Solar DEM Models

$$\frac{I_b \tau_b}{\sqrt{I_b \tau_b + \sigma_b^2}} = \frac{(\sum_{t=1}^{T} \beta_t M_{bt}) \tau_b}{\sqrt{I_b \tau_b + \sigma_b^2}} + RandomGaussianField$$

I_b : A solar image in color band *b*, m×n pixels, containing a particular solar feature, for b= 1, 2, … B

M_{bt} : The expected *Emission Measure in color band b originating at temperature t, for t = 1, 2, . . . , T.*

Solar DEM Models

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β_t : the proportion of the total volume at temperature *t.*

e_{ijb} : the measure error of the ith row and jth column pixel of the certain image in color band b.

σ_b : computed from the magnitude of the negative values of I_b in the data.

Solar DEM Models

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Assumptions:

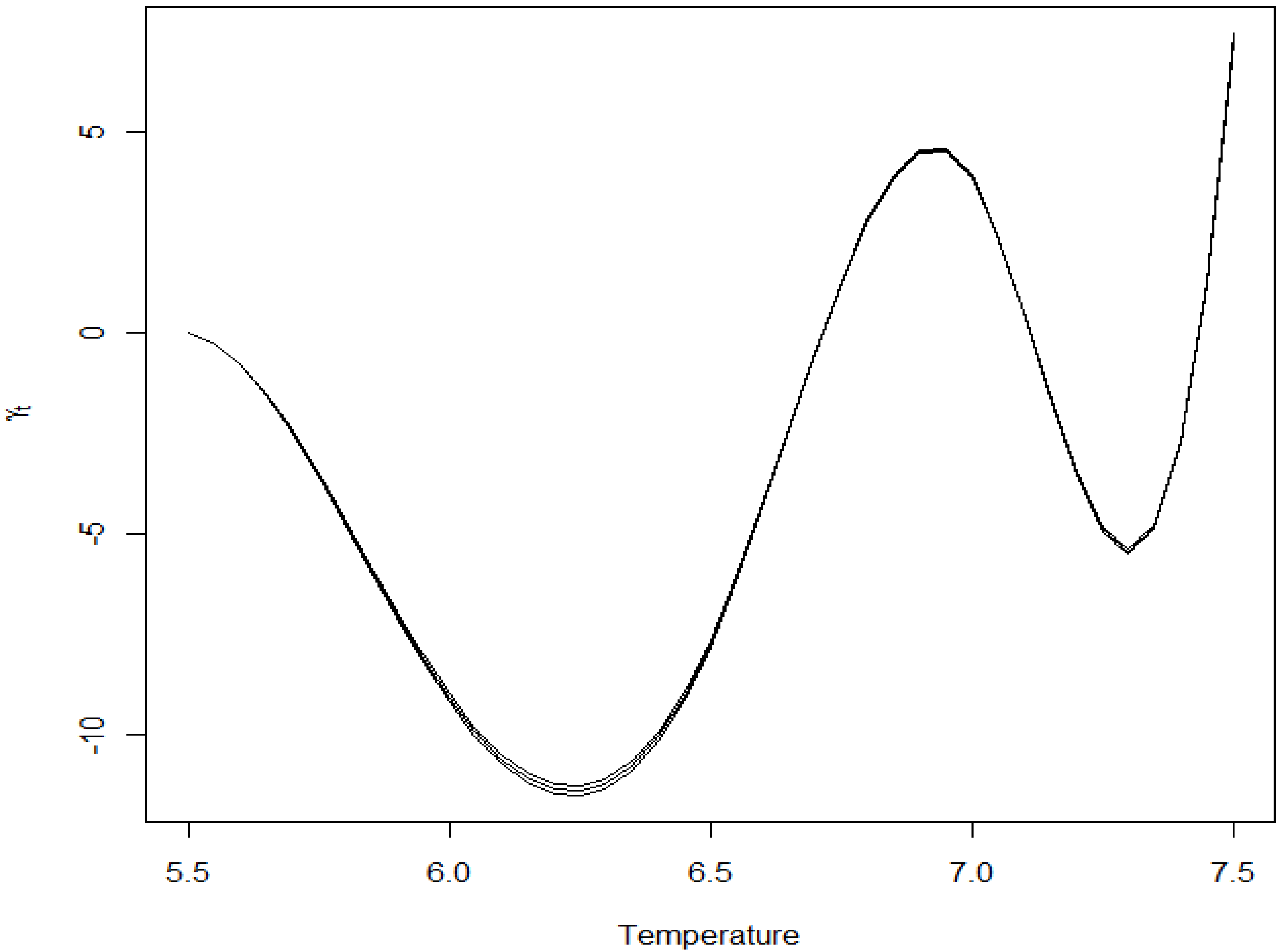
1.Errors in different color bands are independent.

2.Errors in the same color band have exponential covariance model, that is:

$$Cov(\widehat{e}_{ijb}, \widehat{e}_{mnb}) = Nugget_b + Var_b * Exp\{-\frac{|ij - mn|}{Scale_b}\}$$

Use CM algorithm, it converges…

```
> Beta
             [,1]       [,2]      [,3]      [,4]      [,5]      [,6]      [,7]
[1,]  0.018073756  0.5063130  10.10641   9.94494 -13.97194  14.40147 -7.284121
[2,] -0.001229361 -0.5544484 -25.07788 -28.38127  39.73250 -40.37617 19.254062
[3,] -0.001209625 -0.3852280 -14.13066 -15.76870  21.58390 -21.19361  9.469062
[4,] -0.001088313 -0.3346946 -11.82067 -13.24685  17.91289 -17.28480  7.461128
[5,] -0.001081804 -0.3323187 -11.71705 -13.13515  17.74959 -17.10950  7.369508
[6,] -0.001081777 -0.3323136 -11.71680 -13.13495  17.74918 -17.10888  7.369019
[7,] -0.001081774 -0.3323127 -11.71676 -13.13490  17.74912 -17.10882  7.368988
[8,] -0.001081774 -0.3323127 -11.71676 -13.13491  17.74912 -17.10882  7.368988
```



5
0
-5
-10
5.5
6.0
6.5
7.0
7.5
Temperature

Other Solar DEM Models

$$\frac{I_b}{\sqrt{I_b\tau_b+\sigma_b^2}}=\frac{(\sum_{t=1}^{T}\beta_t M_{bt})\tau_b}{\sqrt{I_b\tau_b+\sigma_b^2}}+RandomGaussianField$$

$$\frac{I_b\tau_b}{\sqrt{I_b\tau_b+1/4}}=\frac{(\sum_{t=1}^{T}\beta_t M_{bt})\tau_b}{\sqrt{I_b\tau_b+1/4}}+RandomGaussianField$$

$$I_b=(\sum\beta_t\cdot M_{ijb})\cdot\tau_b+N(f(I_b),\sigma_{ijb})$$