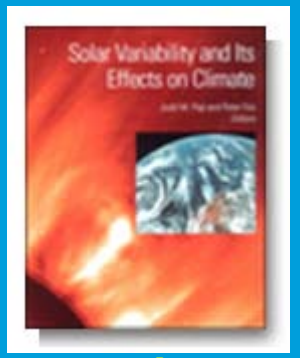
Reference Solar Irradiance Spectrum - Initially IVOS discussion

Nigel Fox – representing IVOS team

18/02/2014



AGU monograph 2003/4

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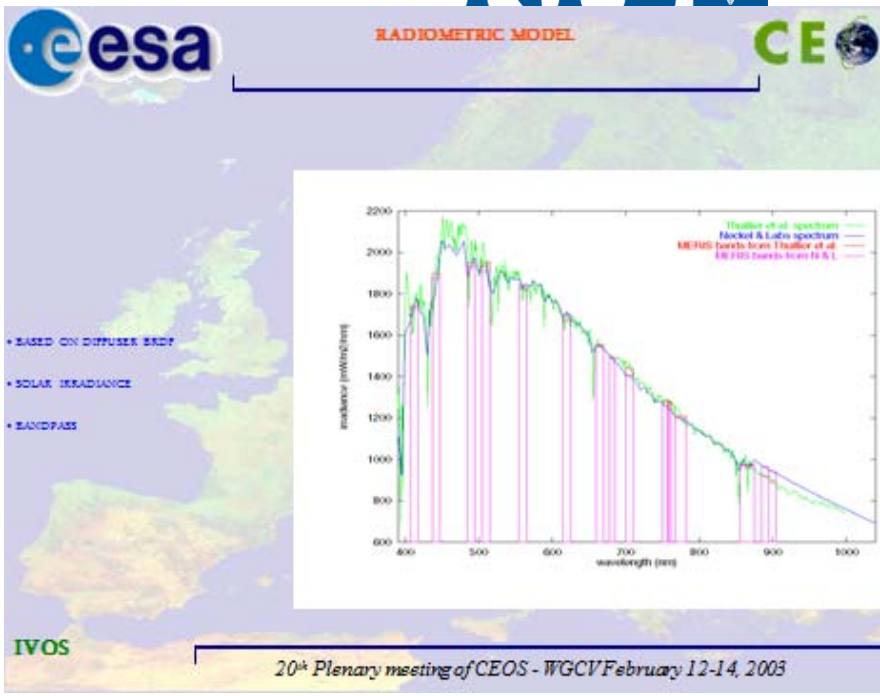
CEOS IVOS

Background

From an IVOS perspective - Exo-atmospheric Solar spectral irradiance key parameter to link Earth Viewed radiances and reflectances (TOA and BOA)

- Band averaging, RT codes etc
- Spectral range (largely) ~400 – 2400 nm
- linkage and comparison of products from different sensors will depend on choice & method of use of solar irradiance spectrum
- 2003 CEOS plenary adopted a resolution from WGCV to encourage agencies to use a common spectrum (based on a composite from Thuillier et al paper) or as a minimum to make clear what has, and how it has been used.
- However, whilst significant agency uptake – not universal & is it still appropriate??



	B1	B2	B3	B4	B5	B6	B7	B8	B8a	B9	B10	B11	B12
Cent λ/nm	443	490	560	665	705	740	783	842	865	945	1375	1610	2190
Bandwidth/nm	20	65	35	30	15	15	20	115	20	20	30	90	180
% diff SORCE/Thuillier	0.5	0.9	2.1	0.4	2.2	1.2	0.2	0.3	0.6	1.0	1.7	1.4	1.7
% diff Kurucz/Thuillier	2.5	0.5	2.1	1.7	1.3	1.1	1.9	1.8	2.3	1.7	16.4	1.7	1.6

E.G. Impact on Sentinel 2

Discussion webex and conclusions (Oct 2013)

- 1 hr fixed time webex
- 18+ attendees (inc commercial) No US Gov due to shut down.
- From inputs: Pre- & during meeting
  - ~ 75% used CEOS recommended Thuillier
    - IOCCG formally recommend/encourage use of CEOS spectrum
  - Kurucz used were high resolution is reqd e.g. FT spectrom also when integrated into other software packages (Modtran
  - Neckels and Labs also used (in 6S)
  - ISRO provides products utilising both Neck/Lab & Thuillier
  - Eumetsat keen for spectrum to ~5 um most content 2.5 um
    - 380 nm enough for most IVOS but Atmos Chem??
  - Agreed is value in a common spectrum but difficult to achieve for all applications particularly non Land/Ocean but should aim for:
    - a few well defined spectra with accessible data via cal/val portal
    - a 'best practise for use/convolution with sensor/application characteristics
  - Note that for Atmos Chem there is significant solar irradiance variability in UV
  - Thuillier also created a high resolution spectrum

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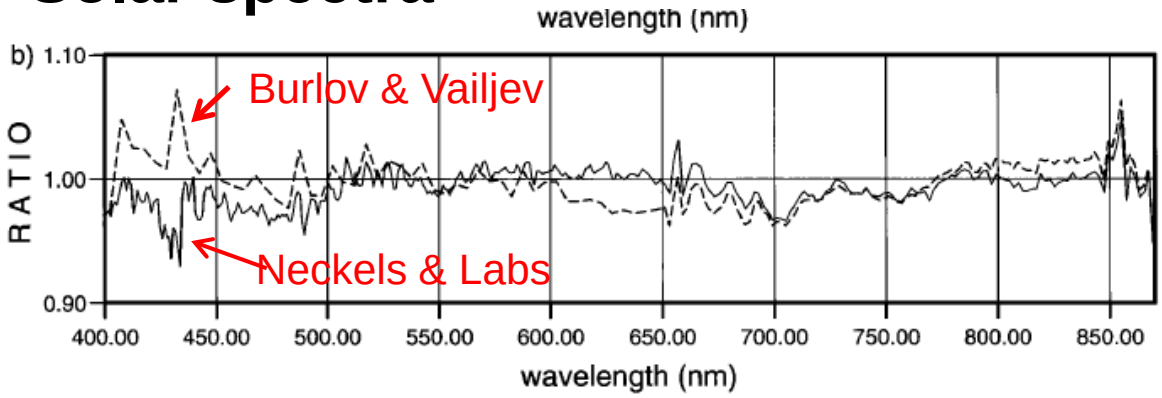
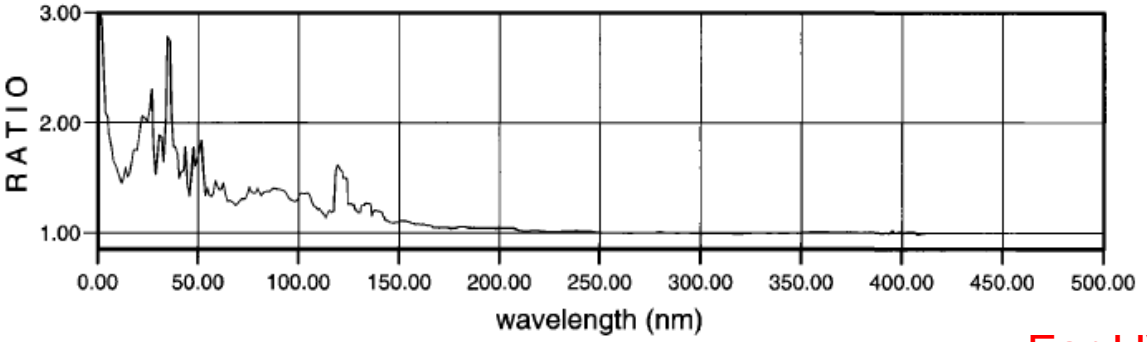
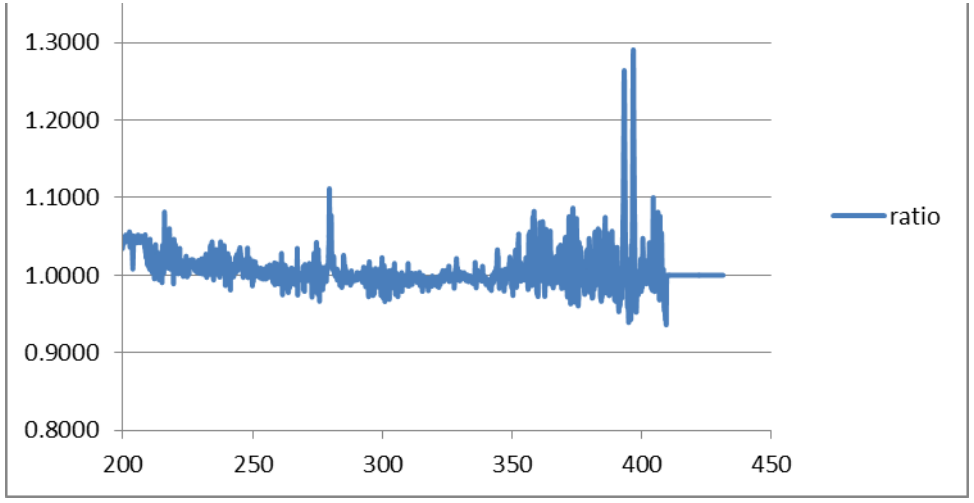
Mission	Launch	Applied Solar Spectrur
MOS-IRS	1996 Mar	Neckel & Labs (1984)
SeaWiFS	1997 Aug	Thuillier et al. (2003)
MODIS Terra	1999 Dec	Thuillier et al. (2003)
MODIS Aqua	2002 May	Thuillier et al. (2003)
MERIS	2002	Thuillier et al. (2003)
GLI	2002	Thuillier et al. (2001a)

e.g. from IOCCG

Solar spectra







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Ratio to Thuillier (2004)

Metrology for Solid State Lighting

EURAMET

Determining the uncertainty associated with integrals of spectral quantities

EMRP-ENG05-1.3.1

Version 1.0

http://Tinyurl.com/NPLIntegrals

For UV solar max and solar min spectra?

Emma R. Woolliams
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A report of the EMRP Joint Research Project

Metrology for Solid State Lighting

www.m4ssl.npl.co.uk

- Cross sub-group activity?
- Best practice? (NPL may have starting point)
- Standard spectrum or spectra ?