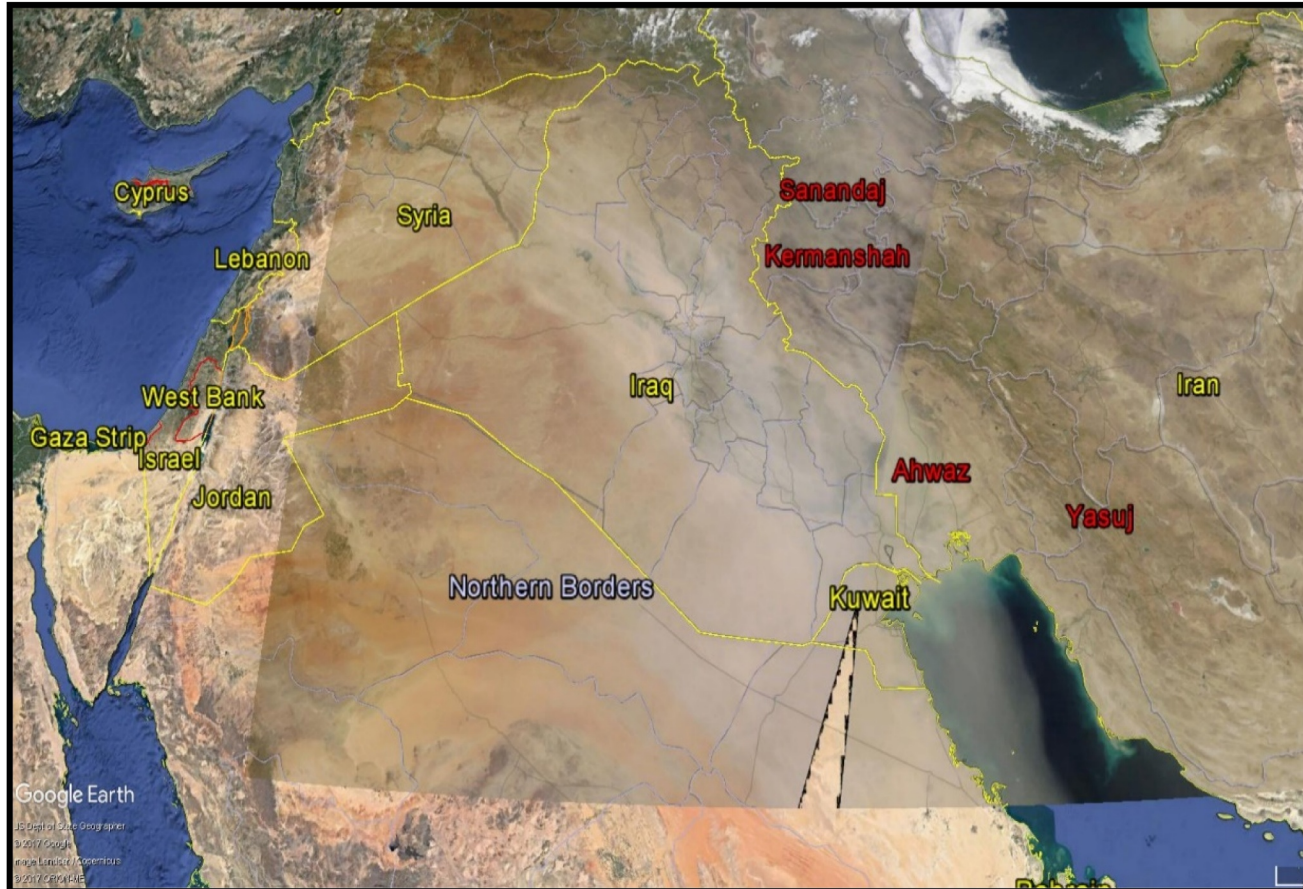# Dust Forecasts on the Monthly Scale

S. Omid Nabavi, Leo Haimberger

Fakultät für Geowissenschaften, Geographie und Astronomie,
Uni Wien
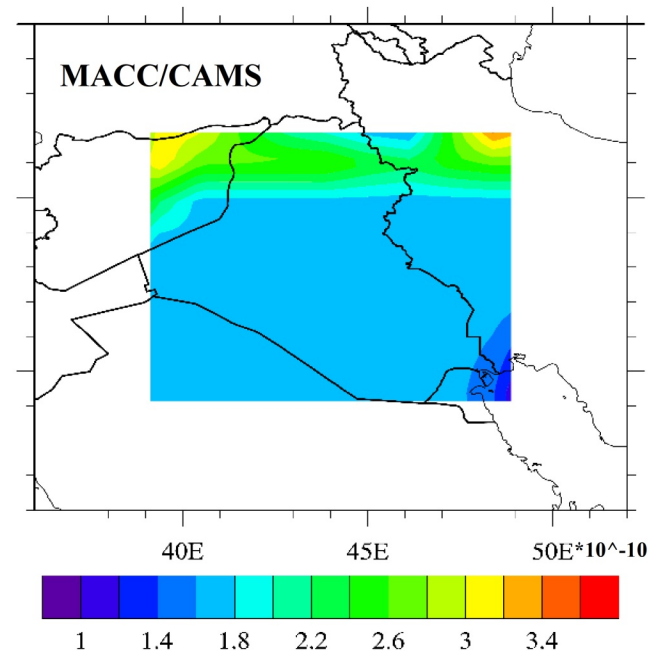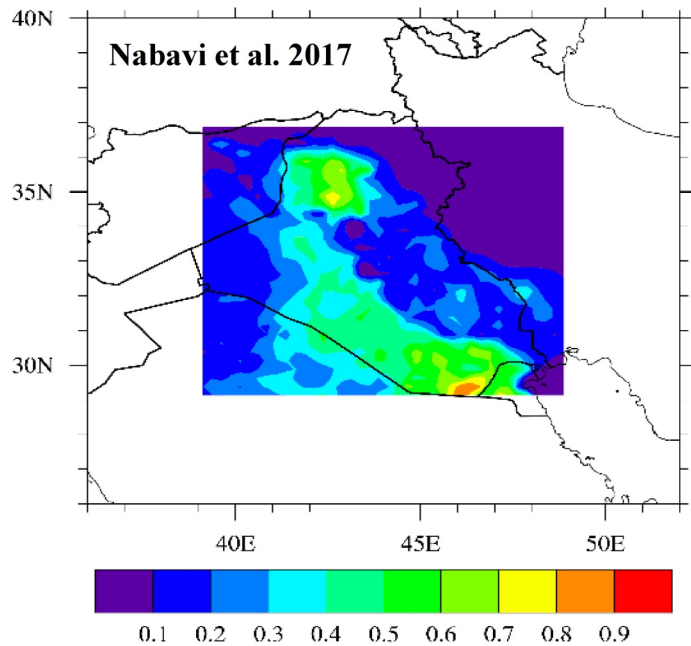
Dust Transports

☐ Forecast of dust AOD on a monthly scale?
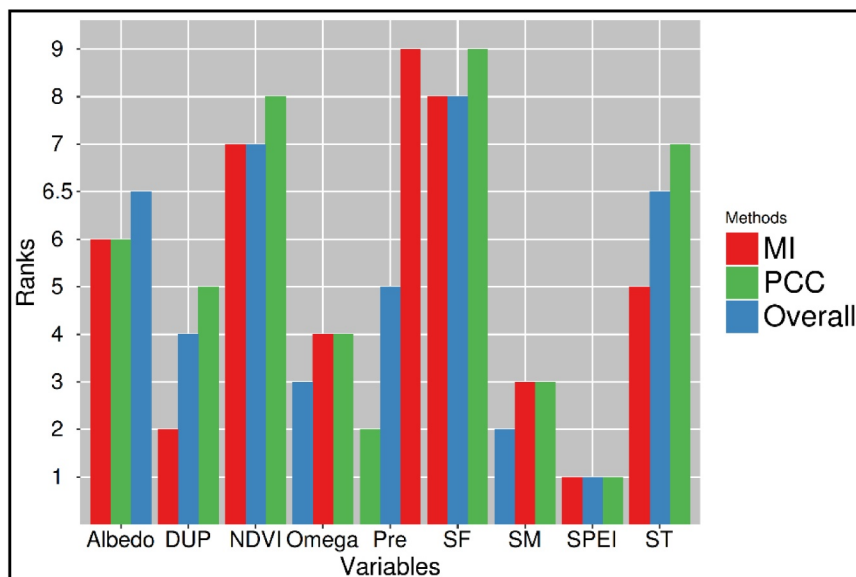☐ What are the most important predictors?

Source potential for dust

- Climatological availability of light & mobilisable material
- Activated with sufficient wind speed and dry conditions
- Source potential in the usual global data sets needs to be substantially improved

Forecast of monthly dust AOD

- Observable: Deep Blue AOD (MODIS)
- MACC, DREAM (operational products)
- WRF-chem with improved source algorithm
- Machine-learning algorithms (MLA) e.g. RF, SVM, ANN ..
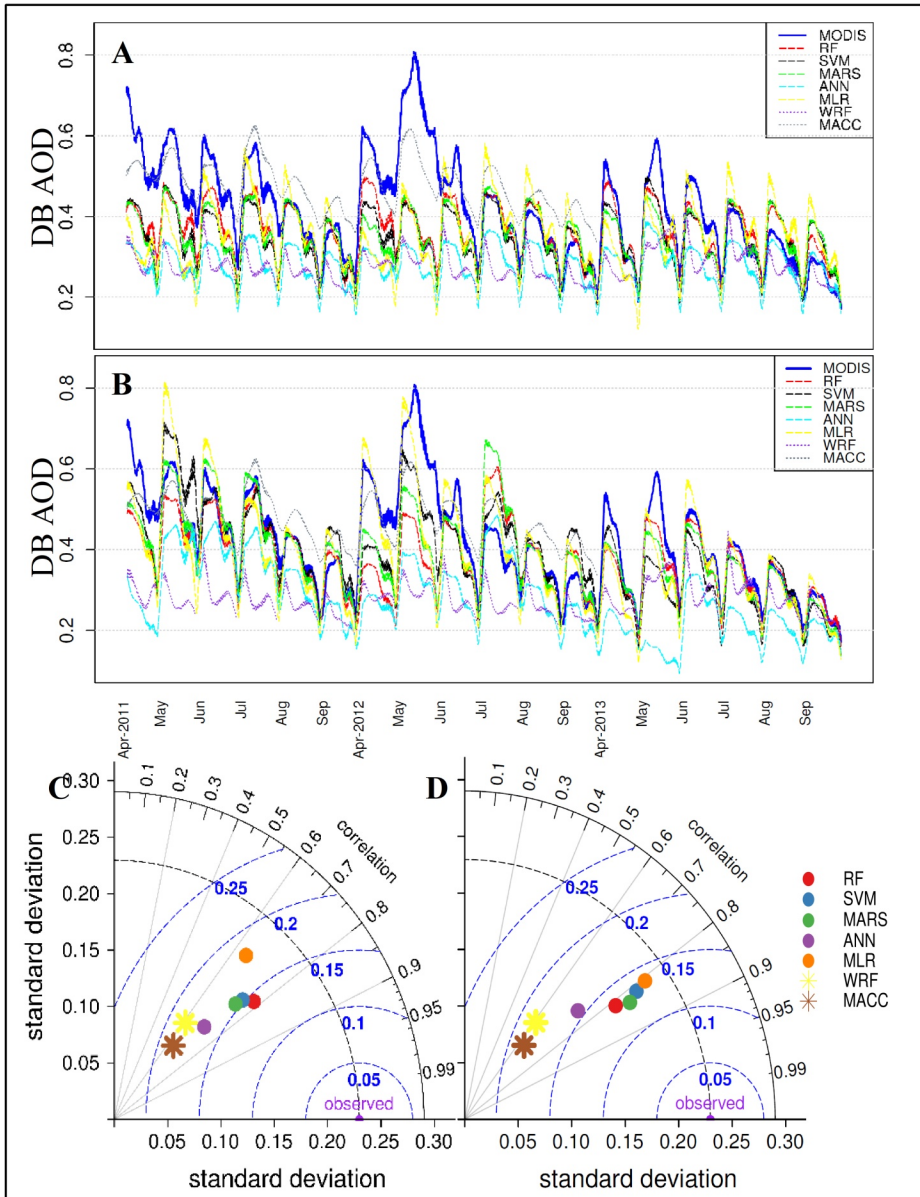 - 8 yrs training data, 3 yrs for verification

Most important predictors:

- source function
- precipitation
- albedo
- temperature

Verification 2011-2013

- target: MODIS DB-AOD
- from dust concentration with observation operator (WRF, MACC),
- direct (MLA)
- MLA performance quite good

Nabavi et al., under review

Verification

- Deterministic dust forecast has large errors
- Conversion of dust concentration to AOD uncertain?
- Advantage for MLAs also for in situ observable??

RF=0.13
SVM=0.12
MARS=0.12
ANN= 0.13
MLR=0.13
WRF=0.23
MACC=0.18
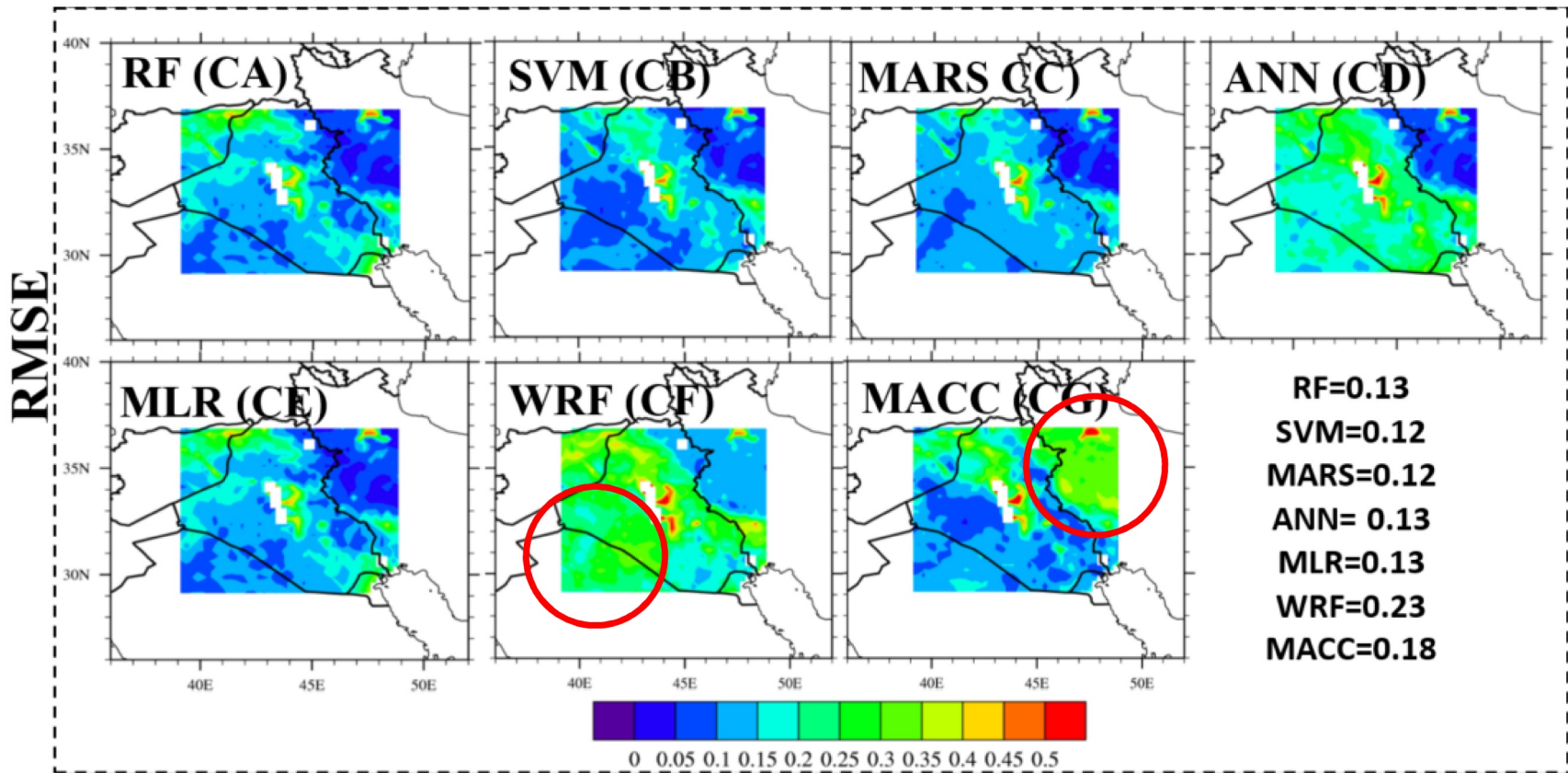
Outlook

- Application to aerosols other than dust?
- Could model-output statistics of WRF & MACC products help to obtain equal or better results compared to MLD?
- More comparison with in situ daten (surface, airborne)
- "Impulse" project with Iran submitted, financing secured for at least next 18 months
- Nabavi, S.O., Haimberger, L., Samimi, C., 2016: Climatology of dust distribution over West Asia from homogenized remote sensing data.

Aeolian Research, 21, pp. 93-107.

Nabavi, S.O., Haimberger, L., Samimi, C., 2017: Sensitivity of WRF-chem predictions to dust source function specification in West Asia.

Aeolian Research, 24, pp. 115-131.

Nabavi , S.O., Haimberger L., Abbasi R., Samimi , C. Prediction of Aerosol Optical Depth in West Asia using Dust Models and Machine Learning Algorithms. Submitted to Atmos. Env.

Literatur:

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