itoh — Oral

11.30 **Invited:**
The hydrothermal decomposition of biomass and waste to produce bio-oil
P. De Filippis, B. de Caprariis, M. Scarsella & N. Verdone — Oral

11.50 **Invited:**
GIS and infrared aerial view: advanced tools for the early detection of environmental violations
M. Lega & G. Persechino — Oral

12.10 Assessment of airborne and spaceborne thermal infrared remote sensing for detecting and characterizing landfills
B. Beaumont, J. Radoux & P. Defourny — Oral

LUNCH
Return to Hotel

Wednesday, 14th May 2014

Session 3: Environmental assessment (I)
Chairman: R. Sjoblom

14.30 **Invited:**
Tropospheric ozone behaviour as a function of precursor emissions
S. Carletti & G. Passerini 3

14.50 **Invited:**
Environmental impact of the Energía Costa Azul LNG terminal at Ensenada, B.C., México
M. Quintero-Núñez, C. del C. Sanchez-Sanchez, R. García-Cueto, N. Santillán-Soto, S. Ojeda-Benítez & N. Velázquez-Limón 15

15.10 **Invited:**
Cleaner air in seaport container terminals: assessing fuel(s)
J. M. Vleugel & F. Bal 25

15.30 **Invited:**
The environmental impact of human activities on the Mexican coast of the Gulf of Mexico: review of status and trends
J. A. Benitez, R. M. Cerón-Bretón, J. G. Cerón-Bretón & J. Rendón-Von-Osten 37

15.50 Global climate change and its impact on a developing country (Armenia)
A. Melkonyan Oral

REFRESHMENT BREAK

Session 4: Sustainable cities
Chairman: G. Genon

16.40 Equalization of the costs and benefits of sustainability measures in area development: two cases to bring new focus
W. J. Fikken, A. van Timmeren & J. W. F. Wamelink 267

17.00 Sustainable development and Brazilian states: comparison using the sustainability barometer
T. B. Cetrulo & N. M. Cetrulo 279

17.20 Impact of the subsidy on the electric rate in the use of renewable energy for net zero housing in Mexicali, Mexico
R. Gallegos, E. Tapia & S. Romero 291

17.40 Rainwater infiltration in the urban areas
G. Markovic, M. Zelenáková, D Káposztásová & G. Hudáková 313

Additional presentation:

18.00 A combined mehtod to remove acetone, xylene and ammonia from air stream
P. Baltrenas, E. Baltrenaite, G. Passerini & M. Jurele Oral

END OF DAY 1
Conference Dinner (TBA)

Thursday, 15th May 2014

Session 5: Environmental assessment (II)
Chaiman: S. Wunderlich

	Invited:	
09.00	Treatment of acidic mine waters containing metals: past practices and new approaches N. T. Smith, D. J. Reisman, N. R. Anton, M. R. Nelson, R. L. Olsen & A. K. Frandsen	51
09.20	An approach for handling environmental and economic conflicts in the context of sustainable building K. Allacker, D. Trigaux & F. De Troyer	79
09.40	TModel for the environmental impact assessment of neighbourhoods D. Trigaux, K. Allacker & F. De Troyer	103
10.00	Environmental impact assessment of flood mitigation measures: methodology based on risk analysis M Zelenáková & L. Zvijáková	115

REFRESHMENT BREAK

Session 6: Environmental assessment (III)
Chairman: F. Polonara

	Invited:	
11.10	Choice of techniques revegetation of degraded areas using assessment of environmental damage in the Amazon forest, Brazil A. I. Ribeiro, F. H. Fengler, R. M. Longo et al.	Oral
11.30	Environmental impact assessment in the surounding areas of urban forests R. M. Longo, A. L. Mulato, T. A. M. Misono, M. F. Silva, A. C. Demanboro, S. C. Betine & A. I. ribeiro	Oral
11.50	Environmental impact assessment of new district development F. Fadli, M. Sobhey, R. Asadi & E. Elsarrag	Oral

Additional presentations:

12.10	Water use efficiency as an indicator of environmental impact of irrigated crops under subtropical conditions G. A. de Medeiros, F. B. Arruda, A. I. Ribeiro, E. C. Guimarães et al.	455
12.30	Wear debris materials from breake systems environmental issues R. Ciudin, P C Verma, S. Gialanella & G. Straffelmi	Oral

LUNCH BREAK

Thursday, 15th May 2014

Session 7
Chairman: C. Brandoni

Part 1: Environmental policies

Part 2: Economic impact

REFRESHMENT BREAK

Session 8
Chairman: J. Benitez-Torres

Part 1: Energy and the environment

Part 2: Environmental health risk

Additional presentation:

END OF DAY 2

Friday, 16th May 2014

Session 9
Chairman: G. Passerini

Part 1: Water resources management

09.00 Treatment and use of wastewater in Mexicali, Baja California, Mexico
S. Romero, A. Villagomez, D. Trasviña, J. García, R. Gallegos, J. Reyes, J. Ramírez & F. Solís — 591

09.20 Watershed management through transportation funding
M. A. Sloan & B. T. Bidolli — 603

09.40 Water awareness for sustainable local groundwater management
S. Hori — 615

Part 2: Environmental policies and planning

10.00 Optimization model for predicting green area in Jakarta to minimize impacts of climate change
S. Listyarini, L. Warlina, E. Indrawati, T. Pardede — Oral

10.20 A dynamic model of pollution impact of Dioxin/Furan on the environment, society and economy
L. Warlina — Oral

REFRESHMENT BREAK

Session 10
Chairman: C. Brebbia

Part 1: Brownfield rehabilitation

11.10 Aligning brownfields remediation to transit oriented development
M. A. Sloan & B. T. Bidolli — 565

11.30 Assessment of the operating windows of a combined solidification/ stabilization and granulation treatment applied to industrial soil in the context of brownfield regeneration
O. Capobianco, G. Costa & R. Baciocchi — 577

Part 2: Soil assessments

11.40 Assessing changes in soil properties and quality arising from natural forest conversion to peasant cocoa plantation of different ages in tropical lowland rainforest, southwest Nigeria
S Adeniyi, A V Niekerk, W D Clercq & T Ologunorisa — Oral

12.00 Trace metals geochemical background in soils in the Suape Port and Industrial Complex, Pernanbuco, Brazil
E Santos de Lima, L Perreira de Souza Santos & C Regis — Oral

Additional presentations:

12.20 Gulf of Mexico ecosystem restoration: a risk-based integrated environmental, economic, and social resource management decision support framework
D. Hanson, L. Hachmeister, D. Hale & E. Hassler — 531

12.40 Visual impact from quarrying activities: a case study for planning the residential development of surrounding areas
G. Alfaro Degan, D. Lippiello, L. Picciolo & M. Pinzari — 125

END OF THE CONFERENCE

附件 3　摘要論文

Tropospheric ozone behaviour as a function of precursor emissions

S. Carletti & G. Passerini
Department of Industrial Engineering and Mathematical Sciences, Marche Polytechnic University, Italy

Abstract

Several air-quality monitoring stations, located along the Marche Region coastline, recorded, over the last decade, high concentrations of tropospheric ozone. For this reason, analysing the formation of photochemical smog, particularly in an Area at High Risk of Environmental Crisis (AERCA) became a crucial task. To evaluate ozone dynamics as a function of precursor emissions and local meteorology, we implemented a modelling system made of RAMS (Regional Atmospheric Modelling System), EPS3 (Emission Processor Ver. 3), CAMx (Comprehensive Air quality Model with eXtensions), and OSAT (Ozone Source Apportionment Technology). CAMx is an Eulerian photochemical dispersion model that allows the assessment of gaseous and particulate air pollution over many scales ranging from sub-urban to continental. Thus CAMx is the kernel of the modelling chain while the OSAT tool allows CAMx to track source-region and source-category contributions to the predicted ozone concentrations. For any selected receptor and for any selected period, the model gives information about the likely distribution of ozone and ozone precursors by source category and by source region. Similarly, it assesses whether the ozone at the selected time and location would more likely respond to upwind NO_X or VOC controls. By means of such models, it was possible to map the ozone behaviour in diverse areas and to assess the impacts of different types of source emission and sectors. Such results also allowed us to develop a possible choice ozone-control strategy to reduce ozone peaks and to avoid ozone episodes.
Keywords: tropospheric ozone, CAMx, OSAT, air control strategies.

1 Introduction

This work presents a rather complex set of simulations carried out to better describe the ozone behaviour in the Marche Region especially in a particular area located across the Adriatic Sea. The area was declared "Highly at Risk of Environmental Crisis" (AERCA) by Regional Authorities and competent Ministries. The risk is mainly due to the concurrent presence of a big oil refinery, several highways, the local airport, and a rather big port, including industrial harbours. This situation led to high levels of several different species of pollutants. Between all, in the past, Volatile Organic Compounds (VOCs) levels and Nitrogen Oxides (NO_X) levels often reached and overcame legal limits. It is well known that VOCs and NO_X concur to the formation of Photochemical Smog and their comparative and absolute concentrations deeply affect ground ozone dynamics and ozone cycles. In fact, during past years, comparatively high concentrations of ozone were registered by monitoring stations in the analysed area and in other districts of Marche Region.

The Ozone dynamics in AERCA and for the whole Marche Region was modelled in-deep by the means of the photochemical model CAMx (Comprehensive Air quality Model with eXtensions) with the additional implementation of a dedicated probing tool called OSAT (Ozone Source Apportionment Technology) specially developed for the appointment of precursor sources according to the ozone dynamics.

The results provided us with important information about the conditions of ozone formation, the role of each single emission group, and, more specifically, information about when and where a certain pollutant involved in the ozone dynamics was released.

2 Human health effects and climate interactions

Ozone is continually produced and destroyed in the atmosphere by chemical reactions. The respiratory system is the primary target of the ozone oxidizing effects on human health. Exposure to elevated concentrations is associated with increased hospital admissions for pneumonia, chronic obstructive pulmonary disease, asthma, allergic rhinitis and other respiratory diseases [1]. The extent of adverse respiratory consequences due to ground-level ozone depends on a number of factors, including pollutant concentrations, duration of exposure, local climate, individual sensitivity, and any pre-existent respiratory disease. The Air Quality Standards in Italy, according to Europe, define the maximum daily eight-hour mean of 120 $\mu g/m^3$ and the information threshold of 180 $\mu g/m^3$ during one hour [2].

Tropospheric ozone is also a greenhouse gas: after carbon dioxide and methane, it is the third most important contributor to greenhouse radiative forcing [3]. Since pre-industrial era, the radiative forcing value due to tropospheric ozone is estimated to be +0.35 W/m^{-2} (range 0.25–0.65).

3 Ozone formation in the troposphere

3.1 The role of VOC and of NO_X

Tropospheric ozone is produced by photochemical oxidation of carbon monoxide (CO), methane (CH_4) and non-methane volatile organic compounds (VOC) in the presence of NO_X. The hydroxyl radical (OH) is the key reactive species in the chemistry of ozone formation, and it can react with CO, CH_4 and VOC. In general, methane is not simulated explicitly in ozone models. The sensitivity of ozone formation to VOC and NO_X at any given time is attributable to the fate of radicals, and the production does not increase linearly with an increase in the precursors concentrations. In general, increasing VOC concentrations means more ozone while increasing NO_X may lead to either more or less ozone depending on the prevailing VOC-to-NO_X ratio [4].

The radical pool is often referred to as odd hydrogen (HO_X) and is most usefully considered as the sum of OH, HO_2 and RO_2 radicals. Ozone formation occurs through the following sequence of reactions. The sequence is usually initiated by the reaction of various CO or VOC with the OH radical according to formulae (1) and (2).

$$CO + OH \xrightarrow{+O_2} CO_2 + HO_2 \tag{1}$$

$$RH + OH \xrightarrow{+O_2} RO_2 + H_2O \tag{2}$$

This is followed by the conversion of NO to NO_2 through reaction with HO_2 or RO_2 radicals, which also regenerates OH according to formulae (3) and (4). RO_2 represents any of a number of chains of organics with an O_2 attached

$$HO_2 + NO \rightarrow NO_2 + OH \tag{3}$$

$$RO_2 + NO \xrightarrow{+O_2} R'CHO + HO_2 + NO_2 \tag{4}$$

NO_2 is photolyzed to generate atomic oxygen, which combines with O_2 to create O_3 through reaction (5) and (6).

$$NO_2 + hv \rightarrow NO + O \tag{5}$$

$$O + O_2 + M \rightarrow O_3 + M \tag{6}$$

Ozone episodes in polluted regions are usually due to the ozone production sequence shown above. However, at night-time and in the immediate vicinity of very large emissions of NO, ozone concentrations are depressed through the process of NO_X titration, according to the formula (7).

$$O_3 + NO \rightarrow NO_2 + O_2 \tag{7}$$

There is a competition between VOC and NO_X for the OH radical. At a high ratio of VOC to NO_X concentration, OH will react mainly with VOC while, at a low ratio, the NO_X reaction can predominate [4].

When the VOC/NO_X concentration ratio is approximately 5.5:1, with the VOC concentration expressed on a carbon atom basis, the rates of reaction of VOC and NO_X with OH are equal. Whenever the VOC/NO_X ratio is lower than 5.5:1, reaction of OH with NO_2 predominates over reaction of OH with VOC.

The OH-NO_2 reaction (8) removes OH radicals from the active VOC oxidation cycle, retarding the further production of O_3.

$$OH + NO_2 + M \rightarrow HNO_3 + M \quad (8)$$

Under these conditions, called VOC-limited, a decrease in NO_X emissions favours O_3 formation. Conversely, when the ratio exceeds 5.5:1, OH reacts preferentially with VOC. At very low NO_X concentration, reaction (9) becomes significant and it removes free radicals from the system.

$$HO_2 + HO_2 \rightarrow H_2O_2 + O_2 \quad (9)$$

This condition is named NO_X-limited, because the growth of NO_X emissions induces the reaction (3) and consequently the ozone formation.

3.2 Sillman indicator

In reality, many of the trajectories start out VOC-limited and become NO_X-limited during the course of the day essentially because the NO_X is depleted more rapidly than the VOC.

Nitric acid (HNO_3) production, according to the reaction (8), is indicative of plentiful NO_X while peroxide formation (H_2O_2) is indicative of scarce NO_X.

Sillman [5] has exploited this situation to develop useful indicators of VOC vs. NO_X-limited ozone formation based on the ratio of peroxide production to nitric acid production. Sillman proposed that the transition between these conditions occurs when:

$$P_{H_2O_2}/P_{HNO_3} = 0.35 \quad (10)$$

Before midday, with an initial VOC/NO_X ratio 10:1, the Sillman ratio is less than 0.35 indicating a VOC-limited ozone formation. After that, it exceeds 0.35 indicating a NO_X-limited ozone formation. After sunset, the ratio falls below 0.35 again, but this is after the ozone peak and the concepts of VOC-limited and NO_X-limited are no longer relevant [6].

The true impacts of VOC is related more closely to the reactivity of the VOC species with respect to OH rather than to the total amount of VOC. Locations with highly reactive VOC, e.g. xylene or isoprene, are more likely to have NO_X-limited chemistry than locations with similar total VOC but lower reactivity [7]. For this reason, the photochemical models require the chemical speciation of the emission inventory.

4 Ozone modelling system

4.1 Meteorological model

A coastal region is influenced by many meteorological phenomena due to the interactions between breezes and large-scale wind systems. Mesoscale air flows in coastal regions are mainly determined by land-sea temperature contrast that drives land-sea breezes, and by the orography that drives mountain-valley breezes while the shape of the coastline has an effect on mesoscale wind flow [8]. A mesoscale meteorological model (RAMS) has been used. RAMS is a versatile modelling system capable of simulating flows from the scale of a global hemisphere to the scale of a building [9] with numerous options including multiple nesting, and several convective and boundary layer parameterization options.

4.2 Emission inventory and model input

A photochemical model simulates the hour-by-hour photochemistry occurring for each grid cell in the modelling domain; consequently, the input emissions data must contain a comparable level of resolution. Total emissions (e.g., VOC, NO_X) must be chemically allocated into the chemical classes employed by the model. Additionally, the emissions data must be spatially allocated by grid cell for each hour of the modelling episode [10]. The flexibility of EPS3 (Emissions Processing System, version 3.20) provides the user with many options for processing their emissions inventory. EPS3 consists of a series of Fortran modules that perform these intensive data manipulations, producing an emissions inventory for photochemical modelling. Referring to ozone assessment, the model is usually applied for a multi-day period during which adverse meteorological conditions result in elevated concentrations. For the present study, we used three differed grids: one master grid and two nested grids. The coarse grid (G1), as shown in Figure 1(a), is 960x800km wide and covers most of continental Italy through its 60x50 cells with 16km step.

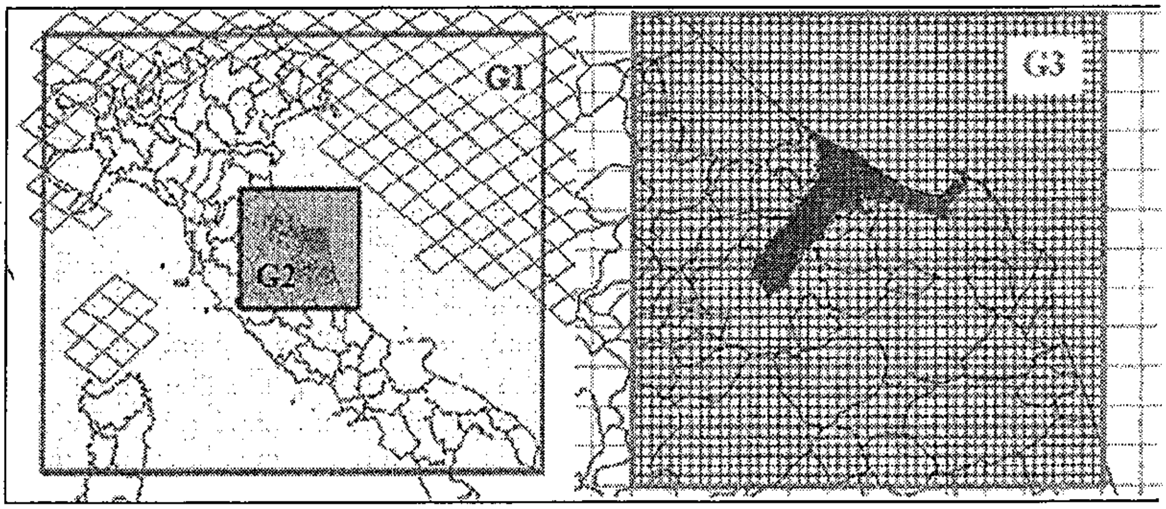

Figure 1: Master grid G1 and nested grid G2 (a); grid G3 (b) with area declared "Highly at Risk of Environmental Crisis" (AERCA) in red.

The second nested grid (G2) is 232x219 Km wide, well covers the Marche region, and is made of 58x54 cells of 4 km steps. The finest grid (G3) is 50x50km wide and is made of 50x50 cells of 1 km steps. It covers the AERCA restraint (Fig. 1(b)).

The air emission inventories here in use has been derived from the EMEP Centre on Emission Inventories and Projections [11] for the sources outside

Italy, the Italian Emission Inventory 2005 [12] for all the provinces outside Marche Region, and the Emission Inventory [13] to the municipality level of Marche Region.

4.3 Photochemical model

CAMx (Comprehensive Air quality Model with eXtensions) is an Eulerian photochemical dispersion model that allows an integrated "one-atmosphere" assessment of gaseous and particulate air pollution (ozone, PM2.5, PM10, air toxics, mercury) over many scales ranging from sub-urban to continental.

CAMx simulates the emission, dispersion, chemical reaction, and removal of pollutants in the troposphere by solving the pollutant continuity equation for each chemical species on a system of nested three-dimensional grids [6]. The Eulerian continuity equation describes the time dependency of the average species concentration within each grid-cell volume as a sum of all of the physical and chemical processes operating on that volume.

4.4 Source apportionment tool

Ozone source apportionment (OSAT), in CAMx, tracks the contributions to each grid cell from emissions source groups, emissions source regions, initial conditions, and boundary conditions with reactive tracer species (NO_X , VOC, and O_3). Tracers provide information on the relative importance of transport and chemistry [14]. To distinguish VOC and NO_X-limited regimes, the tool uses the Sillman's indicator. The tracers operate as spectators to the normal CAMx calculations so that the underlying CAMx predicted relationships between emission groups (sources) and ozone concentrations at specific locations (receptors) are not perturbed [6].

The emission data were roughly split into three different groups: Industrial (I: anthropogenic fixed point sources; from SNAP97 sector 1 to 6, and 9), Transport (T: road transport and other mobile sources; SNAP97 sectors 7 and 8) and Natural (N: agriculture, forest and other natural sources; SNAP97 sectors 10 and 11). The tool OSAT needs an input file called Source Map file that allows the user to indicate other subdomains of emission within the grid set before. A Source Map file is required for the master grid and optional for the nested ones. The Source Map was designed according to the borders of Italian Regions. Smaller regions were joined together.

5 Operational evaluation results

5.1 Base case

Our study was performed over four days, namely from August 25 to August 28 of 2006. The chemistry mechanisms activated was Carbon Bond IV [15] with 113 reactions and up to 76 species (up to 44 state gases, up to 22 state particulates and 10 radicals).

The results of the first simulation are shown in Figure 2. The emission scenario is the base case, without any modification to the emission inventories. The boundary conditions, namely the primary and secondary pollutants released outside the grid G1, are evaluated from EMEP prescribed values [16].

The predicted concentrations are in agreement with measurements of the two monitoring stations placed in AERCA: "Chiaravalle/2" (Fig. 2) and "Falconara Scuola" (not reported). The differences are larger in the first two days of simulation, and then become smaller. The model needs at least two days of simulation to give acceptable results simply due to the self-tuning: ozone derived from initial and boundary concentrations have less weight percentage after the first two days. In Figure 3 the hourly amount of ozone formed is reported with respect to the condition of formation for all emission groups and all emission areas of August 28. It distinguishes between NO_X-limited (O3N) and VOC-limited (O3V). The initial and boundary tracers are ozone not

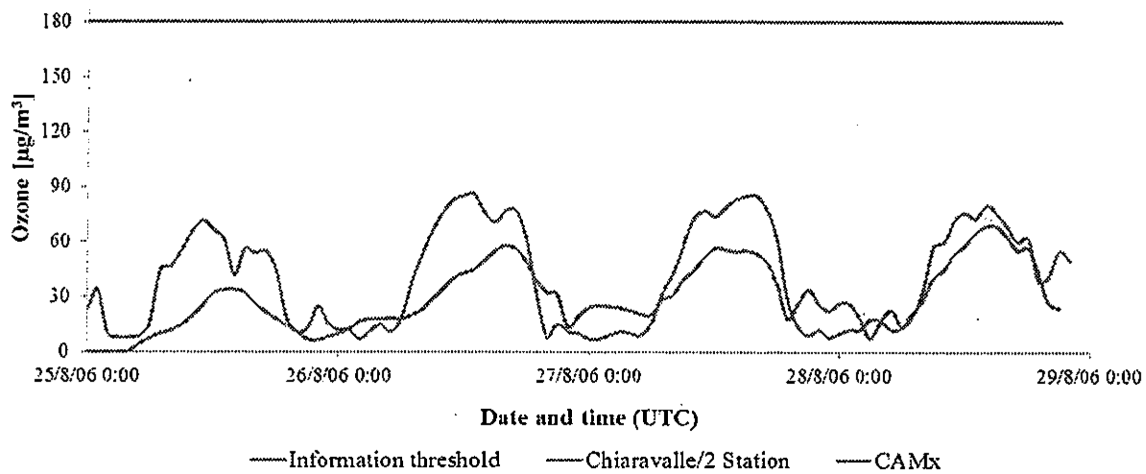

Figure 2: Results with EMEP boundary concentrations at "Chiaravalle/2" monitoring station.

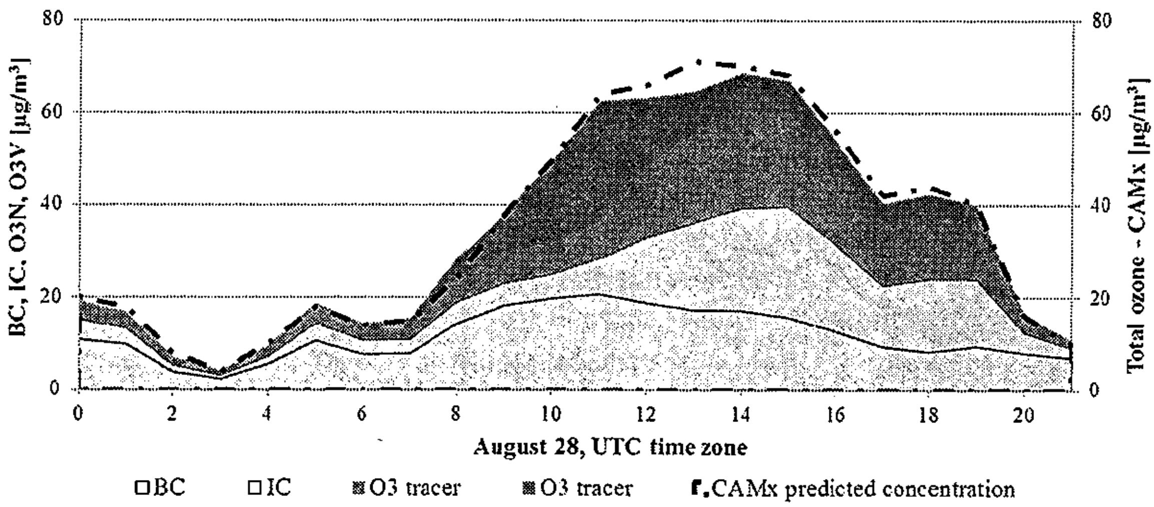

Figure 3: Source apportionment applied to "Falconara Scuola" monitoring station.

chemically produced; this is released during the first hour of simulation or, continuously, in the lateral boundaries, respectively.

During the first part of the morning, at high concentration of NO_X, the reaction of the radical HO_X is faster with NO_X than with VOC and so the production of nitric acid, according to Formula (8), is high. The Sillman Indicator is below the transition point (VOC-limited situation) up to about 12:30 PM. At this point, because of a low concentration of NO_X, the radical HO_X reacts faster with VOC, the radical-radical reaction (9) becomes predominant and the Sillman indicator starts increasing (NO_X-limited situation). The tracers in Figure 3 match this behavior. A detailed analysis carried out on the Area at High Risk of Environmental Crisis inside the finest grid (G3) has shown a more efficient ozone depletion, after sunset, over the main highway, an area where NO emissions are very high (removal of ozone via reaction (7) is favored).

5.2 Ozone control strategies

Information about ozone condition of formation could be very useful in tuning ozone control strategies so to reach acceptable air quality and to avoid ozone acute episodes. Generally, rural areas appear to be predominantly NO_X-limited: in this regime, an increase in NO_X concentrations is always associated with increased ozone production. Conversely, in a VOC-limited situation, reducing the NO_X emission will result in an increased ozone concentration since less NO_2 will be available to reaction (8), then just a small amount will be transformed into HNO_3. So, the rate of ozone formation is controlled by reactions (3) and (4) and increases with increasing VOC and decreases with increasing NO_X.

Several further simulations through speculative reductions of emission were carried out to investigate how alterations in emission scenarios can influence ozone behaviour in the area.

Figure 4 shows the ozone response in two hypothetical scenarios, the first one with 40% reduction of NO_X and the second one with 40% reduction of VOC

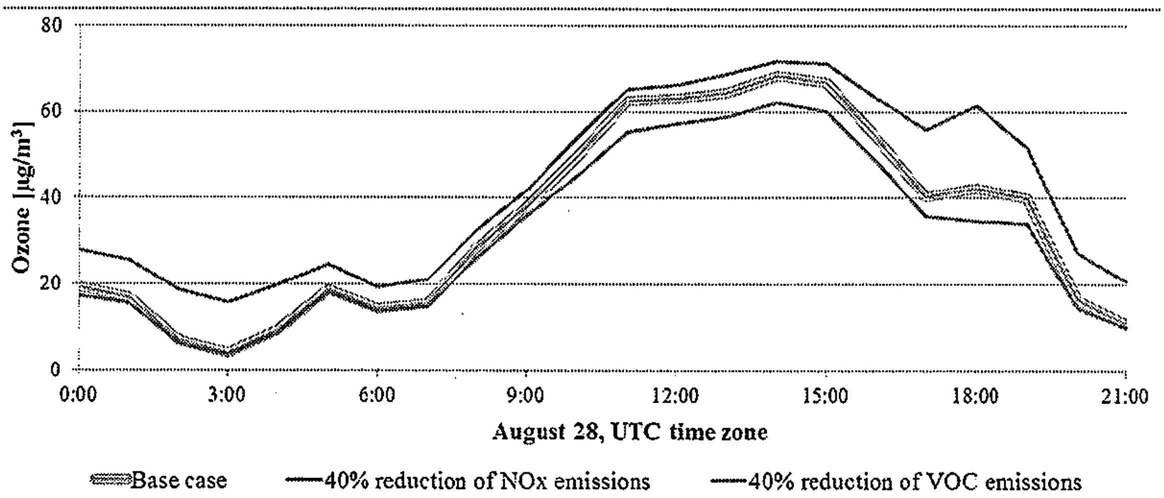

Figure 4: Ozone response to new emission scenarios, at "Falconara Scuola" site.

emissions. As we can see, a 40% reduction of VOC emissions will result in lower ozone concentrations, while reduced NO_X emissions, will trigger an increase of the ozone concentration.

In the simulation with 40% reduction of NO_X emissions, the NO_X-limited situation happens before the one predicted by base case because of the different VOC/NO_X ratio given in input to the model. The higher this ratio is, the earlier the transition occurs.

The ozone behaviour should be matched with the VOC/NO_X ratio, including that measured at "Falconara Scuola" monitoring station. The monitored VOC/NO_X ratio is always above the transition point (VOC/NO_X>5.5), thus ozone formation is NO_X-limited. Conversely, CAMx model simulated a VOC-limited situation in the first part of the morning followed, after midday, by a NO_X-limited situation.

The differences between the predicted and measured VOC/NO_X ratio arise from hydrocarbons. Figure 5 shows the NO_X monitored and predicted at "Falconara Scuola" station in the base case scenario: the values are similar. In fact, the uncertainty associated with emission of biogenic and anthropogenic hydrocarbons are high [7].

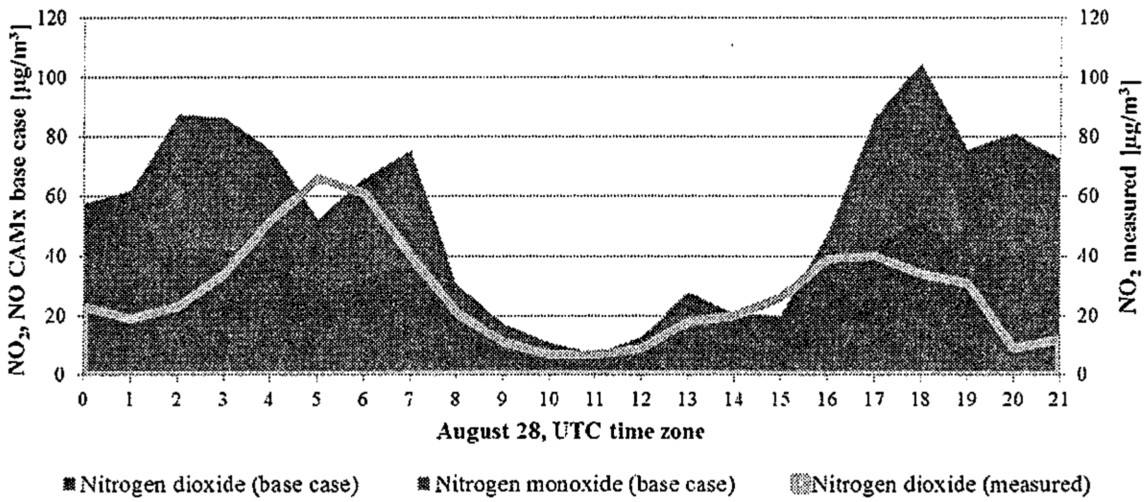

Figure 5: NO and NO_2 simulated by CAMx in base case scenario, and NO_2 measured at "Falconara Scuola" monitoring station (green).

5.3 Sensitivity to emission inventories

Several scenarios were tested, using the data sets obtained from previous simulations, to better understand deviation between model results and measurements. In all of these, multiplicative factors to estimated hydrocarbons emissions of Marche Region were applied.

Figures 6–7 show the predicted hydrocarbons and ozone for the modified scenario in which VOC emissions were multiplied by five. This hypothesis is not as inconsistent as it might appear since VOC emission assessment is very hard in industrialised areas and a big petrochemical plant is located at short distance of monitoring station. As a matter of fact, VOC concentrations monitored by the same stations used for ozone assessment showed a massive presence of VOC incompatible with the officially recorded emissions.

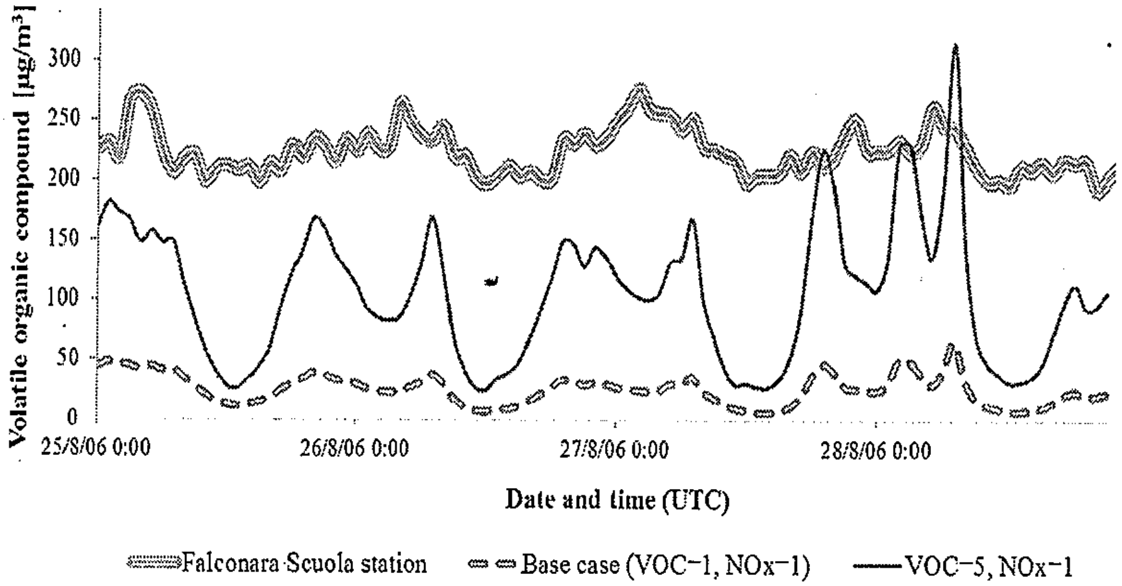

Figure 6: Monitored VOC and predicted for two emission scenarios at Falconara Scuola: base case and that with a factor of five.

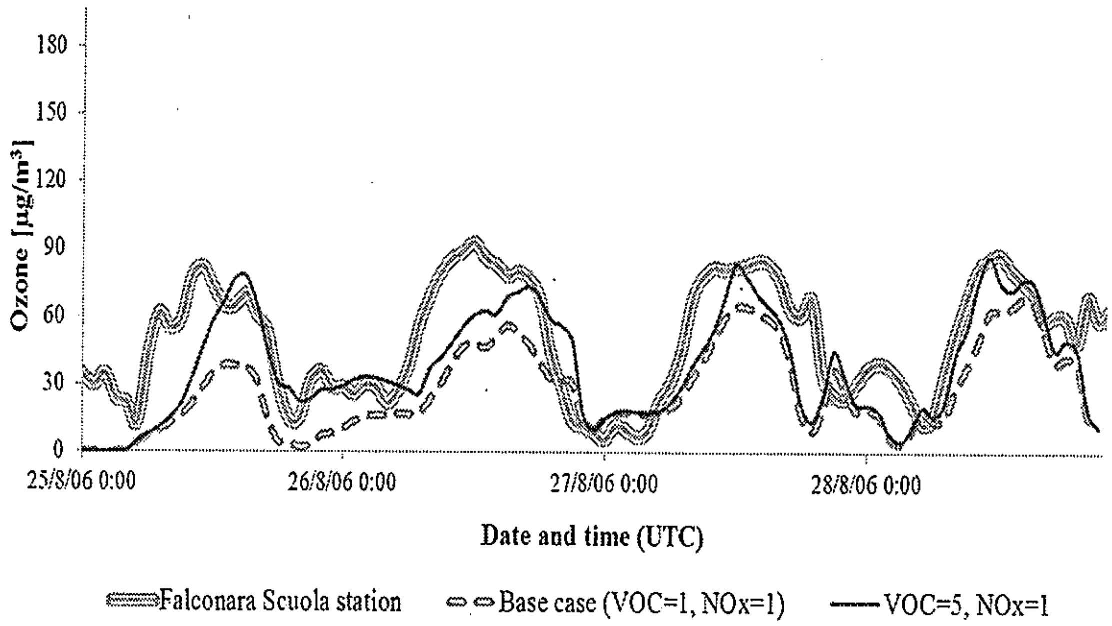

Figure 7: Results with new emission scenario at "Falconara Scuola" monitoring station.

6 Conclusions

Results from base emission scenarios and modified emission scenarios show that the modelling system RAMS-EPS3-CAMx-OSAT well simulates the behaviour of ozone in many places of Marche Region.

The emission inventories are often the largest source of uncertainty in model predictions. Ozone fate and model sensitivity to ozone precursor depend critically on emission rates of anthropogenic VOC and NO_X, on their speciation, (especially of anthropogenic VOC), and on emission rates of biogenic VOC (biogenic hydrocarbons are usually highly reactive).

Control strategies can be very hard to establish since ozone concentrations are difficult to predict if there are not reliable data on emissions and concentrations of ozone precursors including, at least, a rough speciation.

Based on such evidence, policy makers must be aware that, under certain conditions, stopping industrial activities and/or private cars, with the aim of reducing ozone levels, may lead to exacerbation of phenomena and even to ozone episodes. In fact, reducing such human activities may lead to a further increase of VOC/NO_X ratio since most VOC are due to diffuse emissions while NO_X are mostly stack and exhaust-pipe emissions.

Acknowledgement

This work has been supported by Fondazione Cariverona of Italy.

References

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附件 4　其它會議重點資料

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Environmental Impact 2014

14 - 16 May 2014

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WESSEX INSTITUTE

Ashurst Lodge, New Forest, UK

Prof Carlos Brebbia

Wessex Institute is the brainchild of Professor Carlos Brebbia, who created WIT after a long and distinguished academic career.

Carlos was born in Argentina where he completed his first engineering degree. He spent two stimulating years after graduation as part of a small team setting up an Institute of Applied Mechanics. Following this, he registered at Southampton University in England for a higher degree, arranging to carry out his research partly at MIT. This experience, which he found most rewarding, set up the basis for his long and close association with the USA.

After obtaining his PhD at Southampton he worked for the Central Electricity Research Laboratories in the UK, a leading research establishment at the time. He left the Laboratories to take an academic position at Southampton University where he rose from Lecturer to Senior Lecturer and Reader. During his time at Southampton he took leave to become Visiting Professor at many other Universities, including an academic year at Princeton.

After having been appointed Full Professor of Engineering at the University of California, Irvine, he decided to return to the UK to set up Wessex Institute.

Carlos is renowned throughout the world as the originator of the Boundary Element Method, a technique that continues to generate important research work at Wessex Institute. He has written numerous scientific papers and is the author or editor of many books.

His current interests are in the field of strategic planning and research management and looking after all the activities at Ashurst Lodge to ensure that Wessex Institute and its associated companies continue to grow and develop in the right direction.

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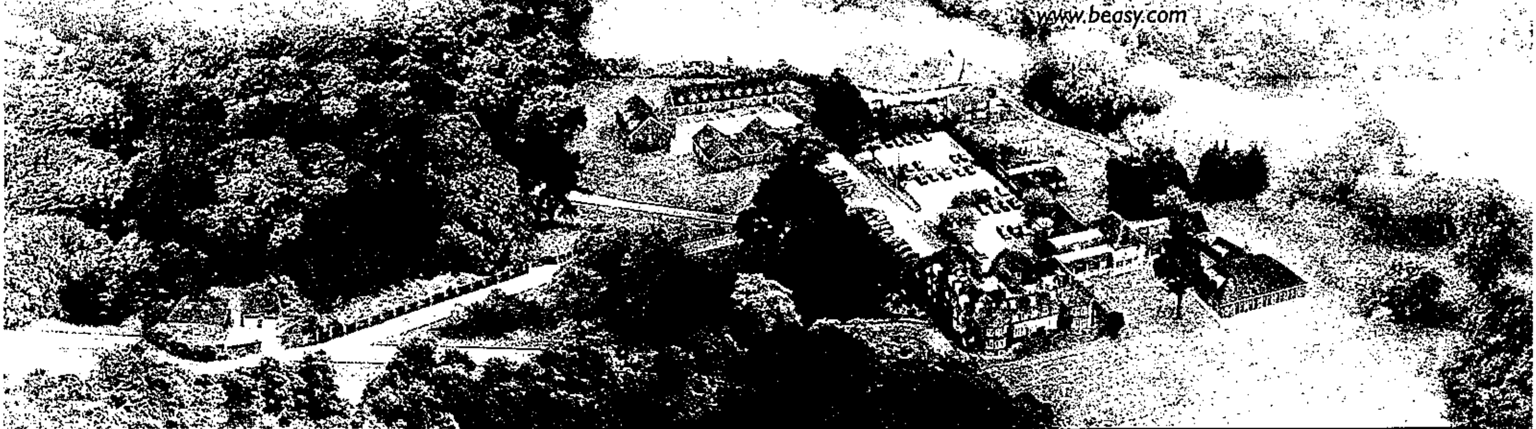
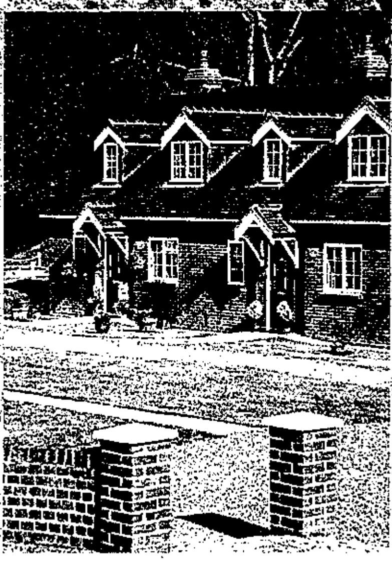
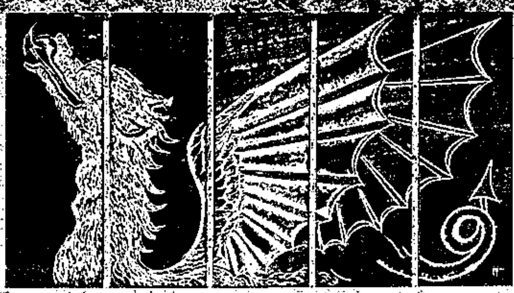
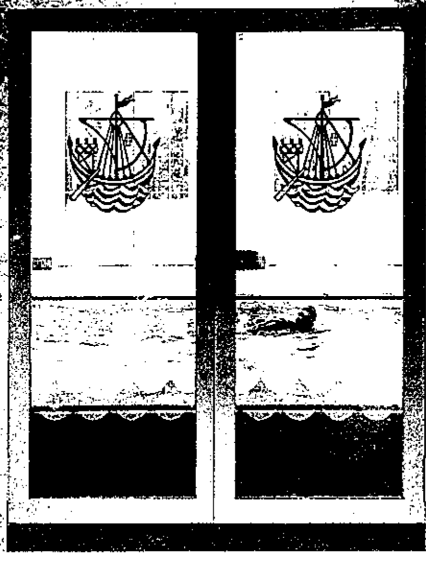








International Conference Programme

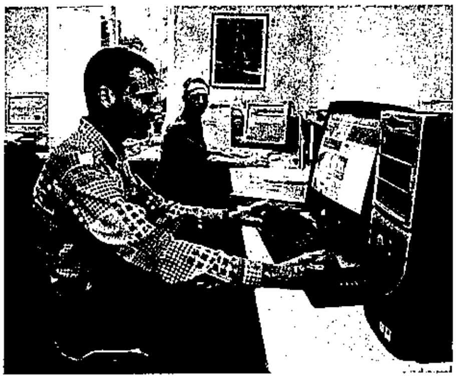
Wessex Institute organises an extensive annual meetings programme, including short courses, seminars and conferences.

Short courses usually take place at Ashurst Lodge, whilst international seminars and conferences are held in many different locations around the world. The conference programme is particularly active and has brought international renown to the Institute.

These meetings are a product of the many international links and scientific contacts that the Institute has. Originally focused on physical sciences and engineering, the range of topics covered by the meetings has expanded to include a wide variety of fields.

The Wessex Institute conference programme is particularly unique as papers presented are available in book format at the conference. They are also permanently available online at *http://library.witpress.com* as part of the Wessex Institute's eLibrary.

Full details are available on the Institute's website at: *www.wessex.ac.uk*.



The American Office

In order to serve industry better and meet the needs of the North American market, the Institute has an established office in Boston, Massachusetts.

This office not only supports and promotes the use of Boundary Elements in industry as well as the distribution of WIT Press publications but also helps to strengthen the links between WIT and the research community in North America.

Software Services

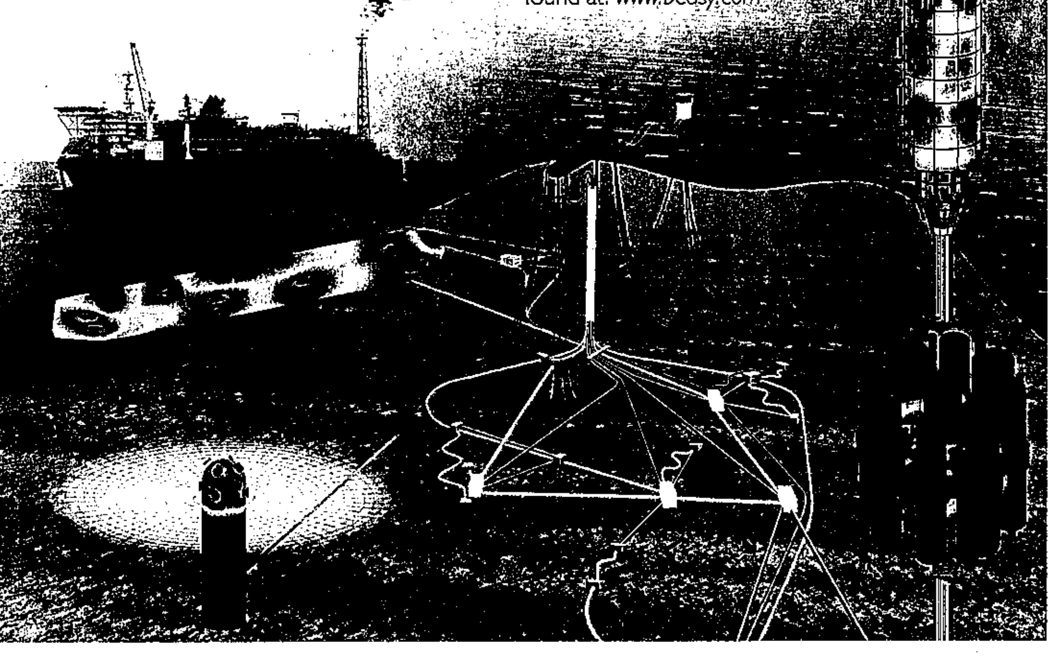
The research carried out at the Institute has resulted in major advances in a variety of fields, primarily through the work on Boundary Elements.

Wessex Institute is associated with the invention of the Boundary Element Method through the pioneering work of the Institute's founder and Director. Many developments at the Institute have been incorporated in a general purpose computer simulation code called BEASY (Boundary Element Analysis System). The BEASY software company continues to develop and maintain the code as a service to industry.

BEASY is now a well-established company with world-wide users. It provides a valuable service to major industries such as aerospace, automotive, mechanical, offshore and naval, as well as specialised applications in fields such as electromagnetics and fracture mechanics, amongst many others.

BEASY provides advanced consulting services and has been particularly active in the analysis of design of cathodic protection systems for offshore platforms, ships, pipelines, etc. This is one of the many fields in which Boundary Element Methods have been found to be of value to industry.

The success of BEASY has been rewarding for Wessex Institute, not only in terms of widening its contacts throughout the world, but also as a validation of the practical importance of the research work of the Institute. This awareness of industrial needs is key to the success of Wessex Institute. Further details about BEASY can be found at: *www.beasy.com*



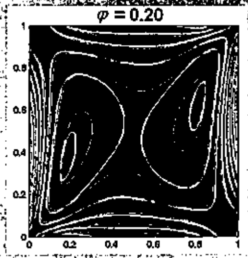
Major Research Activities

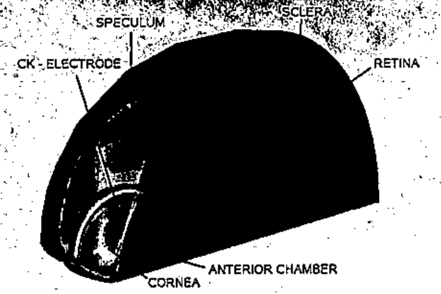
Research in Damage Mechanics relates to the development of computational tools based on the boundary element techniques for stress analysis problems.

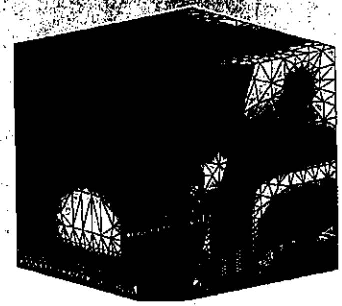
Work on Fluid Flow is dedicated to the modelling of environmental and fluid dynamics phenomena involving applications of high performance computing to the solution of problems in science and engineering.

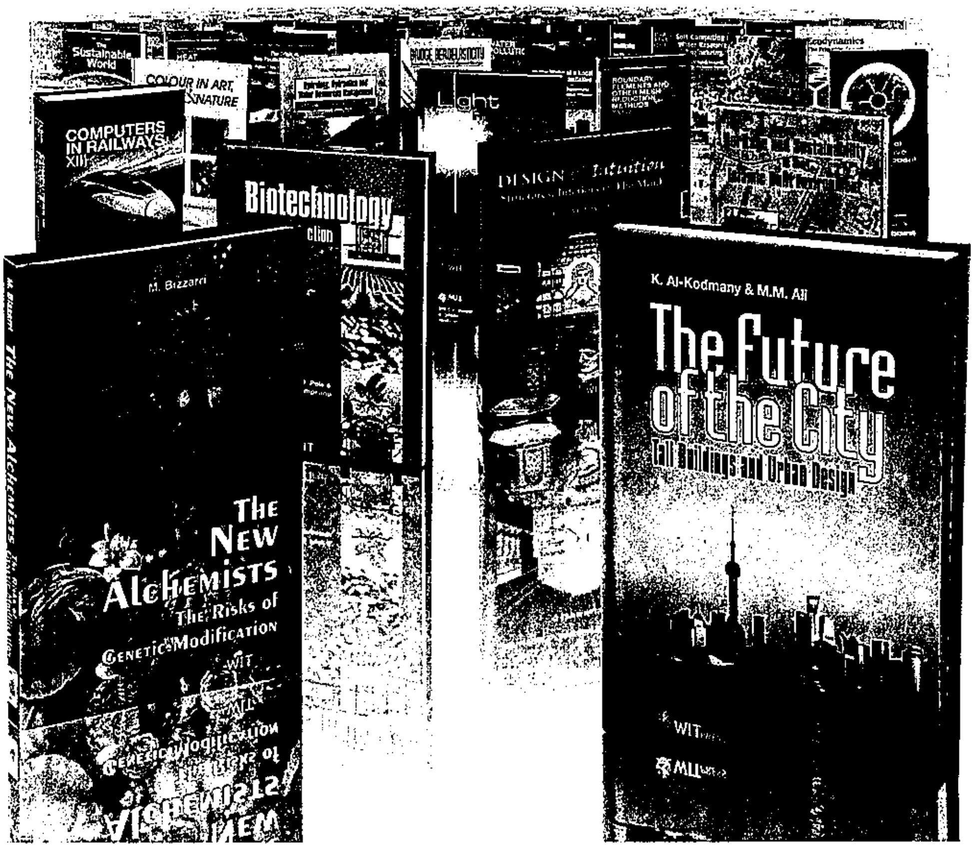
Industrial Research concentrates on solving problems of importance to industry and demonstrates the significance that Wessex Institute attaches to producing practical results.

Advanced Modelling Techniques have been developed for the simulation of electrical – including cathodic protection systems – and electromagnetic problems. Applications include offshore studies, pipelines, biomedical, electromagnetic effects in the human body, acoustics and many others, mostly using Boundary Elements.









Publishing Activities

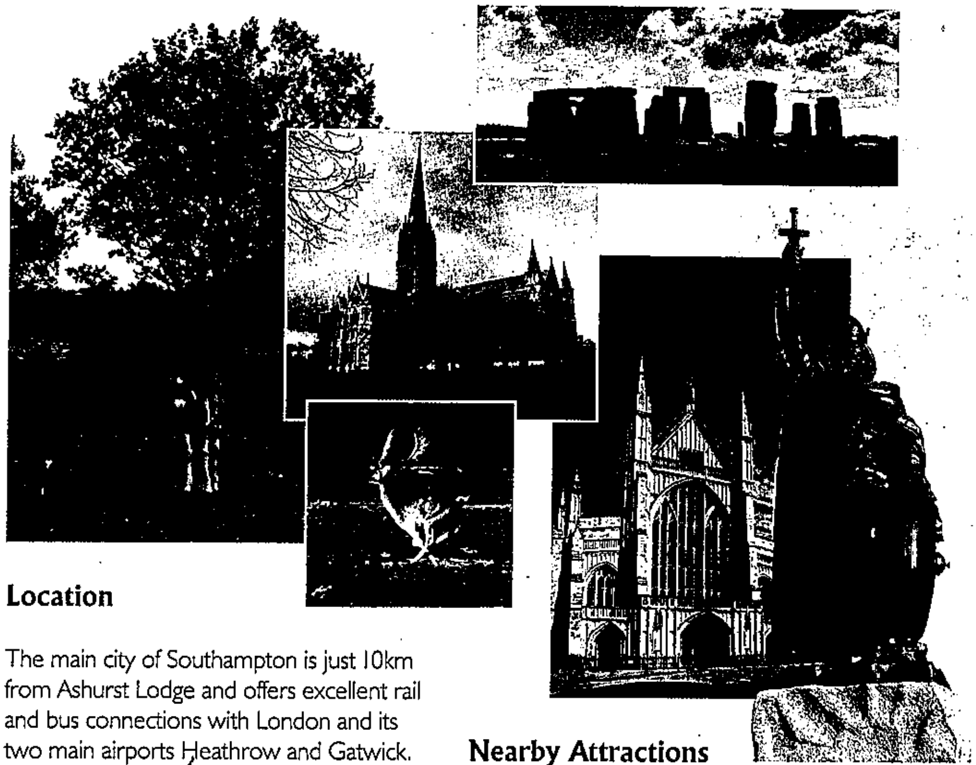
WIT Press not only provides an essential contribution to the smooth running of the Institute's meetings by publishing their proceedings but also produces a substantial number of specialised monographs, and edited works as well as journals.

WIT Press publishes books and Journals in digital as well as paper format.

WIT Press publications are widely distributed all over the world through a network of booksellers. It also mantains a digital library (*www.witpress.com)* incorporating papers presented at Wessex Institute meetings and those of associated institutions.

Come Visit Us

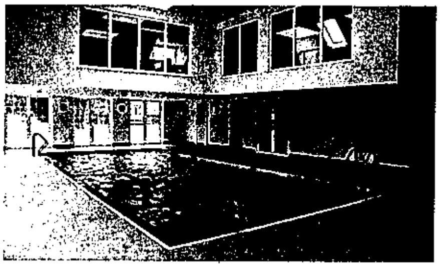
Wessex Institute is keen to strengthen its links with researchers and practitioners from all over the world and is always pleased to welcome visitors.



Accommodation and Facilities

The New Forest Campus offers excellent accommodation facilities for both its researchers and visitors. A series of individual rooms and purpose built cottages are available.

Residents may use the indoor swimming pool and all-weather tennis courts as well as other facilities on the campus.



Location

The main city of Southampton is just 10km from Ashurst Lodge and offers excellent rail and bus connections with London and its two main airports Heathrow and Gatwick. London is just over one hour away by rail from Southampton, with Eurostar connections to Paris and Brussels.

Ashurst Lodge itself is a short distance from a local train station (Ashurst New Forest) with rail services to Southampton and London.

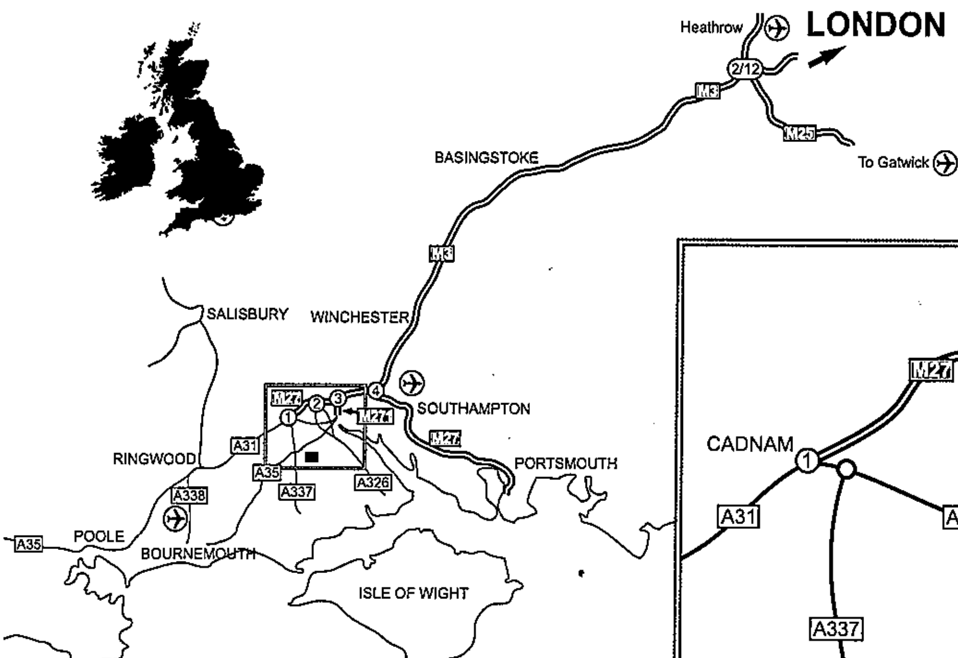
The New Forest has two regional airports on its periphery – Southampton to the East and Bournemouth to the West – both within easy reach of Ashurst Lodge, offering many flights to different locations within Europe.

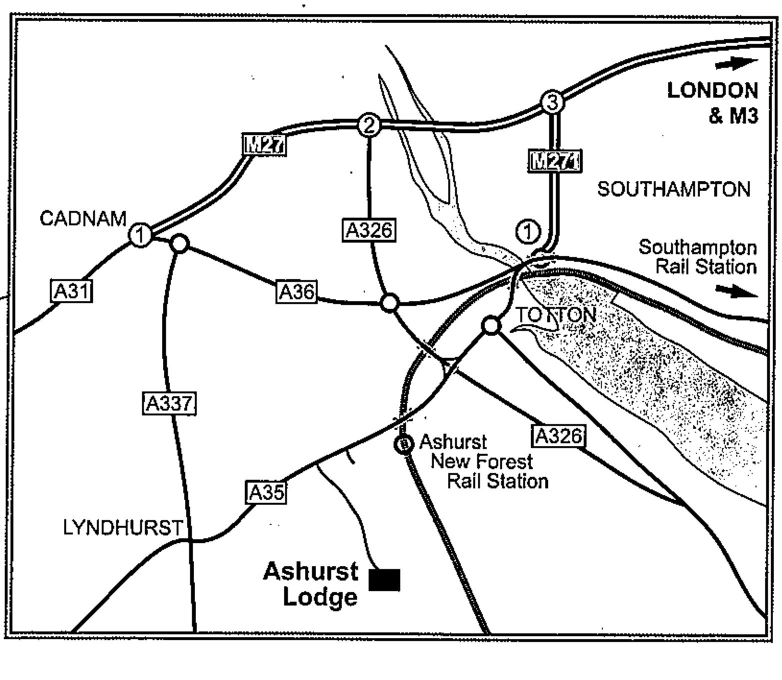
Nearby Attractions

Nearby Lyndhurst caters for day-to-day needs and has good pubs and restaurants. It is also the home of the New Forest Museum. Southampton has an excellent shopping centre, including a large mall and department stores as well as cinemas, theatres and museums.

Several major historic cities and sites are also within easy reach, such as Winchester, Salisbury and Stonehenge.

The New Forest itself has numerous places to visit and is the perfect location for enjoying walking, horse riding, cycling, sailing and fine landscapes. For more information on the New Forest see C. A. Brebbia's book "The New Forest – A personal view" WIT Press, Southampton. Available online at: *www.witpress.com*





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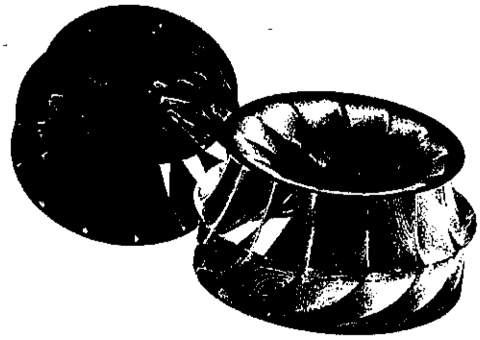
WESSEX INSTITUTE

Located in the beautiful New Forest National Park on the south coast of England, Wessex Institute is a unique organisation serving the international scientific and industrial communities.

The overall aim of the Wessex Institute is to develop a series of knowledge transfer mechanisms, particularly directed towards the exchange of information between academics and professional users within industry.

This is achieved through a range of activities organised by a dedicated team of staff both within the Institute and its associate companies. A large network of prestigious contacts and links have been established with many organisations throughout the world.



Academic Research

The academic activities of Wessex Institute are centred on its New Forest campus at Ashurst Lodge. They consist of a series of post-graduate programmes, many of which are held in collaboration with other academic institutions around the world. These programmes of the Wessex Institute are supported by a variety of research and industrial organisations.

The academic success of the Institute can be measured by the substantial number of researchers who are in positions of responsibility in outstanding academic institutions and industry. Many have become full professors at some of the best UK universities including Imperial College, Nottingham and Brunel, whilst others are now professors in universities within their country of origin. These are major achievements for an independent research institution.

Wessex Institute is proud to retain strong links with its alumni, who actively collaborate with the activities of the institute. This interaction is another way in which WIT promotes the interchange of information.

Core Activities

Specialist Research within the areas of Computational Modelling, Damage Mechanics, Environmental Fluid Mechanics, Information Technology and Industrial Research.

It comprises research at post-graduate level as well as focusing on industrial requirements.

International Conference Programme that is constantly evolving in both size and scope. This has brought international renown to the Institute.

Publishing: WIT Press is the publishing arm of the Institute, which produces numerous scientific books, monographs, journals and edited works as well as the proceedings from the Institute's conference programme. This includes publication in digital as well as paper format.

Software: The software arm of the Institute continues to develop and maintain the Boundary Element Analysis System, which was originated by the Director of the Wessex Institute.

Services: The organisation provides support to industry in areas such as aerospace, offshore, naval and automotive, as well as specialised fields such as biomedicine, electromagnetics and fracture mechanics. Advanced consulting work for industry is one of the diverse ways of serving industry.