FAIRMODE
Forum for air quality modelling in Europe

CCA3
Modeling & Monitoring
Brief overview of FAIRMODE's community on M&M

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and other colleagues

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FAIRMODE Technical Meeting
Aveiro 24-25 June 2015

‘combination of modelling and monitoring’ - any method that makes use of both models and monitoring to provide improved information on air quality.

Source:
Bruce and Spangl, 2010
WG2 FAIRMODE

WORK PLAN IDEAS 2015

1. REVIEWING METHODOLOGIES

- Comparison of various methodologies (for **assessment and planning**) in which monitoring and modeling data are used in conjunction.

2. GUIDANCE ON MODEL VALIDATION WHEN USING M&M

- Guidance on model validation after combination of monitoring/modelling and its incorporation into the model quality objectives and model evaluation tool.

Contribution to WG1 Guidance document

-update the review document produced during the previous FAIRMODE phase

- include the testing of Claudio's proposal

It's today!

Next technical meeting

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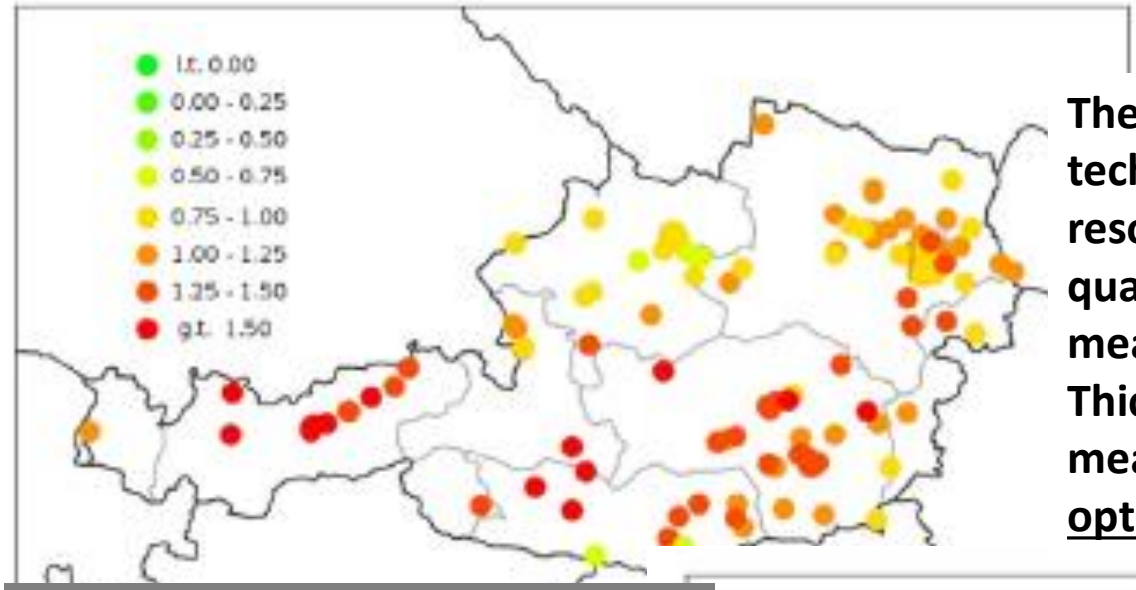
17 replies from 12 countries:

- 1 Sweden
- 2 Belgium
- 3 Germany
- 1 UK
- 1 France
- 2 Italy
- 1 Netherlands
- 1 Austria
- 1 Denmark
- 1 Czech Republic
- 2 Spain
- 1 Portugal

Technique	Purpose	Comments
intelligent interpolation	forecasting, assessment, planning	land use function and measurements – RIO (BE)
background values	annual assessment, planning, research	local scale (AT, DK, UK)
krigging	re-analysis operational forecast, local management, re-analysis, research	(NL) external drift krigging (FR)
linear regression and kriging interpolation	assessment, research	urban and rural stations separately (SP) (CZ)
optimal interpolation	operational forecasting research planning management	(AT) (BE) (IT) (DE)
support vector regression (machine)	maps for model initialization forecasting research	satellite data (AT) local measurements (SE)

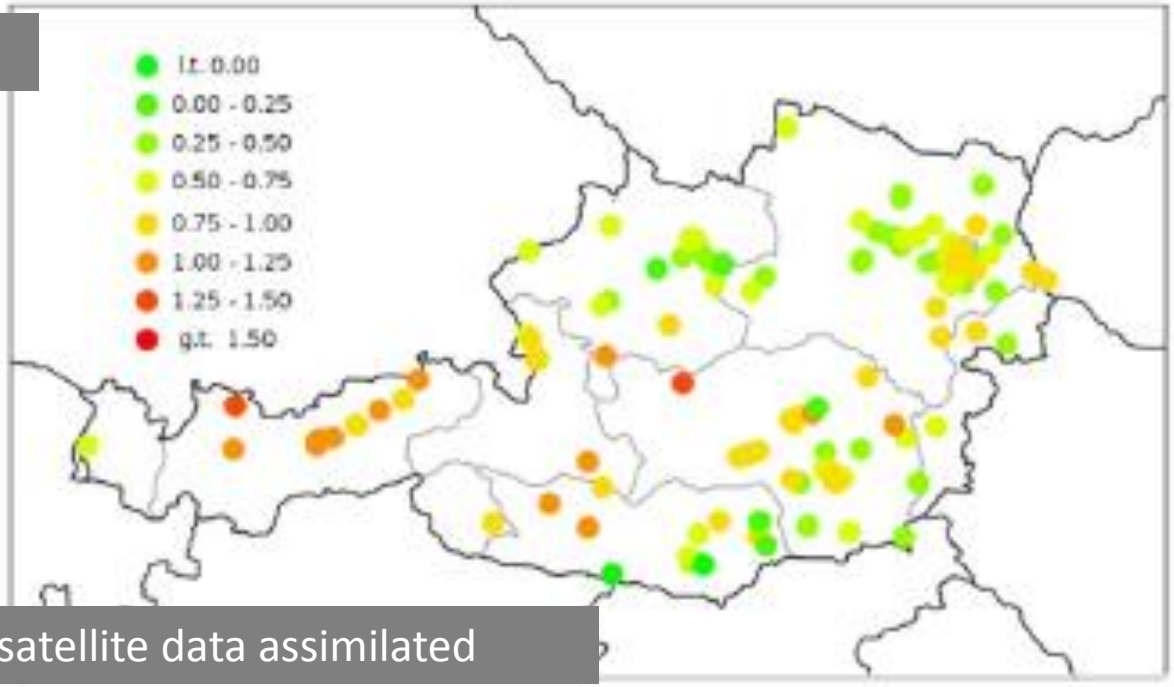
Technique	Purpose	Comments
successive correction method	research, management	(IT)
kalman filter	forecasting and assessment re-analysis	ensemble (NL) (FR) bias correction at stations at surface (SP, PT) AURORA (BE)
variational analysis	operational assessment	using background stations (SE)
data assimilation	research, operational forecasting, management	3- and 4d-var data assimilation (DE, AT, SP, IT)

Fractional bias (hourly data) between PM10 measurements at Austrian AQ stations and model results (february 2010) *(Hirtl et al., 2014)*



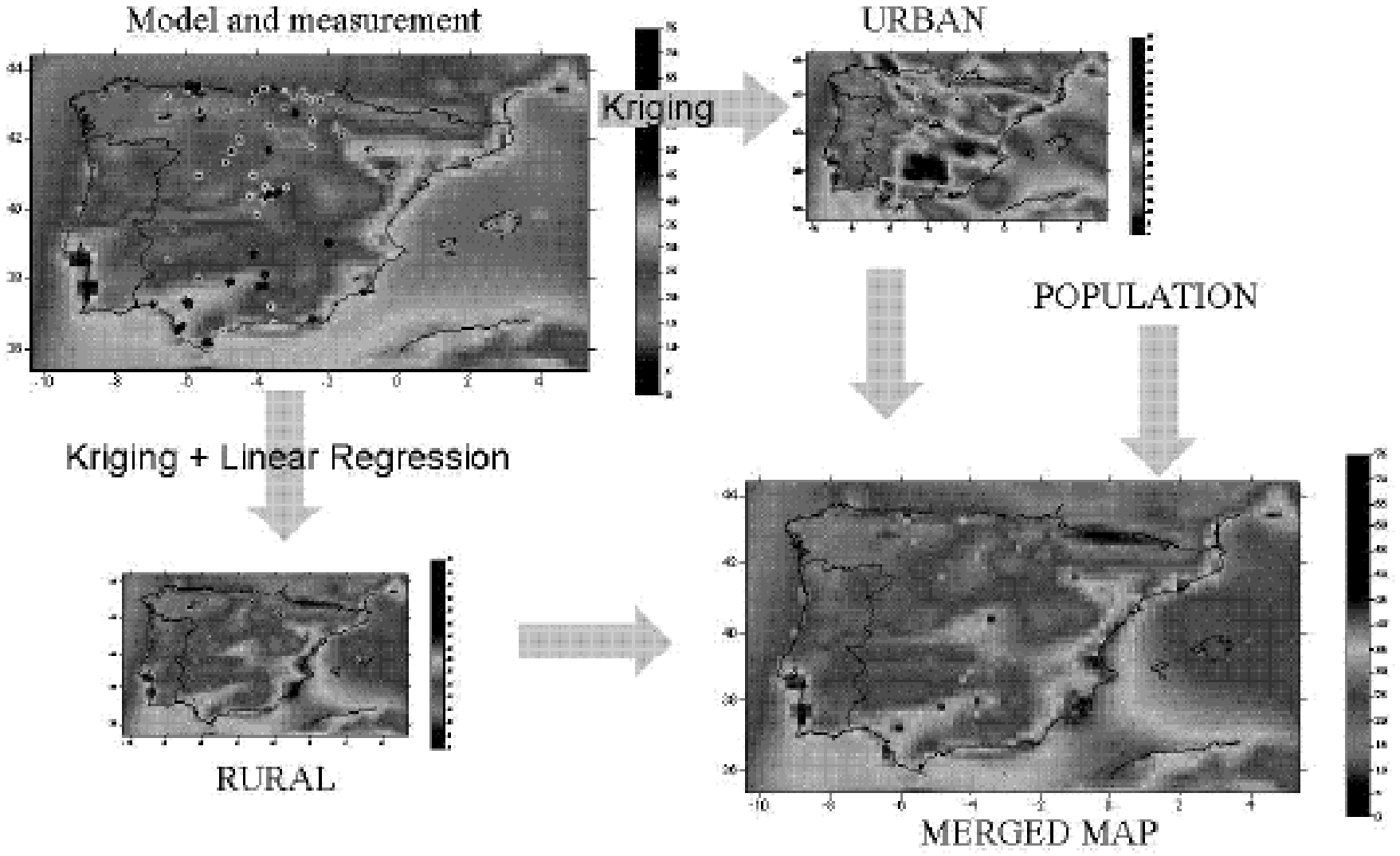
No measurements data included

The <u>Support Vector Regression</u> technique was applied to derive highly-resolved PM10 initial fields for air quality modeling from satellite measurements of the Aerosol Optical Thickness. Additionally, PM10-ground measurements were assimilated using <u>optimum interpolation</u>.



Ground stations and satellite data assimilated

Methodology for measurements and modelling combination *(Martin et al., 2012)*



The use of this methodology has improved the results obtained when using only the (CHIMERE) model data.

How to validate when using a combination of monitored and modelled data?

How to validate?

Leave one out

The "integration" is performed *n* times and each time one of the stations is used to test the results and the others *n-1* stations are used for the "integration"

Large number of re-analyses, but "simple"

Group approach

A set of $n_1<n$ stations is selected for the validation and the others $n-n_1$ are used for the "integration".

More robuts, but how to select the stations?

How to validate?

based on a Monte Carlo approach

1. **A set of n Monte Carlo re-analyses has to be done**

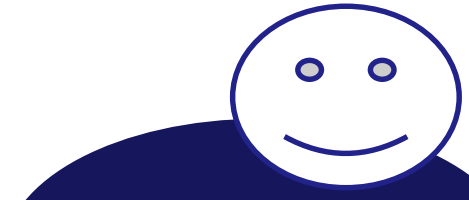
   a) For each one randomly select 20% of the stations to be used as validation stations (do not use them to perform the re-analysis)
   b) Compute for each station i (at least) in each re-analysis j the RMSE (i,j)

2. **Compute for each station i the maximun of RMSE (i,j). Let be vect_max(i) the number of the re-analysis associated to the maximum RMSE for station i**

3. **Create a CDF file to be used in the DELTAtool by selecting for each station i the vect_max (i)**

4. **Use the Deltatool as if the CDF file was the CDF of a single model**

Who wants to test this approach?



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It’s today!

To present results and conclusion at the next technical meeting

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- Statistical post-processing technique – S Anderson, SMHI
- Validation of complex data assimilation methods. The EURAD example – H Elbern, RIU
- ETC/ACM mapping methods – J Horalek, CMHI
- Methodology to detect outliers in the Airbase database – O Kracht, JRC

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2. GUIDANCE ON MODEL VALIDATION WHEN USING M&M

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How to validate model outputs after combination of M&M?

How to arrive to an independent model evaluation?

How can this be incorporated into the model quality objectives and model evaluation tool?




Thank you for your attention

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