Description of CloudSat Cloud feature database

V1.0

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This database is created with 5 years from 2006 to 2011 level 2 geometrical profile product to identify clouds. Cloud features are identified by grouping contiguous pixels with reflectivity of at least -28 dBZ and a cloud mask greater than 20. The properties of each cloud feature, including maximum cloud top height, vertical profile of width, and maximum reflectivity in the cloud, are summarized.

 List of parameters for each cloud feature:

ORBIT   LONG   Array[1599]   orbit number
  YEAR   INT   Array[1599]   year
  MONTH   INT   Array[1599]   month
  DAY   INT   Array[1599]
  HOUR   INT   Array[1599]
  MINUTE   INT   Array[1599]
  SECOND   FLOAT   Array[1599]
  STAI   DOUBLE   Array[1599]   Starting time of the cloud feature
  SLON   FLOAT   Array[1599]   Starting longitude
  SLAT   FLOAT   Array[1599]   starting latitude
  ETAI   DOUBLE   Array[1599]   end time of the cloud feature
  ELON   FLOAT   Array[1599]   end longitude
  ELAT   FLOAT   Array[1599]   end latitude
  LON   FLOAT   Array[1599]   center longitude
  LAT   FLOAT   Array[1599]   center latitude
  NPIX   LONG   Array[1599]   total number of pixels (vertical cloud curtain area can be
calculated by 0.5km x 1.7 km * NPIX
  NHPIX   LONG   Array[1599]   total horizontal coverage pixel
  DISTANCE   FLOAT   Array[1599]   horizontal distance of the cloud [km]
  TOP   FLOAT   Array[1599]   cloud top [km]
  BOT   FLOAT   Array[1599]   cloud bottom [km]
  MAXHTN20   FLOAT   Array[1599]   maximum -20 dBZ echo top height [km]
  MAXHTN10   FLOAT   Array[1599]   maximum -10 dBZ echo top height [km]
  MAXHT0   FLOAT   Array[1599]   maximum 0 dBZ echo top height [km]
  MAXHT10   FLOAT   Array[1599]   maximum 10 dBZ echo top height [km]
  MAXHT20   FLOAT   Array[1599]   maximum 20 dBZ echo top height [km]
  NCLD   FLOAT   Array[40, 1599]   Horizontal cloud size profile in pixels, at 0.5, 1.0 … 20.0
km
  NDBZN20   FLOAT   Array[40, 1599] Horizontal -20 dBZ pixel profile
  NDBZN10   FLOAT   Array[40, 1599] Horizontal -10 dBZ pixel profile
  NDBZ0   FLOAT   Array[40, 1599]   Horizontal 0 dBZ pixel profile
  NDBZ10   FLOAT   Array[40, 1599]   Horizontal 10 dBZ pixel profile
  NHCLD   FLOAT   Array[40, 1599]   Horizontal cloud coverage profile
  PRODBZ   FLOAT   Array[40, 1599]   Maximum reflectivity profile [dBZ]
  MINDBZ   FLOAT   Array[1599]   Minimum reflectivity [dBZ]

MAXDBZ   FLOAT   Array[1599]   Maximum reflectivity at all levels [dBZ]

Parameters from ERA-Interim analysis

Because of better reputation and higher horizontal resolution of ERA-Interim analysis, we have decided to use ERA-Interim analysis to provide the large scale environment for Cloud features in the algorithm. The vertical profiles are temporally interpolated from 6 hourly ERA-Interim data, then the nearest neighbor method is used to pick the profiles from closest grid. The parameters include:

T	Temperature
HGT	Geopotential height
RH	Relative humidity
U	U
V	V
W	Omega
SFC_SP	Surface pressure
SFC_TCWV	Total column water vapor
SFC_10U	10 m U wind
SFC_10V	10 m V wind
SFC_2T	2 m temperature
SFC_2D	2 m dew point
SFC_TCO3	Total column ozone
SFC_SKT	Skin temperature

The 10 levels of profiles are selected from original 38 levels. The pressure levels are: 1000,975,925,850,700,500,400,300,200,100. Currently only profiles for cloud features of 100 pixels are available.

Level-3

One important application of level-2 feature data is to generate the climatology of cloud size and location etc. Level-3 product is just an example and application of generating the physically meaningful statistics from CloudSat cloud pixels.

References

Wall, C., C. Liu, and E. Zipser, 2013: A climatology of tropical congestus using CloudSat, *J. Geophys. Res.*, **118**, 6478–6492, doi:10.1002/jgrd.50455.