Hi Rasmus!

Your paper gave me an excuse to avoid my real work. It must be rather satisfying to fit a single parameter to a single measured quantity ☺. Just a few comments – you can reply directly to me via email if you prefer, or not at all if you don't have time. Overall, very nice work.

- How much of the error comes from the temperature profile assumption? My colleague here found that globally, you could break down temperature profiles in terms of just 2 or 3 eigenvectors. You could redo your method for those eigenvectors, and sum them using a simple analysis to figure out how much of each eigenvector goes into a given temperature profile, which you could get from any met analysis (if you don't mind the lag time).
- What if you didn't fit versus R, but kept y = (L14, L15) ? Do you have a sense of how that would affect the retrieval?
- Pg 6821, monotonous -> monotonic. (monotonous means something quite different ;).
- Pg 6823, when you say "generally high accuracy", don't you mean precision?
- Pg 6826: one of your main factors determining precision is surface albedo, and SGP is pretty bright, right? So it is certainly very precise over *bright* land, but maybe not as accurate over dark land?
- Your error analysis is laudable, but you don't have any validation of it. It might be interesting if you took one of your validation data sets, and when you do your averaging on MERIS pixels, only include pixels with similar posterior (estimated) retrieval errors. Then plot the standard deviation (or maybe bias-corrected RMS) of the actual error on the y-axis, versus the value of the posterior retrieval error on the x-axis. Ideally, they should be one-to-one, or at least exhibit a strong correlation! You could do this separately over land vs. water. The main reason to do this is to validate your error bars – ie, see if your posterior error is actually representative of your real errors (aside from the bias issue, which appears to be mostly spectroscopic).

  If this is confusing, look at figure 12b in my recent AMTD paper for an example: http://www.atmos-meas-tech-discuss.net/4/6097/2011/amtd-4-6097-2011-discussion.html

Cheers,
Chris O'Dell