

OPANA air quality forecasts by using new Internet and mobile communication technologies

Contribution to subproject SATURN

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Summary

The revolution of Internet and the use of new mobile telecommunication technologies such as WAP, SMS, 2,5 GPRS and the future 3,0 UMTS is impacting also in the environmental air quality management. The capability to reach an important portion of the population by using mobile telecommunication technologies is shown in this contribution based on the results of the APNEE (Air Pollution Network for Early warning and on-line information Exchange in Europe) IST EU project. In this contribution we show how the citizen can benefit by new mobile and Internet technologies by subscribing to different services such as e-mail warnings, SMS warnings, newsletter, etc. The system is running in different European cities and in this contribution we will show results for Madrid area. The citizen can subscribe either to historical monitoring data or air quality forecasts for the next 24-48 or 72 hours. The Madrid city domain has been subdivided into different main regions or areas according to Madrid city environmental authorities and also the OPANA air quality forecasts – running in daily operational mode - have been adapted to the desired regions to present balanced and harmonised patterns. The system will be extended to different European areas in the near future such as: additional cities in Norway, Germany and France, and also Andalucía (Spain) and Canary Islands (Spain). The use of new Internet and communication technologies to provide air quality information – and particularly air quality forecasts – will be an important tool to fulfil several aspects of the EU Air Quality Directives; particularly, those related to the need to provide real-time air quality warnings to the public and in the future these tools will be essential to improve substantially the air quality management by the city authorities and also by industrial or traffic sectors.

Aim of the research

The objective of this contribution is to show the importance of providing air quality forecasts results from air quality modelling systems (in this case OPANA, (San José et al. (1999)) to the citizen. We believe that Internet and future generations of mobile telecommunication technologies will play an essential role on fulfilling the EU Air Quality Directives and also on applying complex emission reduction strategies particularly when pollutant episodes are present. The present contribution is part of the activities for the APNEE project by UPM and it enhances the harmonisation of the presentation of the information to the citizen through the Internet and the subscription capabilities of the system which allows the citizen to receive customised air quality information (monitoring and forecasting) on real-time. The behaviour of the citizen can be modified – particularly in case of air quality forecasts – according to the health impact and characteristics of the warning. In this contribution we have focused only on the criteria pollutants except PM which is not already implemented in OPANA but it is considered in the presentation of air quality monitoring historical data sets.

Activities during the year

We have applied a tool developed into the APNEE project which allows the citizen of Madrid city (in practice any Internet user) to receive customised air quality information in his/her e-mail or by subscribing to the SMS service which produces short messages related to different alert levels – either to monitoring data or forecasting data – for different criteria pollutants. The SMS messages are associated to health warnings in function of the characteristics of the pollutant concentrations.

The tool provides to the user the capability to see air quality monitoring and forecasting data and also to see the pollution information at different times and spatial scales by using a WEB/GIS application based on the GRASS/GIS system (open source). All the information is exchanged by using the POSTGRES database (open source) and also a secure shell to guarantee the privacy of the data.

Principal results

In Figure 1 we see the Internet air quality forecasts for Madrid domain with 8 different regions – as defined by the Madrid Environmental Office – and with a four level air quality index – as suggested by the Spanish Environmental Ministry.

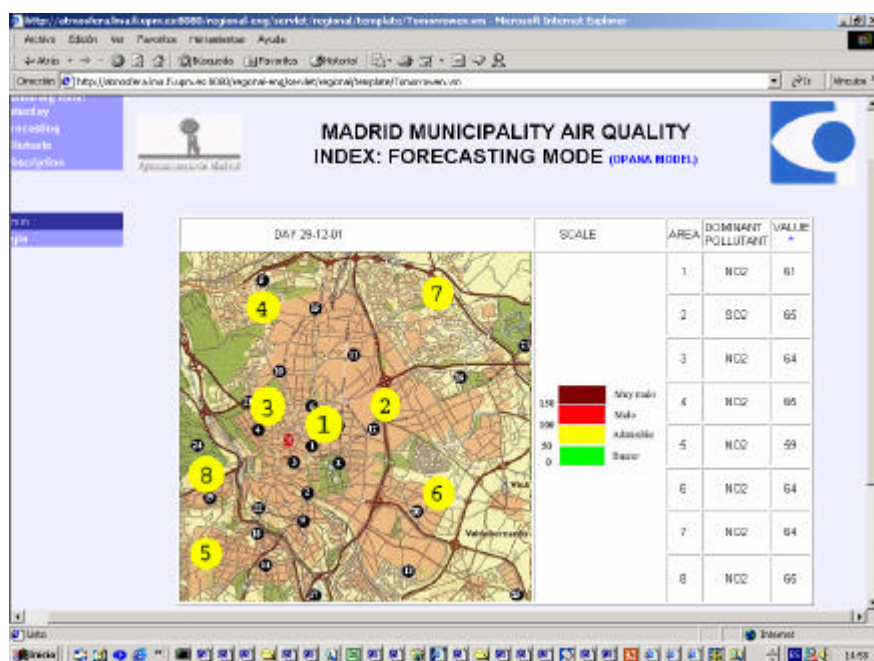


Figure 1. Air Quality Forecasts in APNEE project over the Madrid City domain.

In Figure 2 we see the WAP service to provide air quality monitoring and forecasting data.

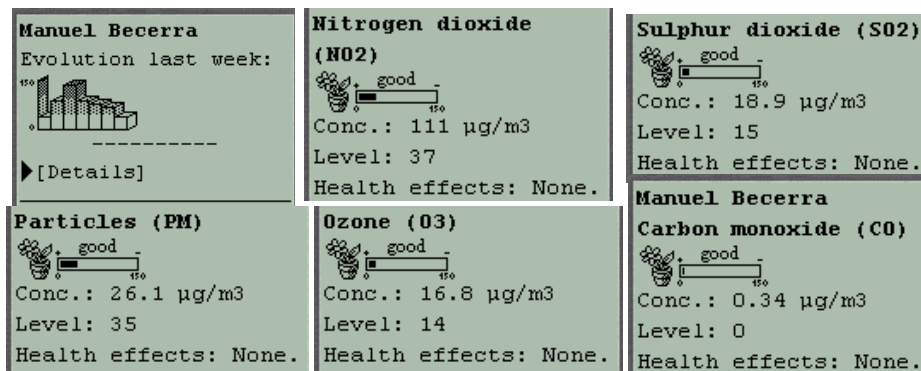


Figure 2. WAP service to provide air quality monitoring and forecasting data.

Main conclusions

The importance of combining Internet and mobile communication technologies and environmental air quality modelling tools is described in this contribution. The future impact on these type of technologies on air quality management focusing on emission reduction strategies is high. The capability to reach a large portion of citizens – particularly of medium and large European cities – on real-time is highly appreciated in order to take actions which prevent the exceedance of the EU Directive Air Quality Pollutant concentration values. Actions over traffic reduction or over industrial emissions will be very effective by using these type of tools closely linked to the capability of air quality models to determine the source apportionment for each pollutant criteria in time and space.

Aims for the coming year

During 2002 we expect to move to the third generation of air quality modelling by using MM5-CMAQ modelling system and we intend to extend the application of APNEE to other areas such as Andalucía region and Canary Island Area.

Acknowledgements

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References

San José, R.; Rodríguez M.A., Pelechano A. and González R.M. (1999) Sensitivity study of dry deposition fluxes. ISBN 1-85312-566-0, ISSN: 1460-1427. pp. 205-246.