Up date : Jul. 10, 2008

Latent Heat Data Format

The latent heat research product is based on the Spectral Latent Heating (SLH) algorithm (Shige, Takayabu et al., 2004, 2007). The algorithm uses TRMM PR information (convective/stratiform classification, precipitation top height (PTH), precipitation rates at the surface, melting level, etc.) to retrieve heating profiles utilizing lookup tables. Heating profile lookup tables for the three rain types - convective, shallow stratiform, and anvil rain (deep stratiform with a melting level) - were derived from numerical simulations of tropical clouds utilizing a cloud-resolving model (CRM). For convective and shallow stratiform regions, the lookup table is based on the PTH. However, PR cannot observe PTH accurately enough for the anvil regions because of its insensitivity to the small ice-phase hydrometeors. Thus, for the anvil region, the lookup table refers to the precipitation rate at the melting level instead of PTH.

[Product version]

Version 02

[Data archive]

ftp.eorc.jaxa.jp/pub/TRMM/LH/v02

(1) L2_LH_NonGrid

/L2_NonGrid/(yyyymm)/

(2) L2_ LH_Grid

/L2_Grid/(yyyymm)/

(3) L3_LH

/L3/(yyyy)/

[File name]

(1) L2_LH_NonGrid

slh.19980201.01034.v02.dat

slh.19980201.01034.v02.geo

(2) L2_ LH_Grid

slhL2G.lh.19980201.01034.v02.dat

slhL2G.q1r.19980201.01034.v02.dat

(3) L3_LH

slhL3.199802.v02.dat

[Volume]

(1) L2_LH_NonGrid

2 files / orbit

Compress ~ 5.5MB / orbit, 90MB / day, 2.6GB / month, 30GB / year

Original ~ 150MB / orbit, 2.3GB / day, 70GB / month, 850GB / year

(2) L2_ LH_Grid

2 files / orbit

Compress ~ 150kB / orbit, 2.5MB / day, 70MB / month, 0.8 GB / year

Original ~ 17MB / orbit, 270MB / day, 8GB / month, 100GB / year

(3) L3_LH

1 file / month

Compress ~ 130MB / month, 1.5GB / year

Original ~ 260MB / month, 3.1GB / year

[Data format]

Binary files generated on Little Endian IEEE environments.

[Refferences]

Shige, S., Y. N. Takayabu, W.-K. Tao and D. E. Johnson, 2004: Spectral retrieval of latent heating profiles from TRMM PR data. Part I: Development of a model-based algorithm. *J. Appl. Meteor.*, **43**, 1095-1113.

Shige, S., Y. N. Takayabu, W.-K. Tao and C.-L. Shie, 2007: Spectral retrieval of latent heating profiles from TRMM PR data. Part II: Algorithm Improvement and heating estimates over tropical ocean regions. *J. Appl. Meteor.,* **46**, 1098-1124.

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http://www.eorc.jaxa.jp/TRMM/lh/

[Data structure]

(1) L2_LH_NonGrid

SLH algorithm data (1 scan) : slh.yyyymmdd.orbit.v02.dat

No.	Name	Type	Angle	Level	Note	Unit
1	lh	int16	49	80	Latent heat	K/hr x 100
2	q1r	int16	49	80	Q1-Qr	K/hr x 100
3	rtype	int16	49	1	Rain type	(none)
4	ltop	int16	49	1	Height of storm top	km x 100
5	lmelt	int16	49	1	Height of melting layer	km x 100
6	lsfc	int16	49	1	Surface altitude	km x 100
7	rmelt	int16	49	1	Rain rate at the melting layer	mm/hr x 100
8	rsfc	int16	49	1	Rain rate at the surface	mm/hr x 100
9	rtype2a25	int16	49	1	Rain type (2A25 rainType)	(none)
10	method	int16	49	1	method (2A25 method)	(none)

rtype (Rain Type) : 0 : no rain、1 : convective、2 : shallow-stratiform、3 : deep-stratiform

1 file consists of 1-scan-data x n scan. (n ~ 9200)

The height levels covers from surface to 20km height by 0.25 km. (level 80)

Note that differences in heights above sea level are not taken into accounts in the current version, so there are problems, especially around Tibet. We will fix this problem in the near-future.

Missing value of -32,768 is stored for lh, q1r, rtype, ltop, lmelt, lsfc, rmelt and rsfc.

Geolocation data (1 scan) : slh.yyyymmdd.orbit.v02.geo

No.	Name	Type	Angle	Level	Note	Unit
1	Scantime	float32	1	1	Time (UTC, 2A25 scanstatus. scantime)	sec
2	Lat	float32	49	1	Latitude (2A25 geolocation. lat)	degree
3	Lon	float32	49	1	Longitude (2A25 geolocation. lon)	degree

1 file consists of 1-scan- data x n scan. (n ~ 9200)

Off-earth value of -9999.9 is stored for Lat and Lon during a period of CERES calibration.

(2) L2_LH_Grid

SLH LH grid data : slhL2G.lh.yyyymmdd.orbit.v02.dat

No.	Name	Type	Lon	Lat	Level	Note	Unit
1	convLHMean	int16	720	148	19	LH convective conditional mean	K/hr x 100
2	convPix	int16	720	148	1	convective pixel counts	(count)
3	stratLHMean	int16	720	148	19	LH deep-stratiform and shallow-stratiform conditional mean	K/hr x 100
4	stratPix	int16	720	148	1	deep-stratiform and shallow-stratiform pixel counts	(count)
5	allPix	int16	720	148	1	all pixel counts	(count)

SLH Q1-QR grid data : slhL2G.q1r.yyyymmdd.orbit.v02.dat

No.	Name	Type	Lon	Lat	Level	Note	Unit
1	convQ1RMean	int16	720	148	19	Q1-QR convective conditional mean (K/hr)	K/hr x 100
2	convPix	int16	720	148	1	convective pixel counts	(count)
3	stratQ1RMean	int16	720	148	19	Q1-QR deep-stratiform and shallow-stratiform conditional mean (K/hr)	K/hr x 100
4	stratPix	int16	720	148	1	deep-stratiform and shallow-stratiform pixel counts	(count)
5	allPix	int16	720	148	1	all pixel counts	(count)

The grid consists of 720 x 148 longitude-latitude elements corresponding to a 0.5 x 0.5-degree grid that covers the TRMM region from 37S to 37N.

The first grid (1, 1) is 179.75W, 36.75S.

Missing value of -32,768 is stored for convLHMean, stratLHMean, convQ1RMean and stratQ1RMean.

The height levels are :

Level	Height
1	Mean of 0.0, 0.25 km height
2	Mean of 0.5, 0.75 km height
3	Mean of 1.0, 1.25, 1.5, 1.75 km height
4	Mean of 2.0, 2.25, 2.5, 2.75 km height
5	Mean of 3.0, 3.25, 3.5, 3.75 km height
6	Mean of 4.0, 4.25, 4.5, 4.75 km height
7	Mean of 5.0, 5.25, 5.5, 5.75 km height
8	Mean of 6.0, 6.25, 6.5, 6.75 km height
9	Mean of 7.0, 7.25, 7.5, 7.75 km height
10	Mean of 8.0, 8.25, 8.5, 8.75 km height
11	Mean of 9.0, 9.25, 9.5, 9.75 km height
12	Mean of 10.0, 10.25, 10.5, 10.75 km height
13	Mean of 11.0, 11.25, 11.5, 11.75 km height
14	Mean of 12.0, 12.25, 12.5, 12.75 km height
15	Mean of 13.0, 13.25, 13.5, 13.75 km height
16	Mean of 14.0, 14.25, 14.5, 14.75 km height
17	Mean of 15.0, 15.25, 15.5, 15.75 km height
18	Mean of 16.0, 16.25, 16.5, 16.75 km height
19	Mean of 17.0, 17.25, 17.5, 17.75 km height

Note that differences in heights above sea level are not taken into accounts in the current version, so there are problems, especially around Tibet. We will fix this problem in the near-future.

(3) L3_LH

SLH monthly data : slhL3.yyyymm.v02.dat

No.	Name	Type	Lon	Lat	Level	Note
1	allPix	float32	720	148	1	all pixel counts
2	LHPix	float32	720	148	1	LH pixel counts (convPix+stratPix+shallowPix)
3	convPix	float32	720	148	1	convective pixel counts
4	stratPix	float32	720	148	1	deep-stratiform pixel counts
5	shallowPix	float32	720	148	1	shallow-stratiform pixel counts
6	LHMean	float32	720	148	80	LH conditional mean (K/hr)
7	convLHMean	float32	720	148	80	LH convective conditional mean (K/hr)
8	stratLHMean	float32	720	148	80	LH deep-stratiform conditional mean (K/hr)
9	shallowLHMean	float32	720	148	80	LH shallow-stratiform conditional mean (K/hr)
10	Q1RMean	float32	720	148	80	Q1-QR conditional mean (K/hr)
11	convQ1RMean	float32	720	148	80	Q1-QR convective conditional mean (K/hr)
12	stratQ1RMean	float32	720	148	80	Q1-QR deep-stratiform conditional mean (K/hr)
13	shallowQ1RMean	float32	720	148	80	Q1-QR shallow-stratiform conditional mean (K/hr)

The grid consists of 720 x 148 longitude-latitude elements corresponding to a 0.5 x 0.5-degree grid that covers the TRMM region from 37S to 37N.

The first grid (1, 1) is 179.75W, 36.75S.

The height levels covers from surface to 20km height by 0.25 km. (level 80)

Note that differences in heights above sea level are not taken into accounts in the current version, so there are problems, especially around Tibet. We will fix this problem in the near-future.

Missing value of -999,999. is stored for LHMean, convLHMean, stratLHMean, shallowLHMean, Q1RMean, convQ1RMean, stratQ1RMean and shallowQ1RMean.