Subject: Re: Calculate sensor response functions
Posted by Paul Van Delst[1] on Fri, 22 Jan 2010 16:55:52 GMT
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Christian Haselwimmer wrote:
> Paulv,
> thanks for your detailed response. I am aware of the Hyperion spectral
> response curves at the link you mentioned but for some irritating
> reason the zip files appear to be corrupt, which is why I am going
> down this route. I would ideally want to use the measured Hyperion
> SRFs but I haven't been able to find these on the web other than the
> from the link above.

Well, down the bottom of the page is an email link for the webpage principal contact. I'm sure he/she would like to know their posted datafile is corrupted. (I can't uncompress it either so it doesn't appear to be anything you or your system is doing).

> I have seen in a number of papers that the SRFs for Hyperion have been
> modelled using gaussian curves based upon central wavelength and FWHM;
> this is all I really want to do but do not have sufficient experience
> of IDL to implement this, hence my post.

If you still want to do that, then my first posted reply is of use. The equation to do what you want is there.

cheers,

paulv

>
> cheers,
> Christian
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>
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>
> On 22 Jan, 15:56, Paul van Delst <Paul.vanDe...@noaa.gov> wrote:
>> Crikey. Alternatively you can google "Hyperion spectral response" and you'll find this page:
>>
>> http://www.eoc.csiro.au/hswww/oz_pi/specresp.htm
>>
>> that contains the spectral response data for Hyperion (and ALI).
>>
>> A much simpler approach.
>>
>> :o)
>>
>> cheers,

>>
>> paulv
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>>
>> Paul van Delst wrote:
>>> Christian Haselwimmer wrote:
>>>> Hi,
>>>> I want to calculate sensor response functions (for E0-1 Hyperion)
>>>> based upon centre wavelength and bandwidth but am struggling to figure
>>>> out the best way to do this with IDL. I was wondering if anybody could
>>>> provide some advice or possibly existing code to do this.
>>> Well, sensor response functions are typically measured, not calculated, since the sensor
>>> response depends on a whole bunch of things (detector response, foreoptics transmission,
>>> the emissivities/reflectivities of the optical surfaces, etc.).
>>> Without the measured SRFs or those modeled by the instrument builder, a really simple
>>> approach is to use some sort of modified Gaussian curve:
>>>   SRF = EXP(-a * |x - x0|^n)
>>> where a is a multiplier determined from the half power (HWHM) points,
>>>   a = -1 * LN(0.5)
>>>   ----------------
>>>   n
>>>   HWHM
>>> and x is the frequency in cm-1
>>>   x0 is the central frequency in cm-1, and
>>>   n is the exponent supplied by the user.
>>> Or, if you want a longer tail to your SRFs, you can use a modified Lorentzian shape:
>>>   1   HWHM
>>>   SRF = ----- . ----------------------
>>>   !PI   (x - x0)^n + HWHM^n
>>> Or some combination of the two.
>>> But either way, the SRFs would be completely made up. Comparing calculations using
made-up
>>> SRFs and actual instrument radiances will be biased because of that.
>>> Hyperion is a grating spectrometer, so you may be able to come up with a better instrument
>>> model based on the actual instrument specs, but you'd need to know a lot more info (I
>>> think). As an example, Lockheed-Martin provided the following SRF model for the EOS Aqua
>>> AIRS instrument (also a grating spectrometer, but ~3-15um) back in the 90's:
>>>   SRF(x-x0) = exp(-a * (x-x0)^2) + $
>>>   (b * (1 - exp(-a * (x-x0)^2)) * (d + |x-x0|)^c)
>>> where a, b, c, and d are the SRF coefficients based on their analysis of the AIRS optical
>>> model.
>>> The above SRF model was great for testing, but we still needed the actual measured
>>> responses for modeling the instrument when it was launched.
>>> Maybe you should contact the NASA/GSFC and/or USGS instrument scientists to determine
>>> where that data is available?
>>> Anyway....
>>> cheers,

>>> paulv
>