

Air Quality Oct 3, 2006.

Oct 31, Y. Wang?

RAQAST model

Summer 2005      70x70km  
hourly  
U.S.

EPA obs. (1000 stations)

# CMAQ

- Put documents about calibration on web  
CMAQ (links to meth.)  
Q19

Real forecast! ETA: metendegy forecast (2005)  
WRF: now!

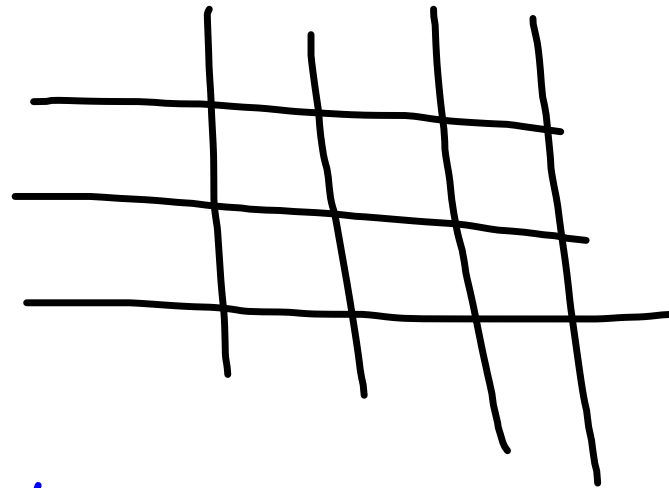
1. Understand calibration ) 2-3 weeks
2. Do the runs: for 2005 ) 2-3 days / run  
20-40 runs.
3. Stat. calibration ) (?)  
spare-time outputs

MDZART: global model 300 x 300 km

- UIUC runs it.
- few calib. parameters
- 60 runs in about 3 weeks. (NCSA).
- data:
  - aircraft campaign
  - sondes

In the meantime...

- Downscaling: use coarse model outputs to predict local values?



2 cases:

1. Integrating model outputs and data to predict locally.  
in the past

You have

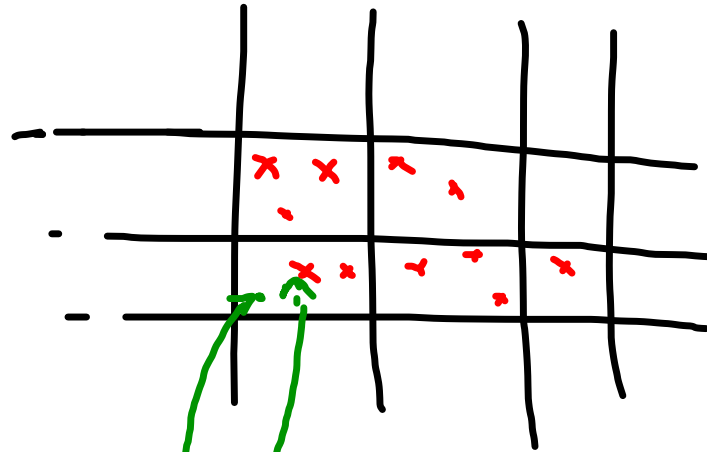
- observation
- model outputs

Then combine this information to get better estimates of spatio-temporal fields.

e.g. regression terms from model ?

For health analysis: at least 2-3 years.  
O<sub>3</sub>, PM

## 2. Forecasting mode



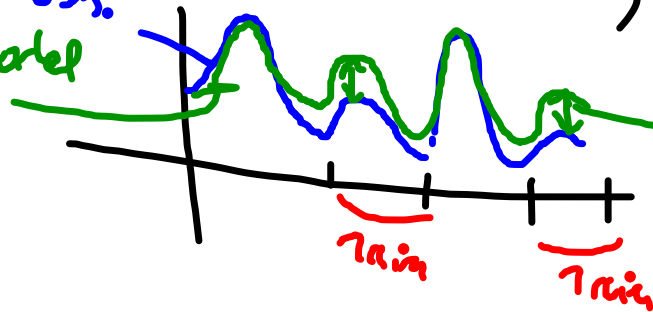
(a) at the station!  
(b)

everywhere! → use spatial model...



RAQAST (2005) data.

obs.  
model



deficiency in the treatment of rain effect

see also "An operational evaluation ...."  
(to put on web).

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For time series (Sage): comp. mod. [ref. ACP 2005]

$$1. \underbrace{O(t)}_{\text{obs.}} = C + a M(t) + N(t)$$

↑                    ↑  
additive bias    multiplicative bias

$t$ : time  
(hours)  
 $t = 1, \dots, 24 \times 7 \text{ days}$ .

error: AR(1).  $N(t) = \rho N(t-1) + \varepsilon(t)$

2. Regress  $\hat{\varepsilon}(t)$  on explanatory variables.

$$\hat{\xi}(t) = \sum_{i=1}^{24} \alpha_i a_i(t) + b_1 \underbrace{w(t)}_{\text{wind}} + b_2 \underbrace{r(t)}_{\text{rain}} + \varepsilon'(t)$$

$$a_1(t) = 1, 0, 0, \dots, 0, 1, 0, \dots$$

$$a_2(t) = 0, 1, 0, \dots, 0, 1, 0, \dots$$

$\hat{\alpha}_i$  signif.  $\Rightarrow$  systematic deficiency for  $\text{row } i$

$\hat{\alpha}_i, \hat{b}_1, \hat{b}_2, \hat{a}, \hat{c}, \hat{\rho} \dots$  build corrected model  $\hat{M}(t)$

Open questions:

1. This corrects systematic errors ..  
What about non systematic ?

2. How to give confidence bands for prediction?

$P(\beta)$

now :: ensembles

. through calibration )