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Subject: Re: Convolve a spectrum (from MODTRAN) with a spectral response function

Posted by [Mat](#) on Wed, 30 Dec 2009 03:55:10 GMT

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On Dec 30, 4:41 pm, Mat <m...@waikato.ac.nz> wrote:

Sorry I will try again!

Hi all

I would like to convolve a spectrum (output from MODTRAN) with a spectral response curve (Landsat7 B62) and then integrate the convoluted result. As you can see from the example below the spectral resolution does not match.

Eg. Spectrum:

Wavenumber	Radiance
800.0	7.52E-004
801.0	7.66E-004
802.0	7.58E-004
803.0	7.25E-004
804.0	7.23E-004
805.0	7.62E-004

Eg. Response

Wavenuber	Relative Spectral response
800.00000	0.2
800.64051	0.29
801.28205	0.27
801.92462	0.28
802.56822	0.36
803.21285	0.36
803.85852	0.39
804.50523	0.41
805.15298	0.42
805.80177	0.43
806.45161	0.45

Any help would be much appreciated.

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Subject: Re: Convolve a spectrum (from MODTRAN) with a spectral response function

Posted by [rogass](#) on Thu, 31 Dec 2009 10:56:58 GMT

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On 30 Dez., 04:55, Mat <m...@waikato.ac.nz> wrote:

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> 806.45161            0.45

>

> Any help would be much appreciated.

Just search in this newsgroup for 'convolve fft' and you will find the answer, i think.

Regards

CR

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Subject: Re: Convolve a spectrum (from MODTRAN) with a spectral response function

Posted by [MC](#) on Sat, 02 Jan 2010 13:04:11 GMT

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On Dec 30 2009, 4:55 pm, Mat <m...@waikato.ac.nz> wrote:

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> Any help would be much appreciated.

Hmm, from your description I'm not sure you want a convolution, more like a point by point multiplication. Congrid will allow you to do this.

Cheers

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Subject: Re: Convolve a spectrum (from MODTRAN) with a spectral response function

Posted by [Paul Van Delst\[1\]](#) on Mon, 04 Jan 2010 22:39:58 GMT

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Your SRF (spectral response function) seems to only increase (looks like only half an SRF?), and your computed radiances do not span the bit of SRF that you do have.

Also, in that part of the IR spectrum you have some water vapour line absorption contamination so I would be suspect of a convolution at such a coarse resolution - I would think you would have a bias that varies with the column water amount in your MODTRAN calc. Easy enough to determine - just plot the convolved result as a function of TPW for a couple hundred(or thousand) profiles.

I would start by doing the radiative transfer calc at a finer resolution and linearly interpolating the results to the same frequency spacing as the SRF. Then it's just a case of

$$\text{Convolved\_Radiance} = \text{TOTAL}(\text{Interpolated\_Radiance} * \text{SRF}, / \text{DOUBLE})$$

You could do a "proper" convolution using INT\_TABULATED or CONVOL, but given the paucity of your dataset, a simple summation is the better option IMO.

At least in the case of INT\_TABULATED, I know from experience it does not (cannot) perform well for too few SRF data points as it uses spline interpolation.

I reckon the FFT approach is overkill here - and you would have to interpolated the SRF to do it... again, not a good idea due to the lack of data.

cheers,

paulv

Mat wrote:

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Subject: Re: Convolve a spectrum (from MODTRAN) with a spectral response function

Posted by [Mat](#) on Mon, 18 Jan 2010 21:51:20 GMT

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On Jan 5, 11:39 am, Paul van Delst <paul.vande...@noaa.gov> wrote:

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> SRF?), and your computed radiances do not span the bit of SRF that you do have.  
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> Also, in that part of the IR spectrum you have some water vapour line absorption  
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>> Any help would be much appreciated.- Hide quoted text -

>

> - Show quoted text -

Thanks to all who replied. Yes I did not need convolve, just interpol and simple multiplication as paulv suggested.

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