11th IRS Mission Advisory Group Meeting
Timing and geolocation of IRS vs FCI Level 1 samples

Claude Ledez

11th IRS-MAG meeting – Timing and geolocation of IRS vs FCI Level 1 samples (1/6)

- Topic
  - Action Item MAG#10 in Nov-20

M10.A3	EUM to present the respective timing and geolocation of IRS and FCI pixels so that users can assess the possibility of the synergetic use of the products from both instruments	Next MAG	EUM

- Useful references

  [FCIL1PUG], *MTG FCI L1 Product User Guide* (https://www.eumetsat.int/media/45923)

  [IRSL1PUG], *MTG IRS L1 Product User Guide* (to be published)

11th IRS-MAG meeting – Timing and geolocation of IRS vs FCI Level 1 samples (2/6)

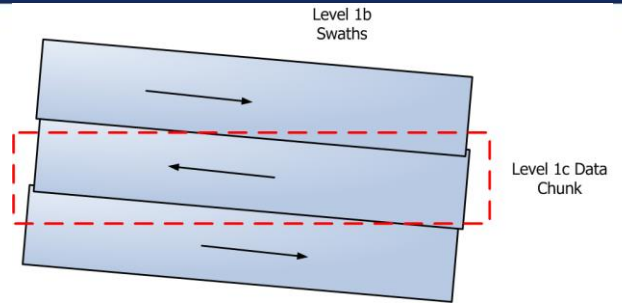
- The FCI and IRS Level 1 radiances can associated in time:
  i. Roughly, from the date fields in the netCDF files names
  ii. Precisely, from the time variables within the netCDF files

- The Level 1 radiances can be associated in space:
  i. Roughly, from the chunk number in the netCDF files names
  ii. Precisely, from the pixel row and column numbers (FCI) and from the sample geographic coordinates (IRS) variables provided within the netCDF files

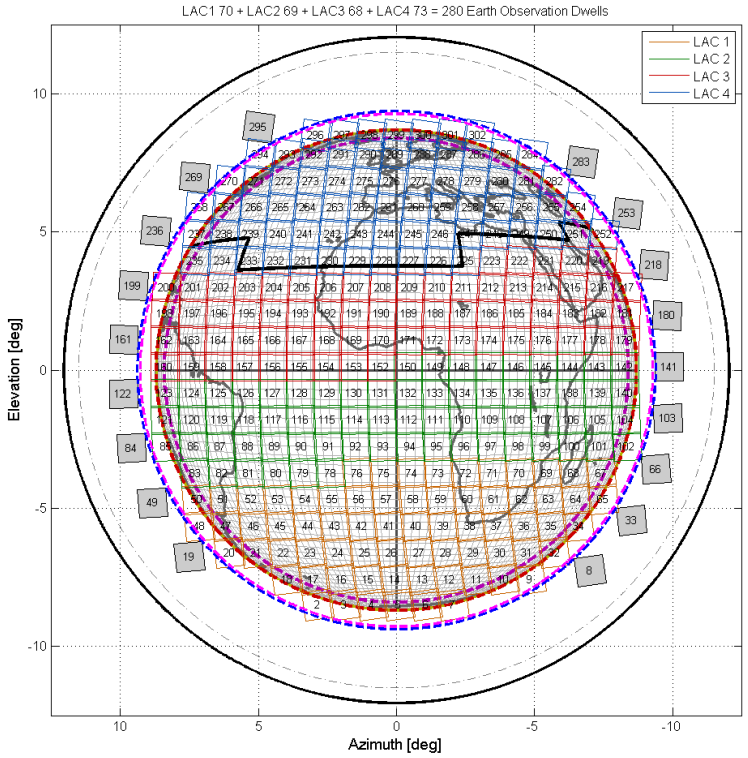
11th IRS-MAG meeting – Timing and geolocation of IRS vs FCI Level 1 samples (3/6)

- For both FCI and IRS, the Level 1 datasets are divided into a series individual netCDF files*:
  - ✓ A FCI Full Disk Coverage Level 1c dataset has 40 body chunks; each one is built from several overlapping and tilted Level 1b swaths.
  - ✓ A FCI Local Area Coverage Level 1c dataset (over Europe) has 13 body chunks.
  - ✓ A IRS Local Area Coverage Level 1 dataset has 84 body chunks, each one corresponding to a dwell, with 73 earth observation dwells covering Europe (LAC4).

*The division of the dataset in this way provides benefits for timely and efficient transfer rates for near real-time dissemination. It also provides a rapid method for retrieving geographically subsetted data from the archive by returning only those chunks that intersect the region of interest.



FCI Level 1c body chunk (red dashed rectangle) and Level 1b swath data



IRS dwell numbering

11th IRS-MAG meeting – Timing and geolocation of IRS vs FCI Level 1 samples (4/6)

- The netCDF file names of the body chunks contains the following fields relevant to the timing and geolocation of the Level 1 samples
  - ✓ *start_time* : time (UTC) of the first measurement within the chunk (yyyMMddhhmmss)
  - ✓ *end_time* : time (UTC) of the last measurement within in the chunk (yyyMMddhhmmss)
  - ✓ *count_in_repeat_cycle* : chunk number in the repeat cycle: starts at 1

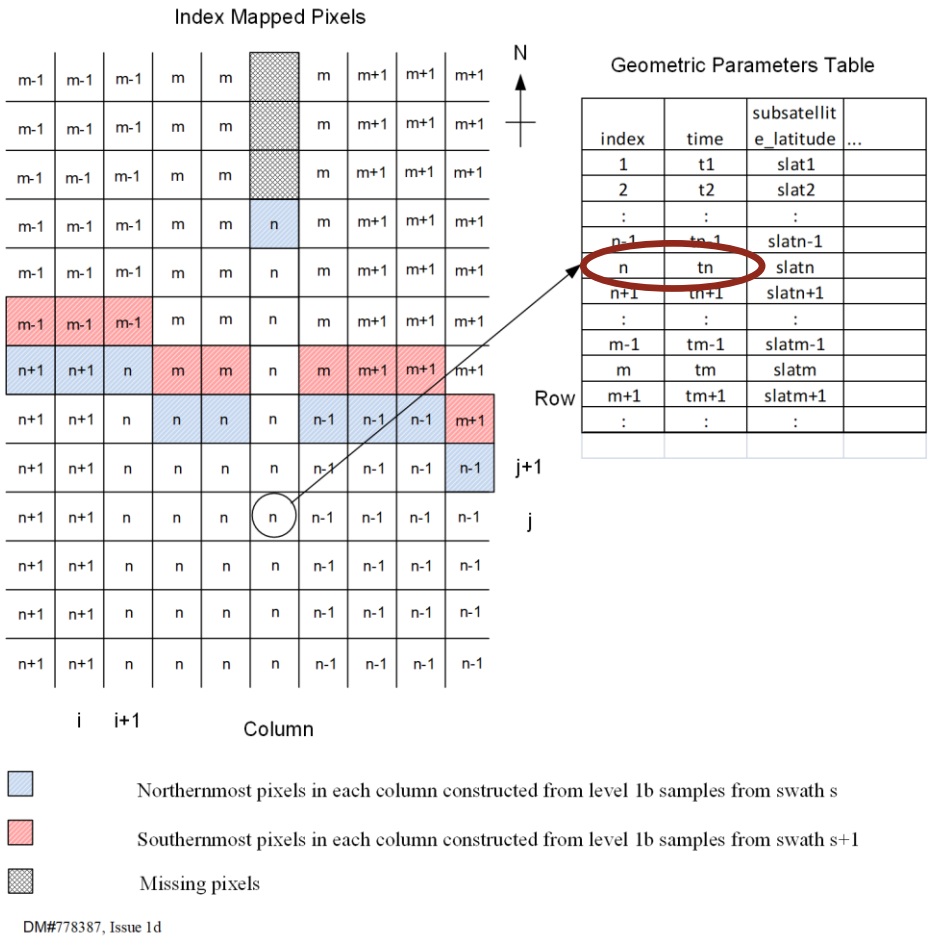
- Example for a FCI Level 1c body chunk

W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD--CHK-BODY--DIS-NC4E_C_EUMT_20210601113629_IDPFI_VAL_20200411100008_20200411100023_N_JLS_T_0061_0001.nc
W_XX-EUMETSAT-Darmstadt,IMG+SAT,MTI1+FCI-1C-RRAD-FDHSI-FD--CHK-BODY--DIS-NC4E_C_EUMT_20210601113721_IDPFI_VAL_20200411100012_20200411100036_N_JLS_T_0061_0002.nc

11th IRS-MAG meeting – Timing and geolocation of IRS vs FCI Level 1 samples (5/6)

- Precise FCI Level 1c pixel time
  - The time (UTC) of a given pixel is given by the global variable *time* via the index provided by the variable *index_map* from the *data.<channel>.measured* group.
  - The index represents an integer number of time intervals from the start of the repeat cycle.
  - The default time interval is 0.1s.

- Precise IRS Level 1 sample time
  - The start time (UTC) of the dwell, common to all spatial samples within the dwell, is given by the variable *time* from the *data* group.



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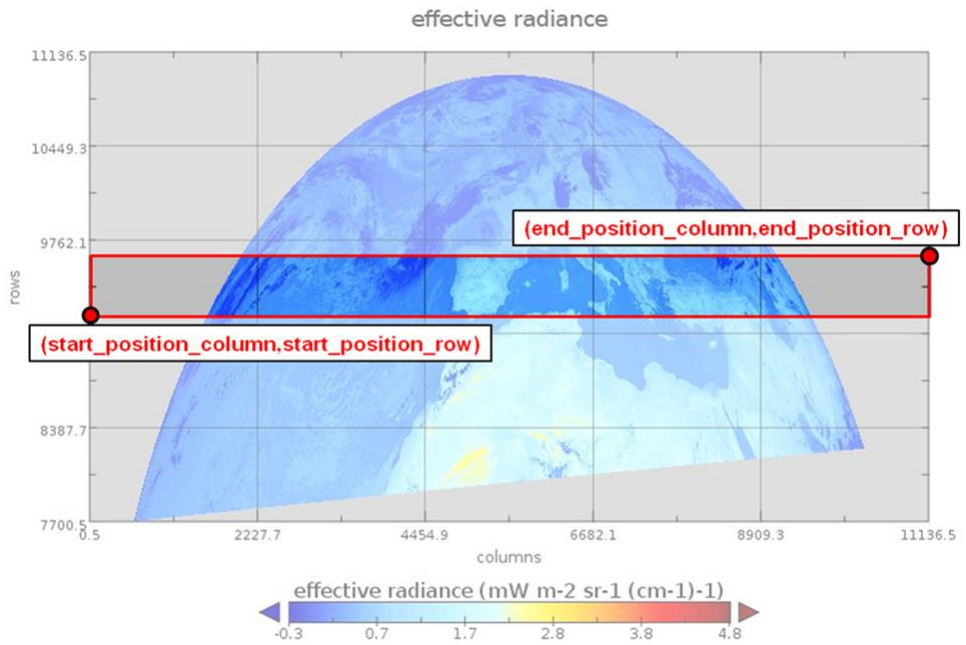
- FCI Level 1c pixel geolocation
  - The radiances do not have associated geolocation variables.
  - The radiances are rectified onto a fixed grid so that a given FCI Level 1c pixel (line, row) has always the same (latitude, longitude) coordinates.
  - NetCDF Climate and Forecast (CF) convention grid_mapping variables for the geostationary projection are included to allow CF-Convention-aware tools to geolocate the grid_mapping associated variables (cf. variable *data.mtg_geos_projection*).
  - Alternatively, the geolocation grid can be calculated using a set of equations and the relevant parameters included in the product.
  - The pixel positions within the grid are provided as coordinate variables *x* and *y* from the *data.<channel>.measured* group.
  - The details for the computation of the grid are given ion §5.2 of [FCIL1PUG].



Position of a FCI Level 1c body chunk within a LAC 4 dataset

- IRS Level 1 samples geolocation
  - The 2-D variables longitude and latitude in the /data group gives the geolocation for each spatial sample in the LWIR band.