

## NETCDF details

### AATSR Operational Data:

- atsr\_10\_time
  - ARM Barrow site AATSR L0 overpass in Julian date format
- atsr\_10\_lat
  - ARM Barrow site AATSR L0 overpass latitude, Degrees North
- atsr\_10\_lon
  - ARM Barrow site AATSR L0 overpass longitude, Degrees East
- atsr\_10\_lst
  - ARM Barrow site AATSR L0 overpass surface temperature, Kelvin
- atsr\_10\_sca
  - ARM Barrow site AATSR L0 overpass scan angle, degrees
- atsr\_10\_solzen
  - ARM Barrow site AATSR L0 overpass solar zenith angle, degrees
- atsr\_10\_qc
  - ARM Barrow site AATSR L0 overpass cloud word
  - Units:
    - 0: Pixel is over land
    - 1: Pixel is cloudy (result of all cloud tests)
    - 2: Sunlint detected in pixel
    - 3: 1.6 micron reflectance histogram test shows pixel cloudy (day-time only)
    - 4: 1.6 micron spatial coherence test shows pixel cloudy (day-time only)
    - 5: 11 micron spatial coherence test shows pixel cloudy
    - 6: 12 micron gross cloud test shows pixel cloudy
    - 7: 11/12 micron thin cirrus test shows pixel cloudy
    - 8: 3.7/12 micron medium/high level test shows pixel cloudy (night-time only)
    - 9: 11/3.7 micron fog/low stratus test shows pixel cloudy (night-time only)
    - 10: 11/12 micron view-difference test shows pixel cloudy
    - 11: 3.7/11 micron view-difference test shows pixel cloudy (night-time only)
    - 12: 11/12 micron thermal histogram test shows pixel cloudy
    - 13: Visible channel cloud test shows pixel cloudy
    - 14: NDSI snow flag
    - 15: Unused
- atsr\_10\_insitu\_lst
  - ARM Barrow in situ LST data for AATSR overpass, Kelvin
- atsr\_10\_insitu\_t2m
  - ARM Barrow in situ 2m air temperature data for AATSR overpass, Kelvin
- atsr\_10\_insitu\_t2m\_dt
  - Time difference between in situ 2m air temperature measurement and overpass time, Minutes
- atsr\_10\_insitu\_upwell
  - ARM Barrow in situ Upwelling Radiation data for AATSR overpass, W/m<sup>2</sup>
- atsr\_10\_insitu\_upwell\_dt
  - Time difference between in situ Upwelling Radiation measurement and overpass time, Minutes
- atsr\_10\_insitu\_downwell
  - ARM Barrow in situ Downwelling Radiation data for AATSR overpass, W/m<sup>2</sup>
- atsr\_10\_insitu\_downwell\_dt
  - Time difference between in situ Downwelling Radiation measurement and overpass time, Minutes
- atsr\_10\_insitu\_cloudcover
  - ARM Barrow in situ Ceilometer measured cloud cover for AATSR overpass
  - Cloud cover units:

- 0: No significant backscatter
  - 1: One cloud base detected
  - 2: Two cloud bases detected
  - 3: Three cloud bases detected
  - 4: Full obscuration determined but no cloud base detected
  - 5: Some obscuration detected but determined to be transparent
- atsr\_10\_insitu\_cloudcover\_dt
  - Time difference between in situ cloud cover measurement and overpass time, Minutes
- atsr\_10\_filename
  - AATSR file name

### University of Leicester AATSR L3 product

- atsr\_13\_time
  - ARM Barrow site AATSR L3 overpass in Julian date format
- atsr\_13\_lat
  - ARM Barrow site AATSR L3 overpass latitude, Degrees North
- atsr\_13\_lon
  - ARM Barrow site AATSR L3 overpass longitude, Degrees East
- atsr\_13\_lst
  - ARM Barrow site AATSR L3 overpass surface temperature, Kelvin
- atsr\_13\_sca
  - ARM Barrow site AATSR L3 overpass scan angle, degrees
- atsr\_13\_solzen
  - ARM Barrow site AATSR L3 overpass solar zenith angle, degrees
- atsr\_13\_qc
  - ARM Barrow site AATSR L3 overpass cloud mask
  - Units:
    - 0: cloud free
    - 1: cloud
- atsr\_13\_insitu\_lst
  - ARM Barrow in situ LST data for AATSR overpass, Kelvin
- atsr\_13\_insitu\_t2m
  - ARM Barrow in situ 2m air temperature data for AATSR overpass, Kelvin
- atsr\_13\_insitu\_t2m\_dt
  - Time difference between in situ 2m air temperature measurement and overpass time, Minutes
- atsr\_13\_insitu\_upwell
  - ARM Barrow in situ Upwelling Radiation data for AATSR overpass, W/m<sup>2</sup>
- atsr\_13\_insitu\_upwell\_dt
  - Time difference between in situ Upwelling Radiation measurement and overpass time, Minutes
- atsr\_13\_insitu\_downwell
  - ARM Barrow in situ Downwelling Radiation data for AATSR overpass, W/m<sup>2</sup>
- atsr\_13\_insitu\_downwell\_dt
  - Time difference between in situ Downwelling Radiation measurement and overpass time, Minutes
- atsr\_13\_insitu\_cloudcover
  - ARM Barrow in situ Ceilometer measured cloud cover for AATSR overpass
  - Cloud cover units:
    - 0: No significant backscatter
    - 1: One cloud base detected
    - 2: Two cloud bases detected
    - 3: Three cloud bases detected

- 4: Full obscuration determined but no cloud base detected
  - 5: Some obscuration detected but determined to be transparent
- atsr\_13\_insitu\_cloudcover\_dt
  - Time difference between in situ cloud cover measurement and overpass time, Minutes
- atsr\_13\_filename
  - AATSR file name

### **Terra-MODIS LST data (MOD11\_L2)**

- mod\_time
  - ARM Barrow site MODIS Terra overpass in Julian date format
- mod\_lat
  - ARM Barrow site MODIS Terra overpass latitude, Degrees North
- mod\_lon
  - ARM Barrow site MODIS Terra overpass longitude, Degrees East'
- mod\_lst
  - ARM Barrow site MODIS Terra overpass surface temperature, Kelvin
- mod\_sca
  - ARM Barrow site MODIS Terra overpass scan angle, degrees
- mod\_solzen
  - ARM Barrow site MODIS Terra overpass solar zenith angle, degrees
- mod\_qc
  - ARM Barrow site MODIS Terra overpass Quality Control:
  - 1 & 0:
    - 00=Pixel produced, good quality, not necessary to examine more detailed QA
    - 01=Pixel produced, unreliable or unquantifiable quality, recommend examination of more detailed QA
    - 10=Pixel not produced due to cloud effects
    - 11=Pixel not produced primarily due to reasons other than cloud (such as ocean pixel, poor input data)
  - 3 & 2:
    - 00=good data quality of L1B in bands 31 and 32
    - 01=missing pixel
    - 10=fairly calibrated
    - 11=poorly calibrated, LST processing skipped
  - 5 & 4:
    - 00=cloud free pixel
    - 01=pixel only with thin cirrus
    - 10=fraction of sub-pixel clouds $\leq$  2/16
    - 11=LST affected by nearby clouds
  - 7 & 6:
    - 00=generalized split-window method
    - 01=day/night method
    - 10=high LST w/o atmospheric & emis corrections
    - 11=cirrus effects corrected
  - 9 & 8:
    - 00=no multi-method comparison
    - 01=multi-method comparison done
    - 10=fair consistency
    - 11=good consistency
  - 11 & 10:
    - 00=inferred from land cover type
    - 01=MODIS retrieved
    - 10=TBD

- 11=default value used
  - 13 & 12:
    - 00=emis quality not checked
    - 01=emis quality checked with land cover type
    - 10=emis quality checked with NDVI
    - 11=emis view-angle dependence checked
  - 15 & 14:
    - 00=error in emis\_31 emis\_32 <= 0.01
    - 01=error in emis\_31 emis\_32 <= 0.02
    - 10=error in emis\_31 emis\_32 <= 0.04
    - 11=error in emis\_31 emis\_32 > 0.04
- mod\_insitu\_lst
  - ARM Barrow in situ LST data for MODIS Terra overpass, Kelvin
- mod\_insitu\_t2m
  - ARM Barrow in situ 2m air temperature data for MODIS Terra overpass, Kelvin
- mod\_insitu\_t2m\_dt
  - Time difference between in situ 2m air temperature measurement and overpass time, Minutes
- mod\_insitu\_upwell
  - ARM Barrow in situ Upwelling Radiation data for MODIS Terra overpass, W/m<sup>2</sup>
- mod\_insitu\_upwell\_dt
  - Time difference between in situ Upwelling Radiation measurement and overpass time, Minutes
- mod\_insitu\_downwell
  - ARM Barrow in situ Downwelling Radiation data for MODIS Terra overpass, W/m<sup>2</sup>
- mod\_insitu\_downwell\_dt
  - Time difference between in situ Downwelling Radiation measurement and overpass time, Minutes
- mod\_insitu\_cloudcover
  - ARM Barrow in situ Ceilometer measured cloud cover for MODIS Terra overpass
  - Cloud cover units:
    - 0: No significant backscatter
    - 1: One cloud base detected
    - 2: Two cloud bases detected
    - 3: Three cloud bases detected
    - 4: Full obscuration determined but no cloud base detected
    - 5: Some obscuration detected but determined to be transparent
- mod\_insitu\_cloudcover\_dt
  - Time difference between in situ cloud cover measurement and overpass time, Minutes
- mod\_filename
  - MODIS Terra file name

#### **Aqua-MODIS LST data (MYD11\_L2)**

- myd\_time
  - ARM Barrow site MODIS Aqua overpass in Julian date format
- myd\_lat
  - ARM Barrow site MODIS Aqua overpass latitude, Degrees North
- myd\_lon
  - ARM Barrow site MODIS Aqua overpass longitude, Degrees East
- myd\_lst
  - ARM Barrow site MODIS Aqua overpass surface temperature, Kelvin
- myd\_sca

- ARM Barrow site MODIS Aqua overpass scan angle,
- myd\_solzen
  - ARM Barrow site MODIS Aqua overpass solar zenith angle, degrees
- myd\_qc
  - ARM Barrow site MODIS Aqua overpass Quality Control
  - 1 & 0:
    - 00=Pixel produced, good quality, not necessary to examine more detailed QA
    - 01=Pixel produced, unreliable or unquantifiable quality, recommend examination of more detailed QA
    - 10=Pixel not produced due to cloud effects
    - 11=Pixel not produced primarily due to reasons other than cloud (such as ocean pixel, poor input data)
  - 3 & 2:
    - 00=good data quality of LIB in bands 31 and 32
    - 01=missing pixel
    - 10=fairly calibrated
    - 11=poorly calibrated, LST processing skipped
  - 5 & 4:
    - 00=cloud free pixel
    - 01=pixel only with thin cirrus
    - 10=fraction of sub-pixel clouds  $\leq 2/16$
    - 11=LST affected by nearby clouds
  - 7 & 6:
    - 00=generalized split-window method
    - 01=day/night method
    - 10=high LST w/o atmospheric & emis corrections
    - 11=cirrus effects corrected
  - 9 & 8:
    - 00=no multi-method comparison
    - 01=multi-method comparison done
    - 10=fair consistency
    - 11=good consistency
  - 11 & 10:
    - 00=inferred from land cover type
    - 01=MODIS retrieved
    - 10=TBD
    - 11=default value used
  - 13 & 12:
    - 00=emis quality not checked
    - 01=emis quality checked with land cover type
    - 10=emis quality checked with NDVI
    - 11=emis view-angle dependence checked
  - 15 & 14:
    - 00=error in emis\_31 emis\_32  $\leq 0.01$
    - 01=error in emis\_31 emis\_32  $\leq 0.02$
    - 10=error in emis\_31 emis\_32  $\leq 0.04$
    - 11=error in emis\_31 emis\_32  $> 0.04$
- myd\_insitu\_lst
  - ARM Barrow in situ LST data for MODIS Aqua overpass, Kelvin
- myd\_insitu\_t2m
  - ARM Barrow in situ 2m air temperature data for MODIS Aqua overpass, Kelvin
- myd\_insitu\_t2m\_dt
  - Time difference between in situ 2m air temperature measurement and overpass time, Minutes

- myd\_insitu\_upwell
  - ARM Barrow in situ Upwelling Radiation data for MODIS Aqua overpass, W/m<sup>2</sup>
- myd\_insitu\_upwell\_dt
  - Time difference between in situ Upwelling Radiation measurement and overpass time, Minutes
- myd\_insitu\_downwell
  - ARM Barrow in situ Downwelling Radiation data for MODIS Aqua overpass, W/m<sup>2</sup>
- myd\_insitu\_downwell\_dt
  - Time difference between in situ Downwelling Radiation measurement and overpass time, Minutes
- myd\_insitu\_cloudcover
  - ARM Barrow in situ Ceilometer measured cloud cover for MODIS Aqua overpass
  - Cloud cover units:
    - 0: No significant backscatter
    - 1: One cloud base detected
    - 2: Two cloud bases detected
    - 3: Three cloud bases detected
    - 4: Full obscuration determined but no cloud base detected
    - 5: Some obscuration detected but determined to be transparent
- myd\_insitu\_cloudcover\_dt
  - Time difference between in situ cloud cover measurement and overpass time, Minutes
- myd\_filename
  - MODIS Aqua file name

### **Metop AVHRR data**

- metop\_time
  - ARM Barrow site Metop overpass in Julian date format
- metop\_lat
  - ARM Barrow site Metop overpass latitude, Degrees North
- metop\_lon
  - ARM Barrow site Metop overpass longitude, Degrees East
- metop\_lst
  - ARM Barrow site Metop overpass surface temperature, Kelvin
- metop\_sca
  - ARM Barrow site Metop overpass scan angle, degrees
- metop\_solzen
  - ARM Barrow site Metop overpass solar zenith angle, degrees
- metop\_qc
  - ARM Barrow site Metop overpass cloud mask
  - Metop cloud mask values 0:6, negative values have same meaning as positive but with low confidence
    - 0: Cloudmask not processed, but inside swath - corrupted data
    - 1: Cloud free (also gap filled - if none of surrounding pixels are 0,2,3 or 5)
    - 2: Cloud contaminated
    - 3: Cloud filled
    - 4: Snow/ice contaminated (cloud free for now... checking)!
    - 5: Processed but not undefined due to separability problems
    - 6: Gap filled (where at least 1 of surrounding pixels cm-values are 2,3 or 5)
- metop\_insitu\_lst
  - ARM Barrow in situ LST data for METOP overpass, Kelvin
- metop\_insitu\_t2m
  - ARM Barrow in situ 2m air temperature data for METOP overpass, Kelvin

- metop\_insitu\_t2m\_dt
  - Time difference between in situ 2m air temperature measurement and overpass time, Minutes
- metop\_insitu\_upwell
  - ARM Barrow in situ Upwelling Radiation data for METOP overpass, W/m<sup>2</sup>
- metop\_insitu\_upwell\_dt
  - Time difference between in situ Upwelling Radiation measurement and overpass time, Minutes
- metop\_insitu\_downwell
  - ARM Barrow in situ Downwelling Radiation data for METOP overpass, W/m<sup>2</sup>
- metop\_insitu\_downwell\_dt
  - Time difference between in situ Downwelling Radiation measurement and overpass time, Minutes
- metop\_insitu\_cloudcover
  - ARM Barrow in situ Ceilometer measured cloud cover for METOP overpass
  - Cloud cover units:
    - 0: No significant backscatter
    - 1: One cloud base detected
    - 2: Two cloud bases detected
    - 3: Three cloud bases detected
    - 4: Full obscuration determined but no cloud base detected
    - 5: Some obscuration detected but determined to be transparent
- metop\_insitu\_cloudcover\_dt
  - Time difference between in situ cloud cover measurement and overpass time, Minutes