6th S2VT meeting : Conclusion Geometry session

4 presentations in this session #2 : **Sentinel2 Level1 geometry validation**

16:40 – 17:00	Geometric Performance of the Copernicus Sentinel-2 products	S. Clerc (MPC/ACRI)
17:00 – 17:20	Copernicus Sentinel-2 Global Reference Image	S. Enache (MPC/CS Group)
17:20 – 17:40	Inter-Detector Management for Copernicus Sentinel-2 Level-1C Products	E. Hillairet (MPC/CS Group)
17:40 – 18:00	A DGGS (Discrete Global Grid System) Datacube Implementation for Sentinel-2	M. Savinaud on behalf of G. Salgues (MPC/CS Group)

+ some geometric parts of presentations in section #1

14:30 – 14:50	Landsat OLI Calibration Status and Validation of Sentinel-2 MSI	E. Micijevic (USGS)
15:50 – 16:10	Self-Supervised Super-Resolution of Sentinel-2 L1B Products Thanks to Inter-Band Shift, Alias and Detectors Overlap	J. Anger (ENS/KAYRROS)

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Geometric performances (Sébastien)

- Absolute geolocation performance : CE95 around 9m (for refined products) (req : 12m)

- Multitemporal coregistration (coregistration to the GRI) : CE95 : 4.5m for S2B, upto 6.9m for S2A in summer.

  ⇒ Better multi-temporal performances when same relative orbit

  ⇒ Refining processing is highly improving the performances.
  Still some non refined products : on specific acquisitions (too cloudy, small islands, no GRI coverage : Antartica)

  ⇒ Some inaccuracies (S2A on southern hemisphere : analysis ongoing : yaw refinement suspected)

- Multiband coregistration : OK after recalibration on S2B.

- Use of DEM30 for Collection1 L1C projection. Improvement on mountainous regions.

Landsat/S2 geometric comparison (Esad)

- Coregistration errors computed on some tiles distributed on all continents.

  - between S2/L8 : CE90 4.6m (good improvement since refinement is working)

  - between S2/S2 ; CE90 3.5m (with refinement)

  - between L8/L8, L8/L9 : CE90 3m

Results similar to Opt-MPC estimations !

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Global Reference Image (Silvia)

- Now freely available on Sentinel Online, 4 possibilities for users :

  - GCP chips in L1B and L1C

  - L1B and L1C reference images.

- Presentation focuses on GCPs :

  - each GCP is a stack of chips, with quality indices.

  - Expect improvements of refinement process by the use of the GCPs instead of global images.

  - Prototype implementation of GCP use in the IPF : Results of validation are OK.

- One advantage of GCP : easily populate the GCP database with chips on uncovered areas and chips from recent acquisitions (GRI acquisitions from 2015-2017)

- Recommendations for use : statistic use (not unitary), spectral band coherency, up to 50m resolution.
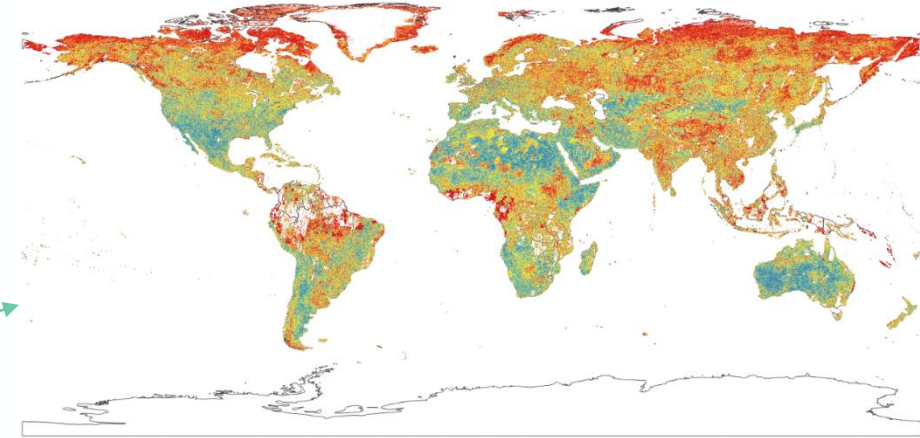
Inter-detector new strategy proposed (Emmanuel)

- Role of inter-detector : define the sew line in detector overlap area for L1C reprojection.

- Actual implementation : 2 topics :

    - Unbalance between detectors,

    - sew line not identical for all bands => Inhomogeneity in the acquisition angles, could generate issues in the downstream algorithms.

- New strategy is presented, based on a master Band for a unique sew line definition for all the bands.

- Results of simulations for new strategy are presented… with the positive visual effect over clouds.

    Discussions about the crenellation effect over clouds, which could be reduced using a 20m master band. Instead of a 60m. Nevertheless, it only concerns the clouds, no crenelation for objects on ground.

⇒ Proposed implementation has been considered of great interest by people of the audience.

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DGGS study (Mickaël)

- Presentation of the interest of DGGS for a global representation of information on Earth.

- Several solutions exist (perfect DGGS does not exist) => Focus on H3, but other solutions should not be abandoned.

- Local use cases on cloud masks, S3 LST, DEM, S2 data are presented.

- Next step is a use case at country level : Belgium.

SuperResolution taking advantage of S2 instrument characteristics (Jérémy)

- High MTF + parallax between spectral bands are used to retrieve high frequencies hidden in the aliasing.

- Neural network is trained first using 5m Planet images, and then taking advantage of detectors overlap in L1B products

- No use of GANs. Specific attention : not to generate hallucinations.

- Significant results are shown with 5m de-aliased images.

- Next step : to enlarge training dataset :

    - Use of Cesbio Dataset (Venµs 5m) ?

    - Use of Tandem acquisitions (expected for S2C Cal/val phase) ?