Towards Understanding and Quantifying Subgrid-Scale Processes for Global Aerosol Modeling

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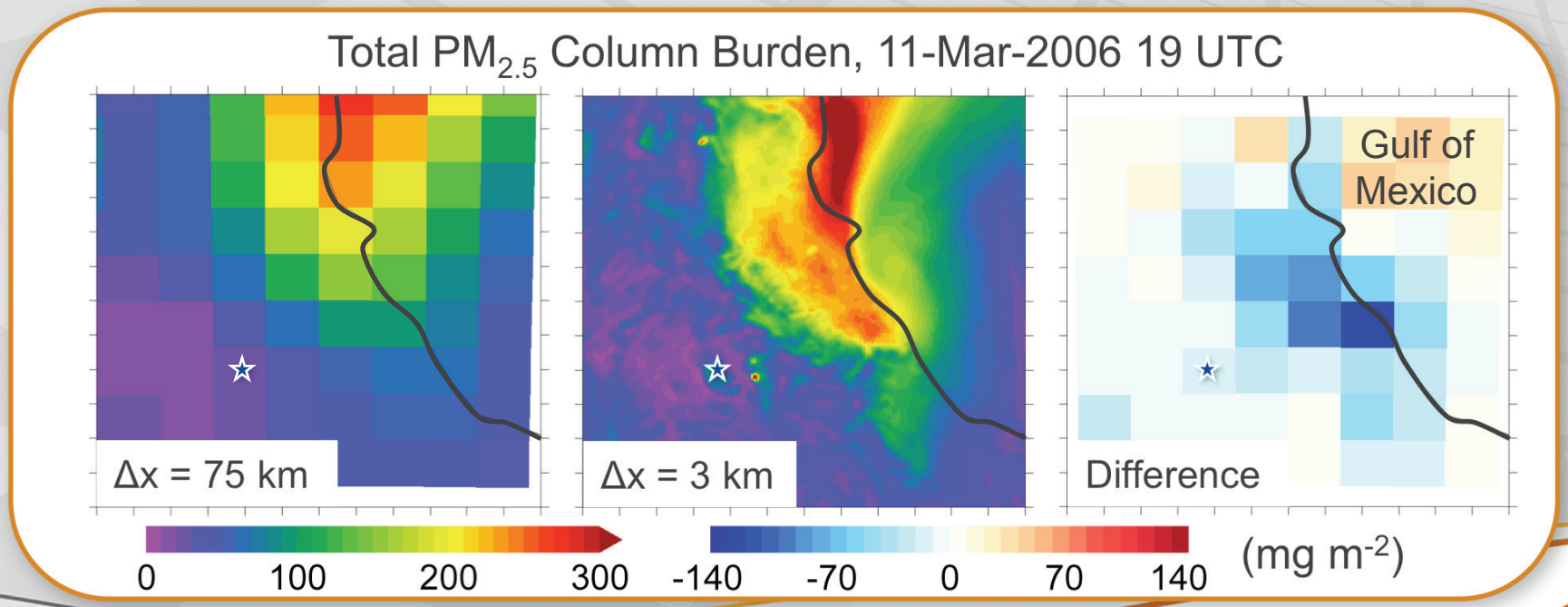

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Working towards parameterization to reduce aerosol errors from subgrid-scale processes

Stage 1
- Quantify uncertainty due to subgrid aerosol processes

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Stage 2
- Indentify cause and effects of uncertainty

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Stage 3
- Develop parameterization specifically targeted for climate impacts

- Using coincident grids at multiple resolutions to quantify missing subgrid aerosol processes at GCM scales, Δx = 75, 15, & 3 km
- WRF-Chem model with full aerosol-climate processes used to quantify the subgrid error and to test new treatments
- MILAGRO field campaign over Mexico is the test region

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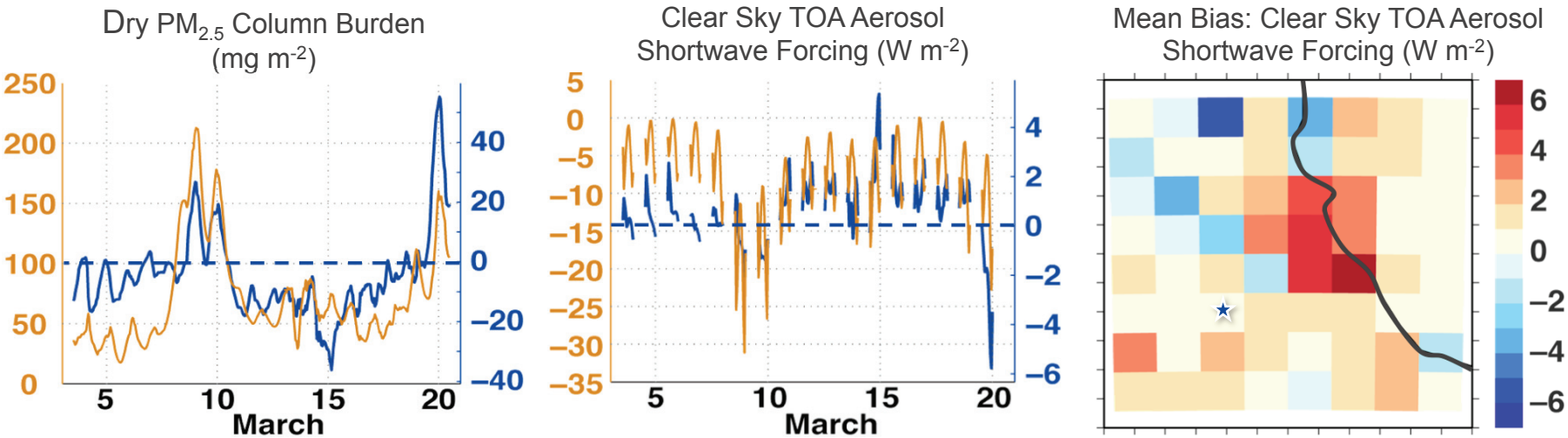
Noticeable error from neglected subgrid processes even with best possible scenario

- Initial analysis is for cloud-free columns and no cloud-aerosol interactions



Colors = Coarse Domain Mean, Mean Bias (Coarse–Fine)

- Climate impact: insufficient cooling by aerosols at GCM scales
- Important subgrid processes not yet included: SOA and clouds

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