Subject: Re: Need help reconstructing flat-field. Minimization problem.
Posted by JJ on Wed, 24 Oct 2007 20:45:14 GMT
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b_gom@hotmail.com wrote:

> Maybe I'm not following exactly, but it seems that you are trying to
> correct for variations in responsivity across your CCD, and your
> problem is that you are trying to do this correction using data that
> is too noisy. Assuming the array responsivity is fixed (or at least
> slowly varying), can you not just build up a high S/N data set by
> staring at a known flat field source, and then use this data set to
> produce your calibration (after dark correction), or at least fit a 2D
> surface and use that? In other words, can't you make 1000 images
> instead of 3, and have them all overlap exactly?
>

OK, I'll spill the beans.

Sure, your suggestion would be nice but it's not currently feasible. The camera's already on Mars you see:-). There's been contamination that has caused the flat field to change drastically since the initial calibration on Earth. And there's nothing particularly flat to look at.
In the past, we have used the sky, looking away from the sun for flat-field monitoring and updates. On clear days, that portion of the sky could be fit as a linear gradient and the gradient could then be removed. But we're currently in the middle of a prolonged dust storm and even the sky's not so flat, and is quite variable. Even if the sky did have a nice smooth gradient, we don't have a good model for what it is based on wavelength and phase angle. Previously, a gradient was simply fit to the image and removed, the flat-field not being so bad and having no gradient of its own, this worked pretty well. But now, the flat field itself clearly has a strong gradient component to it, making it difficult to deconvolve the gradient due to the sky and the gradient due to the flat field.

Ther are other problems too - namely light scattering issues, which are complicating the problem, but it would require more data-volume that we have availalbe right now to try and model that.

For now, I'm left to work with what we have to try and come up with a reasonable flat field with which to better calbirate the images. So I'm pursuing some non-traditional approaches to this problem.

Scant though it is, I think I have the data neccessary to produce a reasonable flat field - I just can't seem to extract that flat field from the data. So now that you know the extent of the problem, I'm hoping for some suggestions on how to work with the data I have.

Right now, vaving images that don't overlap exactly seems to be giving me more information that having perfectly overlapping images. I really think there's enough information to derive a good approximation of the flat field.

So if anyone can help me solve this problem, I promise honorable mention to the camera team.

JD, are you still out there?

I'm also open to suggestions for how best to model the flat field as a surface, using few enough variables that I can reasonably use mpfit or some other minimizer to solve for them.

Thanks again.

-Jonathan
