Instituto de Hidrología de Llanuras
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CURSO DE POSGRADO

Práctica 3:

Estimación de la Temperatura de superficie: Ecuación Monocanal

Curso de posgrado en el marco de la Maestría en Teledetección y SIG – UNICEN.

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Temperatura de brillo

La determinación de la **temperatura de la superficie** terrestre se realiza a partir de las medidas de la radiación terrestre que le llegan al satélite después de atravesar la atmósfera.

ND

↓

L_{sat}

↓

Inversa de la Ley de Planck

→ **Tb (K)**

SIN CORRECCIÓN

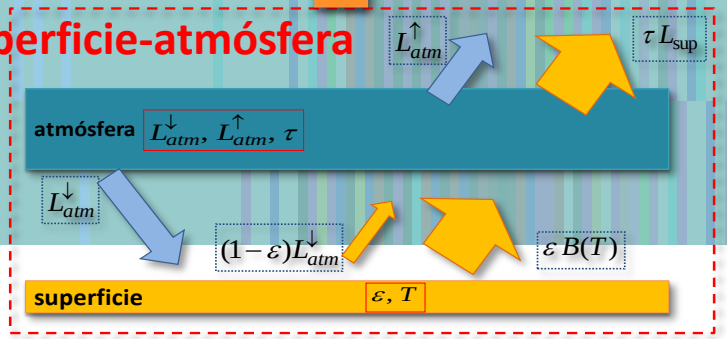
$$L_{sat} = G_\lambda . ND + B_\lambda$$

$$T = \frac{K_2}{\ln\left(\frac{K_1}{L_{sat}} + 1\right)}$$

SATÉLITE

$$L_{sat} = \tau L_{\sup} + L_{atm}^{\uparrow} = L_{TOA}$$

Sistema superficie-atmósfera



Tb nos da información preliminar.

Tb ≠ Tsup -> CORRECCIÓN ATMOSFÉRICA

Ejercicio: Temperatura de brillo

1) Imagen en ND. Hacer:

$$L_{sat} = G_\lambda . ND_\lambda + B_\lambda$$

(0.000334*b10 + 0.1)

2) Imagen en radiancia. Llevar a Tb(k) (Inversa ley de Planck)

$$T = \frac{K_2}{\ln\left(\frac{K_1}{L_{sat}} + 1\right)}$$

1321.08/alog((774.89/b10)+1)

Ejercicio: Corrección Monocanal

Modelos de transferencia radiativa

$$L_{atm}^{\downarrow},\ L_{atm}^{\uparrow},\ \tau$$

http://atmcorr.gsfc.nasa.gov/

MODTRAN 1-4 (5) (1989-actualidad): Moderada resolución espectral 1-0,1 cm^{-1})

(1) $$L_{sat} = G_\lambda . ND_\lambda + B_\lambda$$ **(0.000334*b10 + 0.1)**

(2)

$$B(T) = \frac{\left[\frac{(L_{sat} - L_{atm}^{\uparrow})}{\tau} - (1-\varepsilon)L_{atm}^{\downarrow}\right]}{\varepsilon}$$

$$L_{atm}^{\downarrow},\ L_{atm}^{\uparrow},\ \tau$$

$$\varepsilon = \varepsilon_v Pv + \varepsilon_s [1 - Pv]$$

$$Pv = \left(\frac{NDVI - NDVI_{\min}}{NDVI_{\max} - NDVI_{\min}}\right)^2$$

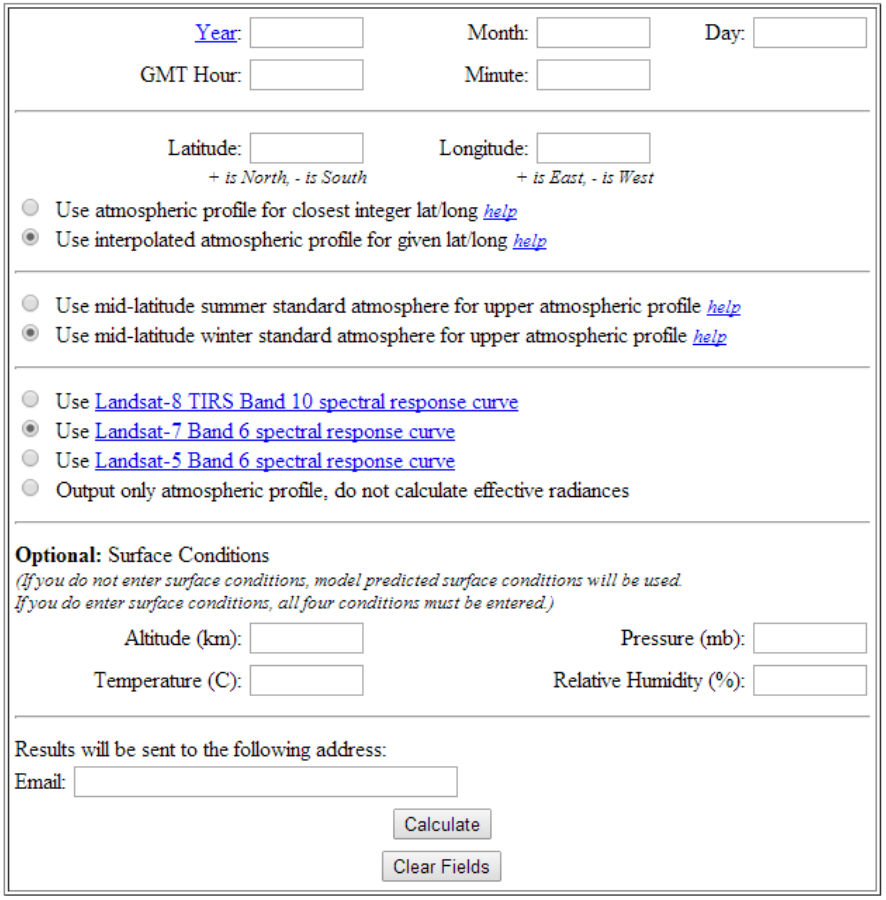
(3)

$$T = \frac{K_2}{\ln\left(\frac{K_1}{B(T)} + 1\right)}$$

1321.08/alog((774.89/b10)+1)

PARA LANDSAT PODEMOS UTILIZAR MODTRAN ONLINE!!!

http://atmcorr.gsfc.nasa.gov/



Year: Month: Day:

GMT Hour: Minute:

Latitude: Longitude:

+ is North, - is South *+ is East, - is West*

- Use atmospheric profile for closest integer lat/long *help*
- (•) Use interpolated atmospheric profile for given lat/long *help*

- Use mid-latitude summer standard atmosphere for upper atmospheric profile *help*
- (•) Use mid-latitude winter standard atmosphere for upper atmospheric profile *help*

- Use Landsat-8 TIRS Band 10 spectral response curve
- (•) Use Landsat-7 Band 6 spectral response curve
- Use Landsat-5 Band 6 spectral response curve
- Output only atmospheric profile, do not calculate effective radiances

Optional: Surface Conditions

(If you do not enter surface conditions, model predicted surface conditions will be used.
If you do enter surface conditions, all four conditions must be entered.)

Altitude (km): Pressure (mb):

Temperature (C): Relative Humidity (%):

Results will be sent to the following address:

Email:

Calculate

Clear Fields

Barsi *et al.* (2003) Y (2005)

$$L_{atm}^{\downarrow},\ L_{atm}^{\uparrow},\ \tau$$

Landsat-7 ETM+ Bands (µm)			Landsat-8 OLI and *TIRS* Bands (µm)		
			30 m Coastal/Aerosol	0.435 - 0.451	Band 1
Band 1	30 m Blue	0.441 - 0.514	30 m Blue	0.452 - 0.512	Band 2
Band 2	30 m Green	0.519 - 0.601	30 m Green	0.533 - 0.590	Band 3
Band 3	30 m Red	0.631 - 0.692	30 m Red	0.636 - 0.673	Band 4
Band 4	30 m NIR	0.772 - 0.898	30 m NIR	0.851 - 0.879	Band 5
Band 5	30 m SWIR-1	1.547 - 1.749	30 m SWIR-1	1.566 - 1.651	Band 6
Band 6	60 m TIR	10.31 - 12.36	*100 m TIR-1*	*10.60 – 11.19*	Band 10
			100 m TIR-2	*11.50 – 12.51*	Band 11
Band 7	30 m SWIR-2	2.064 - 2.345	30 m SWIR-2	2.107 - 2.294	Band 7
Band 8	15 m Pan	0.515 - 0.896	15 m Pan	0.503 - 0.676	Band 8
			30 m Cirrus	1.363 - 1.384	Band 9