
Subject: Re: Calculate sensor response functions
Posted by [Paul Van Delst\[1\]](#) on Fri, 22 Jan 2010 15:56:26 GMT
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Crikey. Alternatively you can google "Hyperion spectral response" and you'll find this page:

http://www.eoc.csiro.au/hswwww/oz_pi/specresp.htm

that contains the spectral response data for Hyperion (and ALI).

A much simpler approach.

:o)

cheers,

paulv

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:

>

> $SRF = EXP(-a * |x - x_0|^n)$

>

> where a is a multiplier determined from the half power (HWHM) points,

>

> $a = -1 * LN(0.5)$

> -----

> $\frac{n}{HWHM}$

>

> 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
