



MAJA and MAQT cross-comparison notebook [on-going]

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Experimental setup

Area of Interest

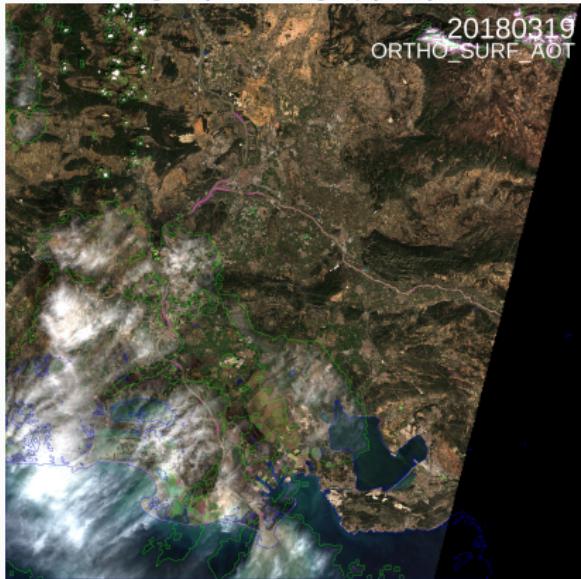
TODO: check DTM file, $\Delta_{altitude}$, Water fraction, etc...

31TFJ 2018-03-14(S2B)



13% clouds

31TFJ 2018-03-19(S2A)



34% clouds

Codes and GIPP versions

Versions of the code:

- MAJA refers here to the 3.3.1 version compiled from repository CNES/MAJA_internal, ran on HAL
- MAQT refers here to the Wdark_fix branch from repository Mireille Huc/Chaines_N2_N3, ran on S2CALC

GIPP sources:

- MAJA: from repository Olivier Hagolle/GIPP_MAJA
- MAQT: in ../Exe/PARAM_N2 from repository Mireille Huc/Chaines_N2_N3

GIPP L2COMM differences

diff GIPP_S2_MAJA_3.3_TM vs GIPP_S2_MAJA_3.3_TM_CAMS

| No CAMS | CAMS |
|-------------------------|-------------------------|
| MT_Weight_Threshold: 19 | MT_Weight_Threshold: 10 |

diff GIPP_S2_MAJA_3.3_TM_CAMS vs GIPP_MAQT

| MAJA | MAQT |
|--|-----------------------------------|
| Cal_Adjust_Factor ¹ : 1.0 1.0 ... | Cal_Adjust_Factor: 1.0 0.5... |
| Saturation_Threshold: 1.3 | Saturation_Threshold: 0.900 |
| Cirrus_Alt_Ref: 2000 | ? |
| Min_Threshold_Var_Blue: 0.016 | Min_Threshold_Var_Blue: 0.014 |
| AOT_KPondCAMS: 0.2 | KpondCAMS = 0.2 in param_S2 |
| AOT_HeightScale: 2000 | ha = 2000 in param_S2 |
| Cirrus_Correction_Option: true | Cirrus_Correction_Option: false |
| Cirrus_Max_Reflectance: 0.07 | ? |
| Cirrus_Gamma_Band_Codes: B2 B3 | Cirrus_Gamma_Band_Codes: B1 B2 B3 |

=> GIPP MAJA values used as reference



¹Cal_Adjust_Option=False in both MAJA and MAQT

Experimental test cases

Configurations flags used:

- Init (I) or Backward (B) mode, although no explicit Init mode found on MAQT (passing single date -d 20180314)
- Cirrus correction defaults to True on MAJA while False on MAQT
- Environment correction defaults to True (both in MAJA and MAQT)
- Use CAMS if True, else Constant_Model: CONTINEN (both in MAJA and MAQT)

Run naming convention: any combination of [MAJA|MAQT]_[I|B][0|1]{4}, one spare bit left for future addition.

Examples of experimental setup used with both MAJA and MAQT:

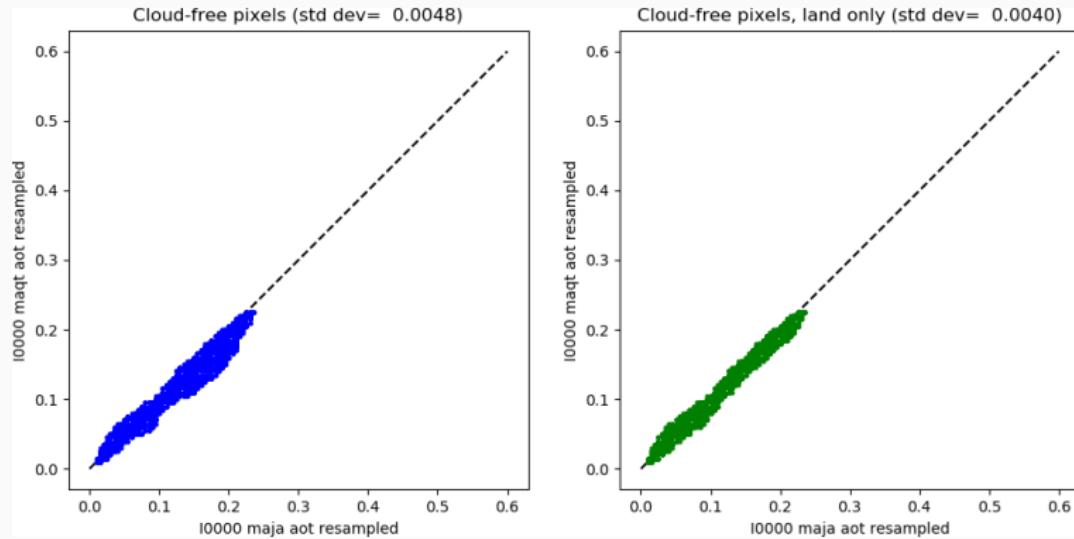
| Test name | l0ooo | l1000 | l1100 | l1110 | B0ooo | B1000 | B1100 | B1110 |
|-------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Mode | I | I | I | I | B | B | B | B |
| Cirrus Corr | F | T | T | T | F | T | T | T |
| Env Corr | F | F | T | T | F | F | T | T |
| CAMS | F | F | F | T | F | F | F | T |

Note on graphics

- The following scatterplots are resampled outputs of either AOT or SRE
- All figures refer to the first image dated back to 2018-03-14
- The resampling applied here is 1/20
- Edge and cloud masks are used to subset "Land and water" plots (in blue)
- The MAQT water mask is added to edge and clouds masks for the "Land only" plots (in green)
- On absolute difference maps, a view of the DTM is provided for interpretation of effects of the topography
- Units are: AOT (-), SRE (-), altitude (meters a.m.s.l, SRTM based)

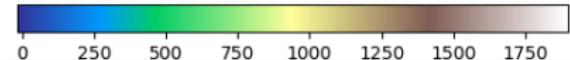
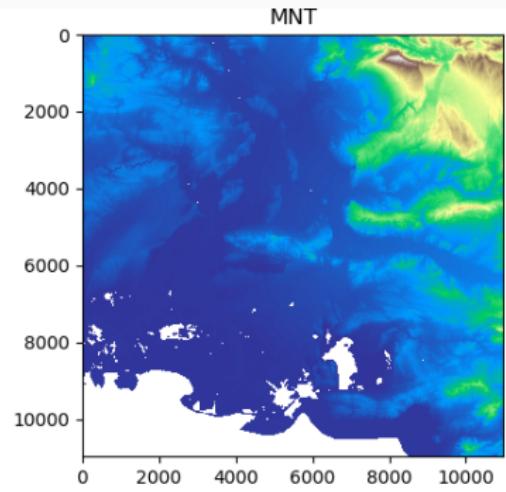
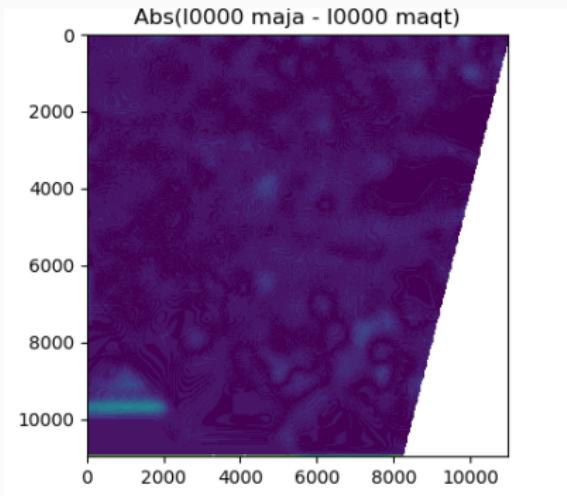
**MAJA vs MAQT in Init mode, no
CAMS, no Cirrus correction**

MAJA vs MAQT in Init mode, no CAMS



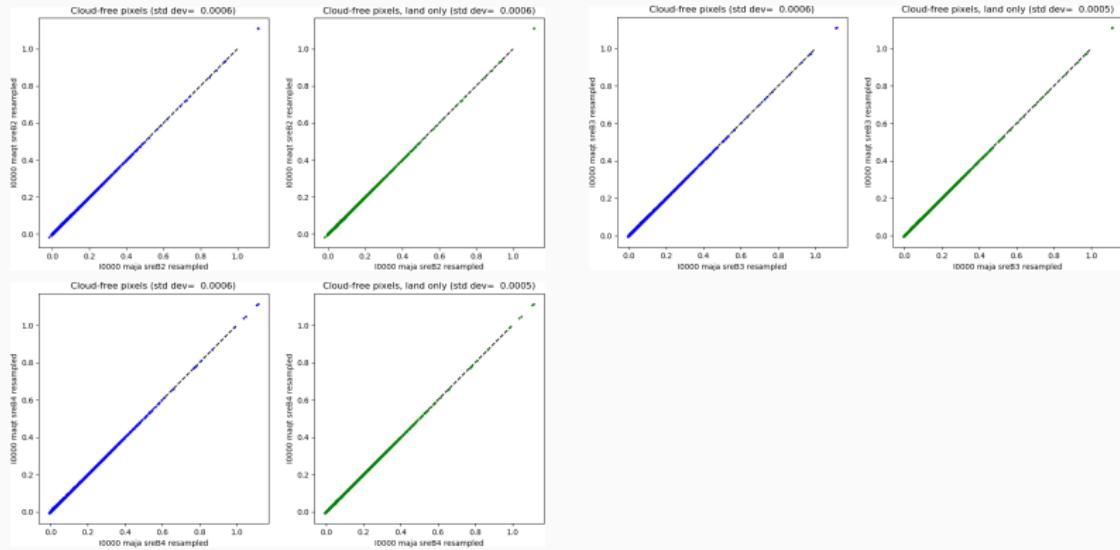
AOT_{MAJA} vs AOT_{MAQT} for all cloud-free pixels (left), and for cloud-free pixels over land only (right), no CAMS, no Cirrus correction (ooooo)

MAJA vs MAQT in Init mode, no CAMS



Gap-filling implementation differs in MAQT (custom) and MAJA (OTB based)

MAJA vs MAQT in Init mode, no CAMS

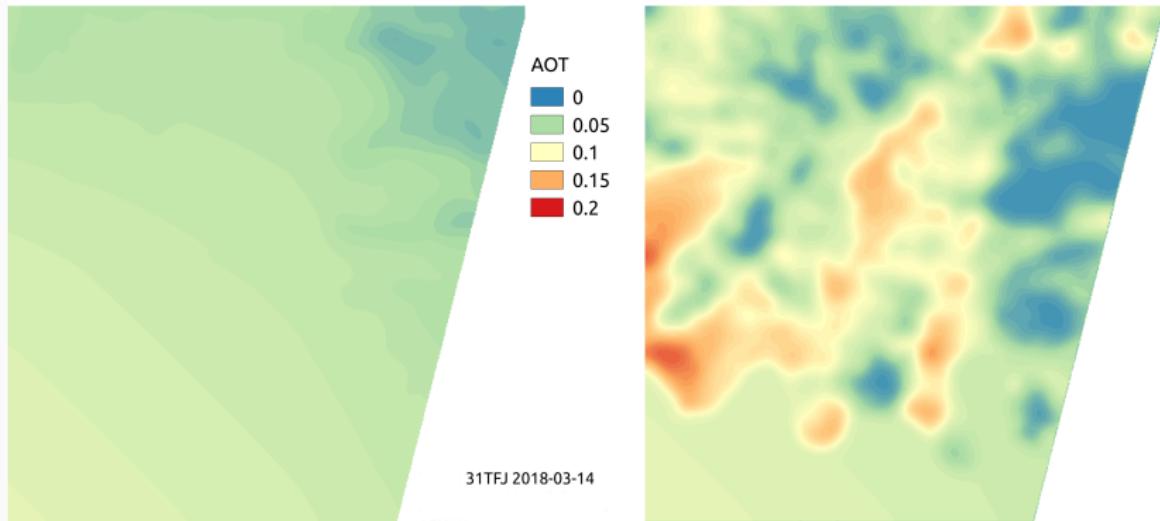


SRE_{MAJA} vs SRE_{MAQT} for B2 (top left), B3 (top right) and B4 (bottom left)

**MAJA vs MAQT in Init mode, with
CAMS, no Cirrus correction**

MAJA vs MAQT in Init with CAMS

AOT results from MAJA (left) as compared to the expected result produced with MAQT (right) in Init mode with Use_Cams_Data = true

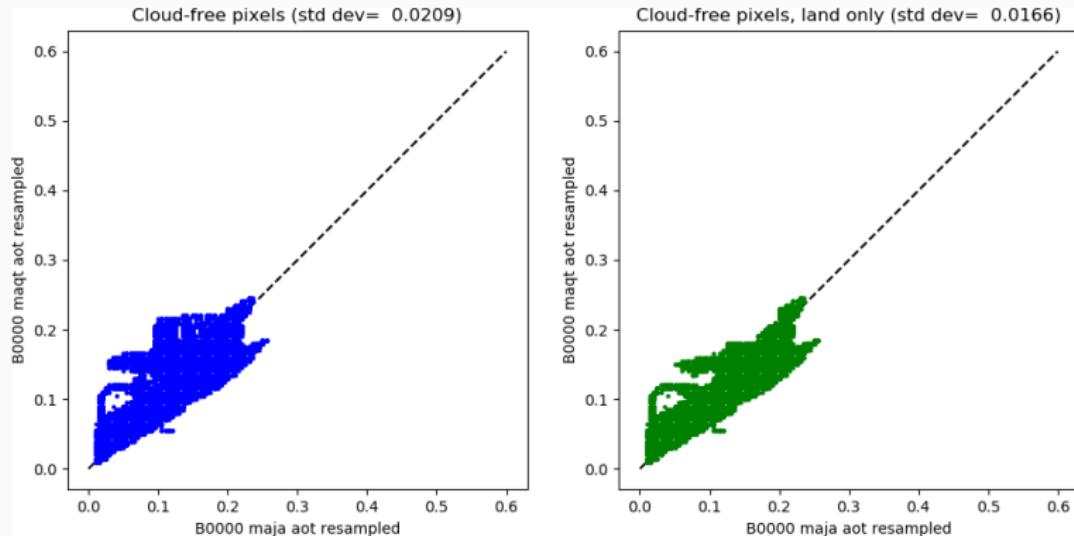


MAQT: /work/CESBIO/projects/Maja/L2A_MAQT/ArlesIntercomp/31TFJ/MAQT

MAJA: /work/CESBIO/projects/Maja/L2A_MAQT/ArlesIntercomp/31TFJ/GIPP_I1110

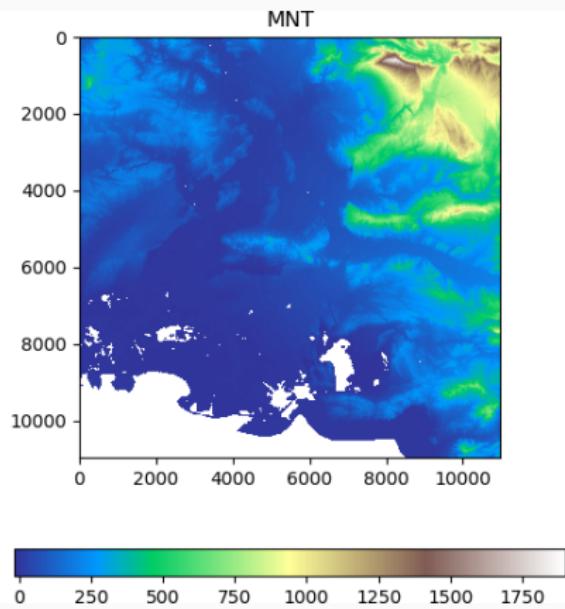
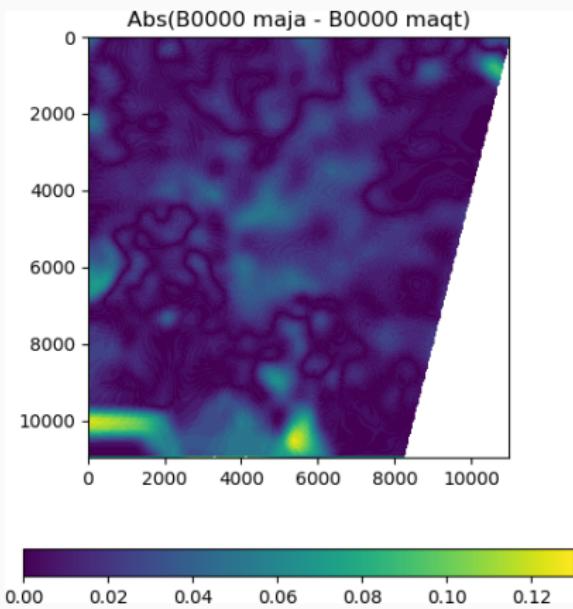
**MAJA vs MAQT in Backward mode,
no CAMS, no Cirrus correction**

MAJA vs MAQT in Backward mode, no CAMS

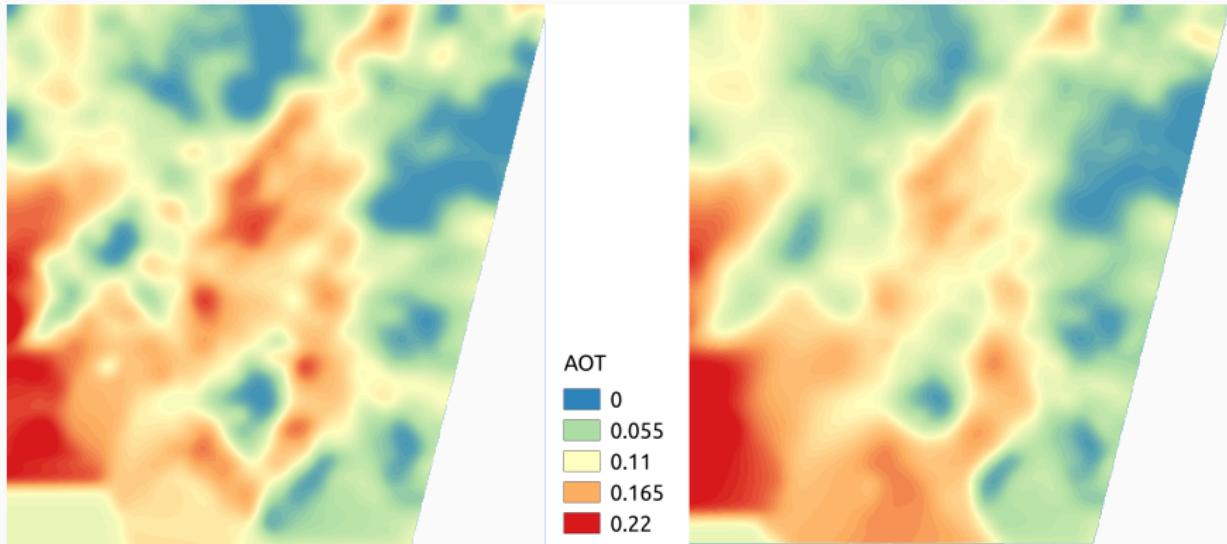


AOT_{MAJA} vs AOT_{MAQT} for all cloud-free pixels (left), and for cloud-free pixels over land only (right), no CAMS, no Cirrus correction (ooooo)

MAJA vs MAQT in Backward mode, no CAMS

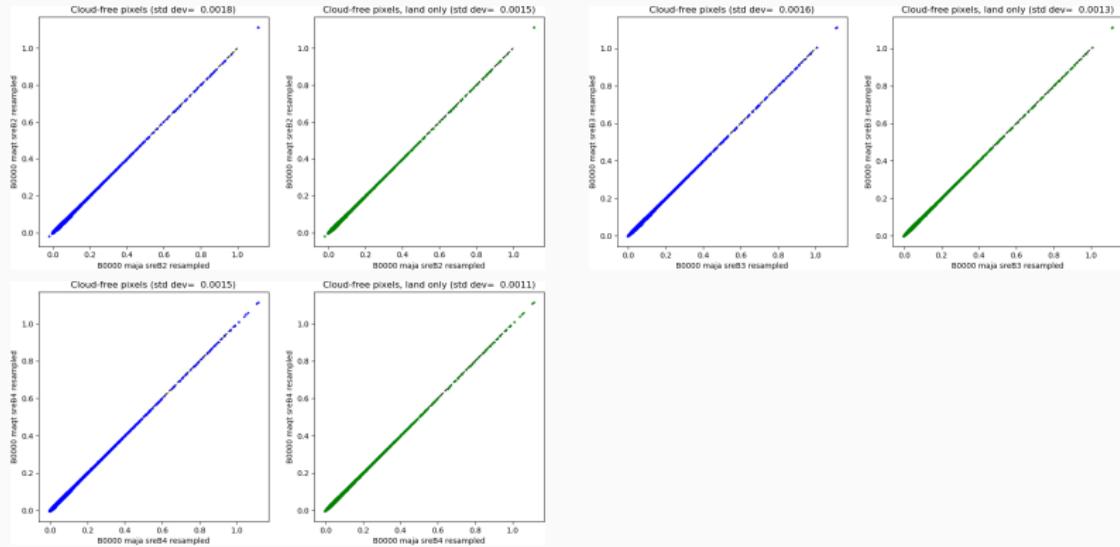


MAJA vs MAQT in Backward mode, no CAMS



AOT results from MAJA (left) vs MAQT (right) in Backward mode with `Use_Cams_Data = false`

MAJA vs MAQT in Init mode, no CAMS



SRE_{MAJA} vs SRE_{MAQT} for B2 (top left), B3 (top right) and B4 (bottom left)

What next?

TODO list

In Init without CAMS:

- Differences found but limited impact on SRE
- Implementation variations for gap-filling, resampling, angles computation for cloud shadows (avg angle in MAQT, one angle per band in MAJA)
- Avoid full-resolution cross-comparison

In Init with CAMS: bug in MAJA 3.3.1

TODO:

- Run/debug MAQT TVA on HAL (clean-up branches in repo)
- Bugfix for MAJA in Init + CAMS (FA xxx)
- Add another test case with strong AOT (ACIX)?