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Interactive comment on "Satellite-derived land surface parameters for mesoscale modelling of the Mexico City basin" *by* B. de Foy et al.

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The paper uses MM5 (v 3.7.2) to simulate the regional wind patterns for an event labeled "O3-South", which has weak synoptic forcing, from 14–17 April 2003. The weak synoptic forcing results an environment where local topographic and thermodynamic features have a strong impact on the wind patterns. The study region has 3-nested grids ranging from 1440×1800 km (36 km grid size) to 183×183 km (3 km grid size) centered on Mexico City.

Not explicitly mentioned in the paper, but alluded to, is the underlying scientific question:
To what extent is a simulation of the surface meteorology effected by the land surface parameters used in the mesoscale model, particularly for an "O3-South" event?

Because of the weak synoptic event being simulated, there is the potential role of the land surface state, and spatial contrast in the states, on the resulting surface heat fluxes and surface pressure and wind patterns. Thus, the authors focus on trying to specify these states across the domain through remotely sensed information.

Given the domain sizes, this study still must be considered a regiona l study. The finest grid spacing is 3 km, and the finest satellite resolution is from MODIS at 1 km (land classification, surface temperature, emissivity, albedo). The standard data sources are from AVHRR or interpolated from GFS, which provided the boundary conditions for the outer domain. The paper reinforces the concern that widely available satellite data is poorly validated (or unavailable) for specific applications (e.g. albedo (Fig 4) or surface emissivity (Fig 6)). In other cases the authors basically ignore the satellite data and use either constant values (soil moisture), or tabular values (emissivity). (They say using MODIS derived emissivity results in too much nighttime cooling by the model, but Fig 16 seems to show that they have a night time warm bias.)

In other cases, it surprises me that the authors didn't look at alternative satellite products (e.g. AMSR-E and TMI based soil moisture is not mentioned; the use of ASTER surface temperatures and emissivity values are not discussed; the availability of the MODIS daily surface temperature (either swath – MOD11 L2/MYD11 L2, or a gridded product like MOD11A1/MYD11A1 or MODB1/MYD11B1) is not discussed but Fig 16 uses instead a $2\frac{1}{2}$ month average; or high resolution vegetation classification data from TM to better understand the variability implied in Fig 5, which shows the vegetation fraction maps. Additionally, they don't discuss topography, and so the reader assumes that at the scale of the modeling study sub-grid topography variability has no impact – is this correct? The paper could have focused some discussion on their attempt to find the very best land surface information on spatial contrasts since that will influence the wind patterns. Understanding the accuracy and scale at which this is needed would have been an important contribution.

With the above data, and simulating a 'base case' versus specifying vegetation fraction

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and an initial surface temperature, results in a (from this reviewer's reading) a modest improvement. The conclusion that the urban heat island was more accurately simulated is not sufficiently supported by information provided in the paper. In Fig 16, the authors need to show the MODIS AQUA 02/14 April 15th images and not a $2\frac{1}{2}$ month average. The author's also claim that "the present work reduces the uncertainty and dependency on look up tables" – there should be discussion on the extent that the satellite data is adequate – "(this) leads to fewer uncertainties in the heat budget in the basin" – no quantitative estimates of what the reduction is, if any, so this statement is rather speculative.

I feel that the modeling study was carefully carried out, and the authors worked quite hard to obtain the strongest set of parameters for the modeling exercise. I felt that the paper didn't take the opportunity to critically look at the sensitivity of the results to the scale of the land information and the scale of the mesoscale modeling. In doing so, they also would need to address issues of predictive skill and validation, including the extent that towers and radiosonde data can 'validate' mesoscale model simulations.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 9861, 2005.