Deconstruction of a science paper's data-evidence basis

Sara Purdue

MPO 624

Spring 2018

My Paper

- Title, citation
  - On smoke suppression of clouds in Amazonia
    - Graham Feingold, Hongli Jiang, and Jerry Y. Harrington
- Size of evidence set:
  - 6 figures, 1 table, 0 magic-number (in-text) results

Instructions

1. Copy each figure, table, or # into a slide of this powerpoint
2. Categorize it according to the list at EVIDENCE_TYPES.md on the course repo
3. If none of those categories quite fit, expand EVIDENCE_TYPES.md in your fork, and make a pull request! Try to follow the outline there, to keep our ideas compact and coherent. I may suggest edits before final PR acceptance.
4. Finally, put the Abstract on a last slide. Annotate it with little figure thumbnails connected to each claim or account of nature, to show how those are rooted in the figures (and thus in data).
5. Put your .pptx in your fork of the class repo, and

Table 1

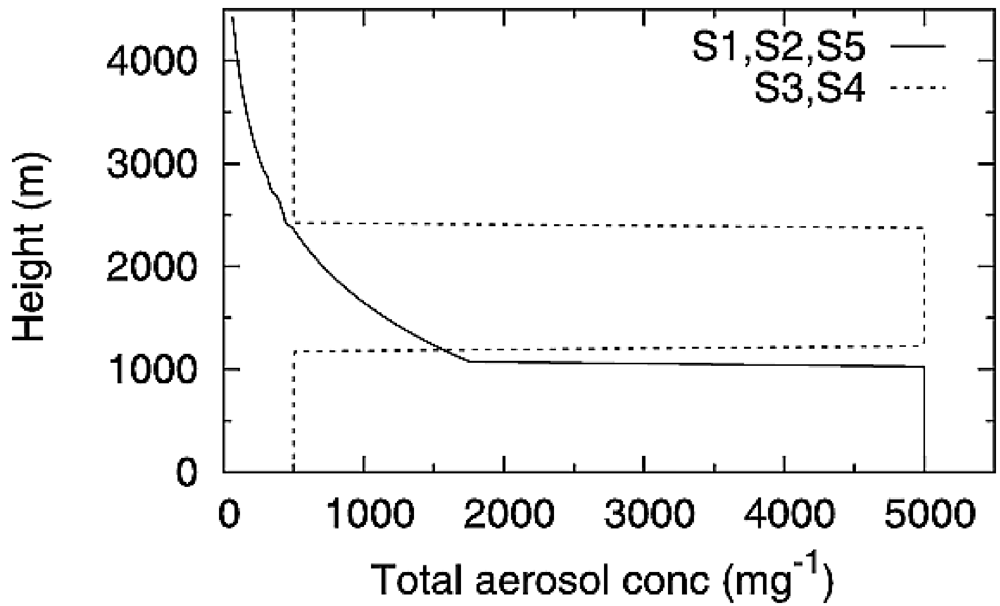
Table 1. Description of Simulations and Mean Quantities Averaged Over 12–16 h Local Time[a]

Name	Aerosol Heating	Fluxes	Smoke Location	LWP $g\ m^{-2}$	CF %	$d\theta/dz$ $K\ km^{-1}$
S1	No	Observed	Surface	15.0	10.0	1.797
S2	Yes	Observed	Surface	16.9	9.9	0.157
S3	No	Observed	Aloft	20.4	10.7	1.908
S4	Yes	Observed	Aloft	3.6	5.0	3.363
S5	No	Reduced	Surface	1.6	2.7	6.897

[a]LWP is domain and time-averaged. $d\theta/dz$ is the lapse rate of potential temperature from 0–1500 m.

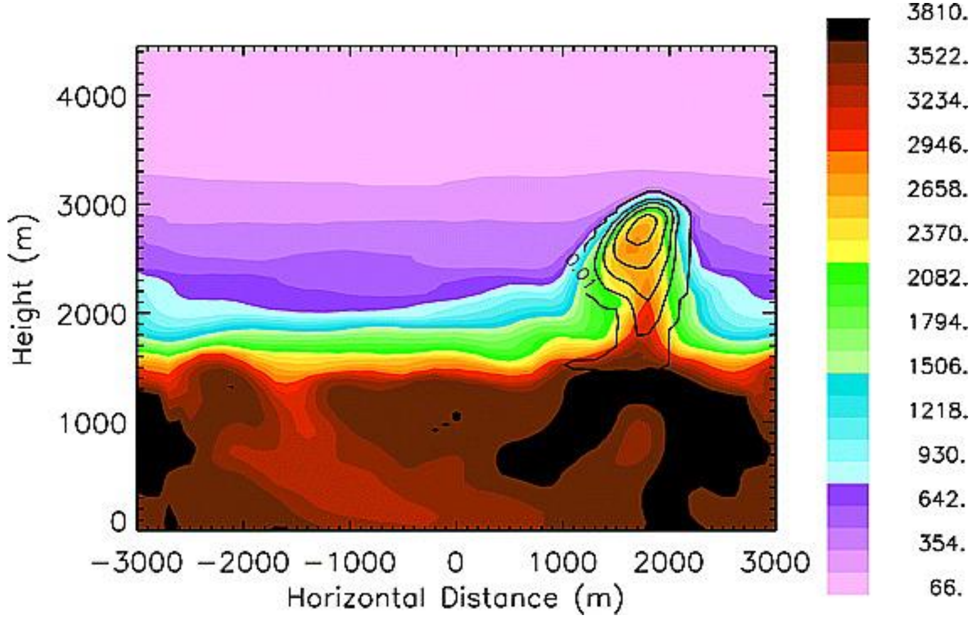
- Summary Info
  - Descriptions of conditions for each model run
- You are meant to see a text summary of the model data

Figure 1



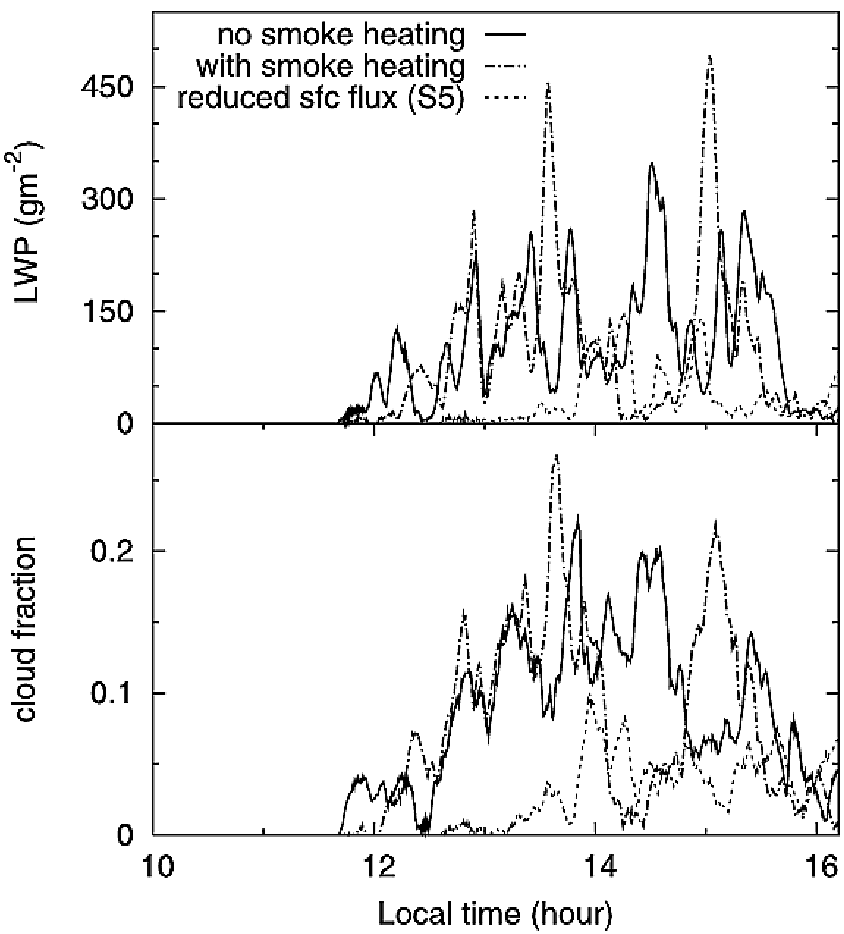
- Summary display of (raw?) data
  - Technically not raw data, it shows the initial conditions for the aerosol profiles in the five different model runs
- You are meant to see a visual summary of some of the model input

Figure 2



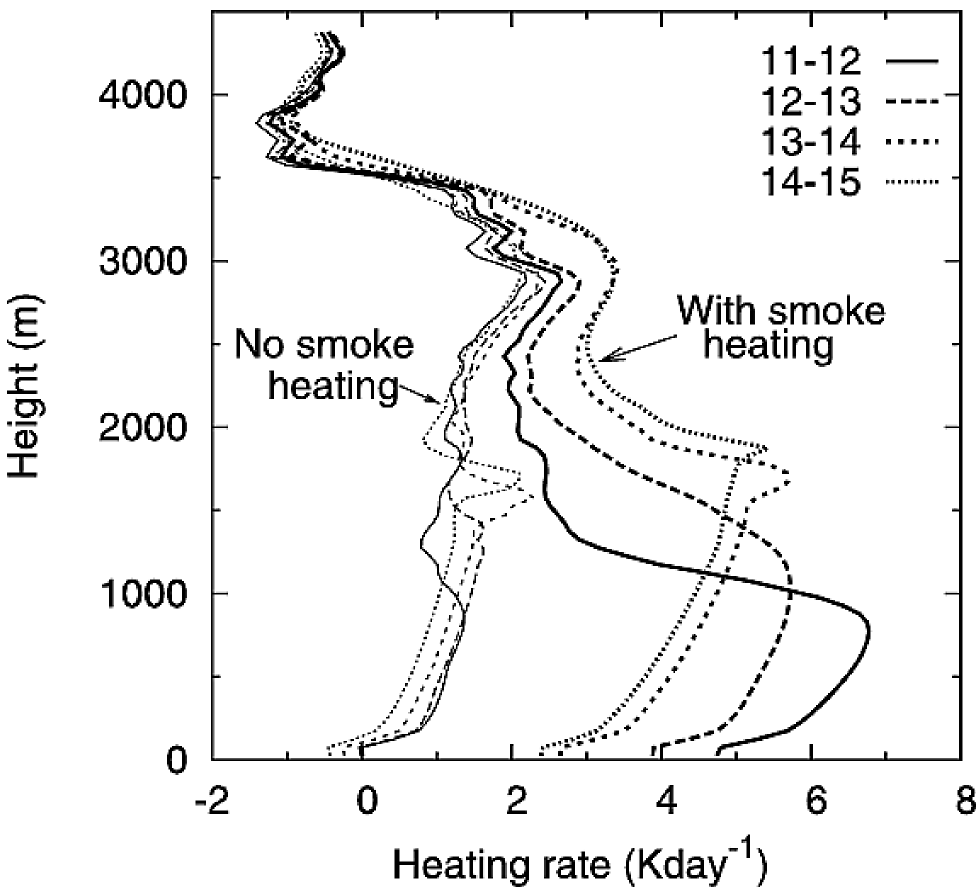
- Example summary display of raw data
  - Average S1 model run cross section of aerosol/smoke concentration (color fill contours) and LWC (black contours)
- You are meant to see claims of a general feature existing and a decomposition (example of typical model run from one model set-up)

Figure 3



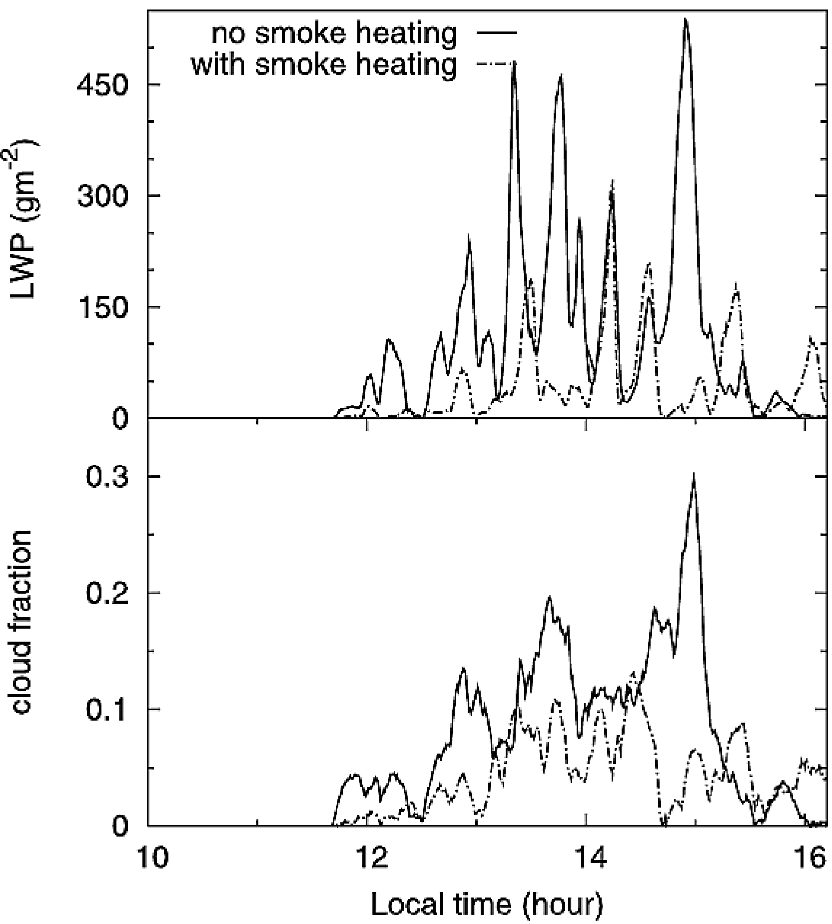
- Feature/relationship is claimed to exist
  - Top panel – LWP under 3 smoke conditions
  - Bottom – cloud fraction under 3 smoke conditions
- You are meant to see claims of a the existence of temporal features in each type of simulation, differences between smoke free and smoky conditions (at the surface, and a relationship between presence of smoke heating (at surface) and cloud fraction/LWP

Figure 4



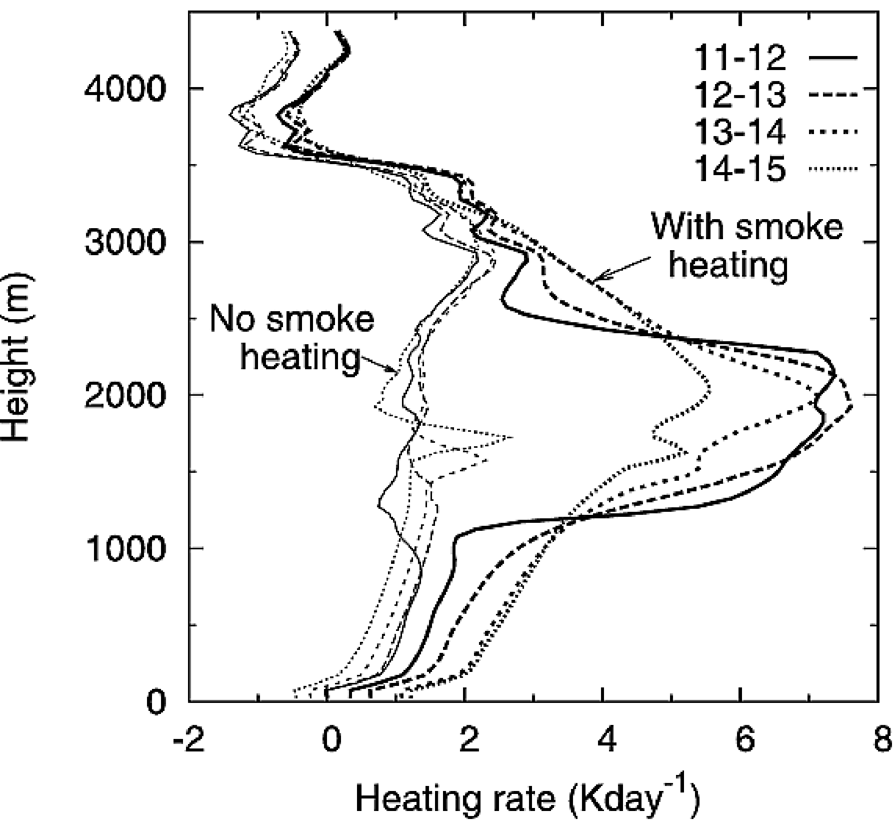
- relationship is claimed to exist
  - Heating rate with height at different times of day (solid and dashed lines), and with/without the presence of smoke
- You are meant to see claims of difference between heating rates at different times of day and with/without smoke heating when smoke is at the surface

Figure 5



- Feature/relationship is claimed to exist
  - Top panel – LWP under 3 smoke conditions
  - Bottom – cloud fraction under 3 smoke conditions
- You are meant to see claims of a the existence of temporal features in each type of simulation, differences between smoke free and smoky conditions (aloft), and a relationship between presence of smoke heating (aloft) and cloud fraction/LWP

Figure 6



- relationship is claimed to exist
  - Heating rate with height at different times of day (solid and dashed lines), and with/without the presence of smoke
- You are meant to see claims of difference between heating rates at different times of day and with/without smoke heating when smoke is aloft

The Abstract, and how figures support its claims

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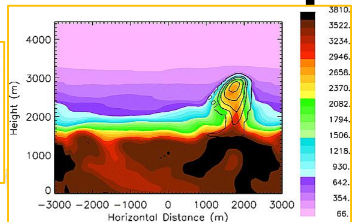
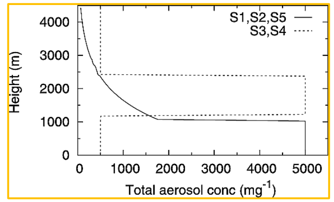
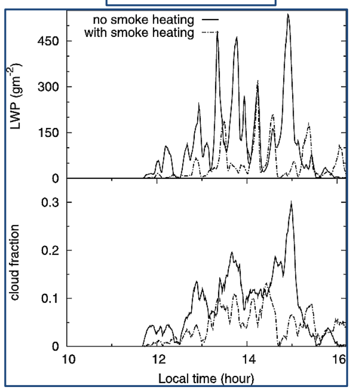
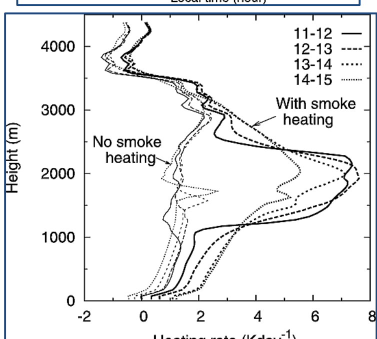




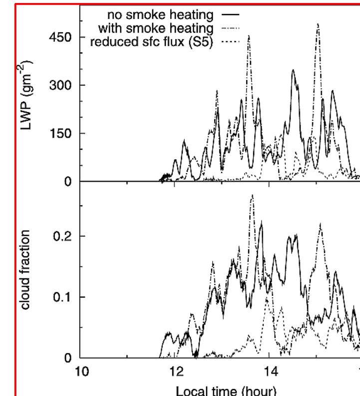
T.1, F.1&2

F.5&6





[1] We use large eddy simulations of smoke-cloud interactions to demonstrate the relative importance of various factors responsible for cloud suppression in the biomass burning regions of Amazonia. The model includes unprecedented treatment of coupled smoke aerosol-cloud-radiative feedbacks in a 3-dimensional model that resolves scales of ~100s m. It is shown that the vertical distribution of smoke aerosol in the convective boundary layer is crucial to determining whether cloudiness is reduced; Smoke aerosol emitted at the surface in a daytime convective boundary layer may reduce or increase cloudiness whereas smoke aerosol residing in the layer where clouds tend to form will reduce cloudiness. On the other hand, the reduction in surface latent and sensible heat fluxes associated with biomass burning is sufficient by itself to substantially reduce cloudiness. **Citation:** Feingold, G., H. Jiang, and J. Y. Harrington (2005), On smoke suppression of clouds in Amazonia, *Geophys. Res. Lett.*, *32*, L02804, doi:10.1029/2004GL021369.



F.3&4