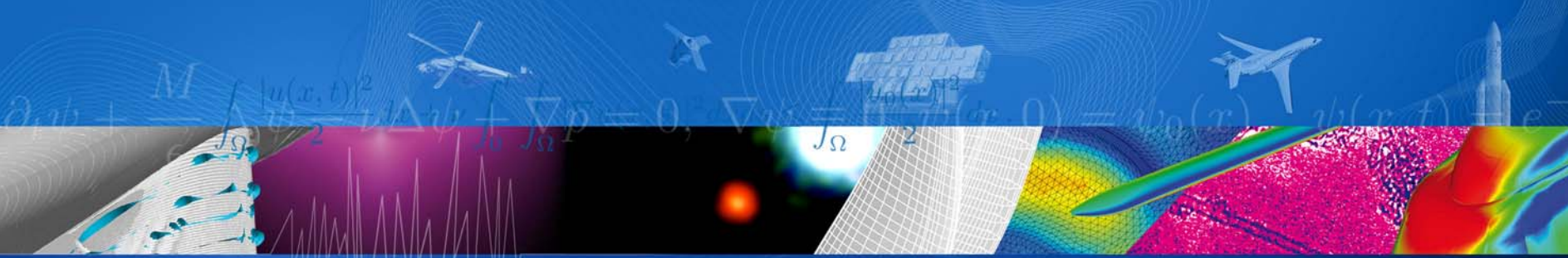

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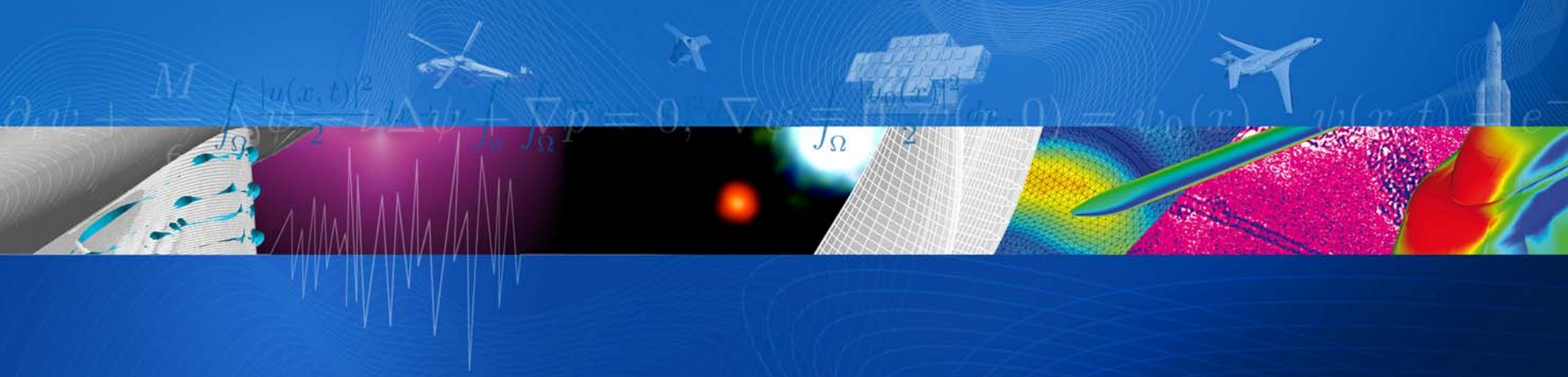

# Preparation of radiometric continuity of VGT data

**F. Viallefont, C. Kent, M. Bouvet**

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# SUMMARY

# INTRODUCTION

Radiometric continuity of VGT data :

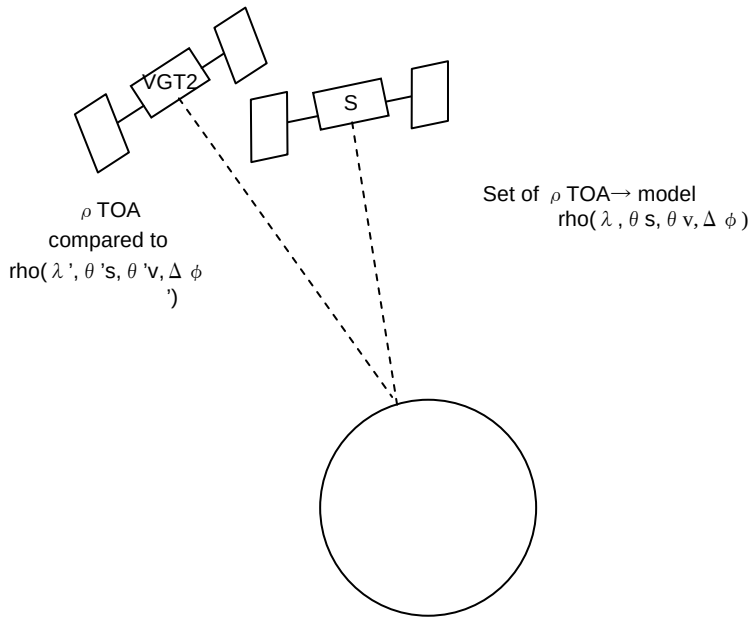
- o Radiometric comparison of VGT2 with a supersensor
- o Radiometric comparison of PROBA-V VGT with the same super sensor

→ radiometric comparison between VGT2 and PROBA-V VGT

Radiometric comparison of VGT2 with a supersensor :

Comparison of simulated reflectances with supersensor with actual VGT2 reflectances

Method deduced from method tested for ALOS AVNIR-2



# METHOD

Creating the super sensor :

Over a calibration site :

- Identify sensors enabling to give a good description of the site from the spectral and directionnal point of view
- Compute TOA reflectance for the sensors
- Choose a sensor as reference and identify doublets of observations between the reference sensor and each sensor
- Fit polynomials to the differences over the doublets
- Recalibrate sensors to the reference thanks to polynomials

# METHOD

Simulating the reflectances :

Over a calibration site at a given date :

- Fit a BRDF model to all observations of supersensor for a bin of x days centered on the date
- Use BRDF model to compute TOA reflectances in the geometries of sensor to simulate
- Extend the computation to all spectral bands of reference sensor thanks to multiplicative ratio <rho_ $\lambda$ /rho_ $\lambda$ ref> applied to 1st coef of BRDF model
- Correct TOA reflectance for gaseous absorption
- Interpolate to compute spectral absorption free TOA reflectances
- Multiply with gaseous absorption
- Convolve with spectral response of sensor to simulate

# DATASET AND PROCESSING PARAMETERS

Supersensor = (MERIS, AATSR, ATRS-2, A-MODIS, POLDER-3) for B0, B2 and B3

Supersensor = (AATSR, ATRS-2, A-MODIS) for SWIR

Calibration sites = Libya4 (2006-2010)
Niger2 (2006-2010)
DomeC (2009-2010)

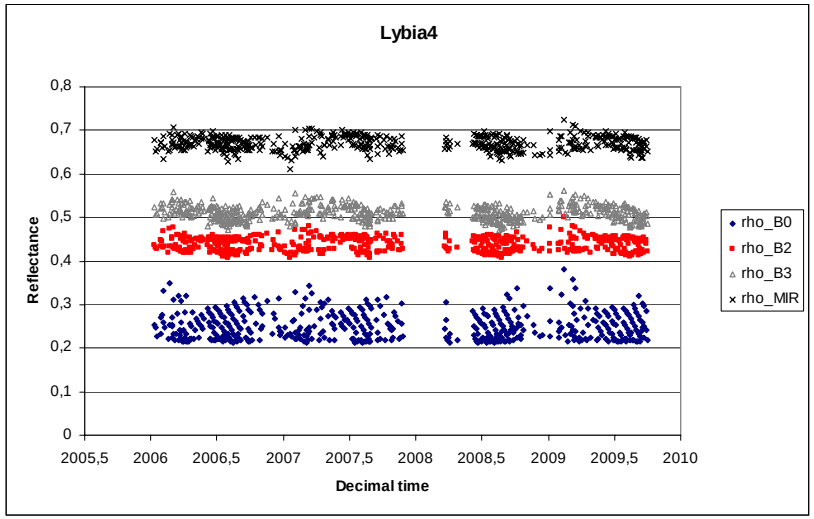
Processing parameters :

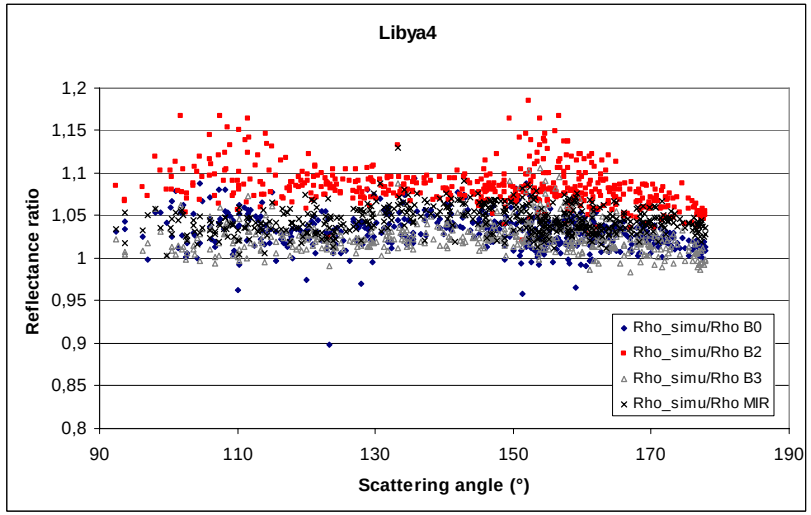
zenithal angles < 75° , common region = 90%, cloud = 0%

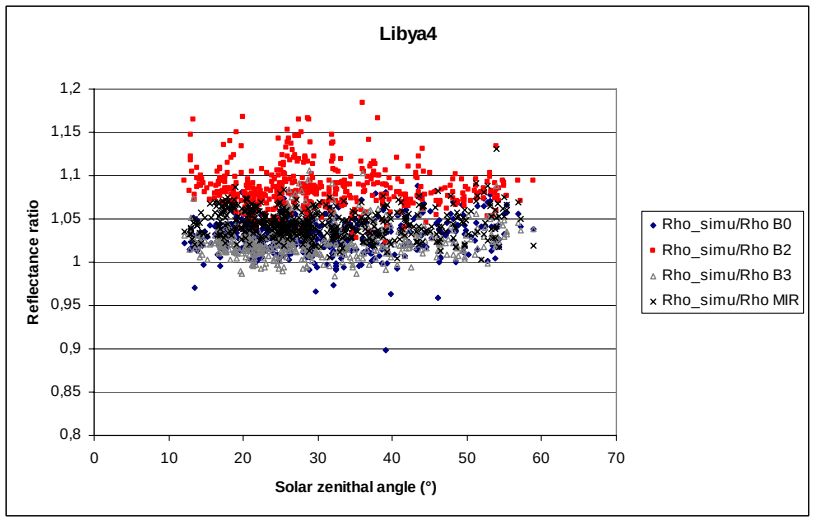
recalibration : difference angles for doublets < 10° , day offset = 3,

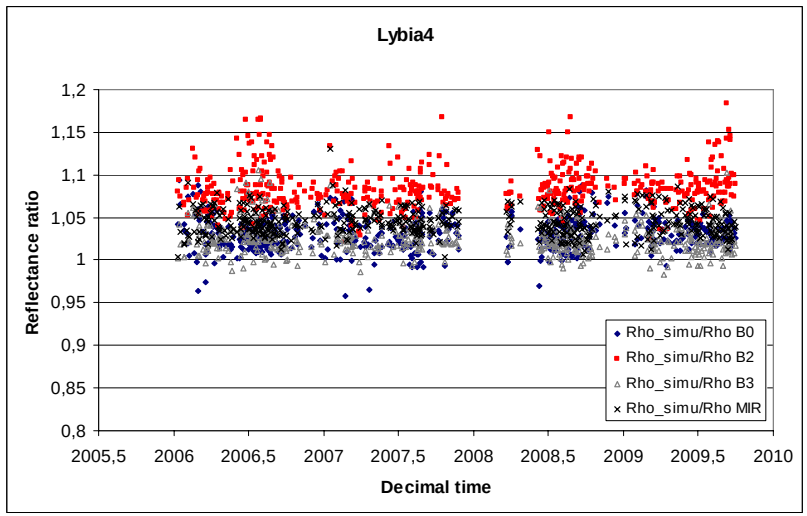
simulation : bin period = 30 days, BRDF threshold = 10

# RESULTS



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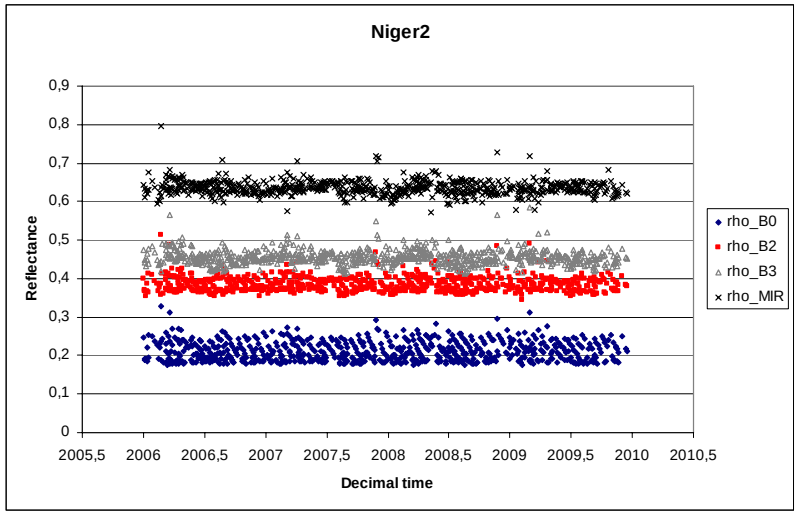
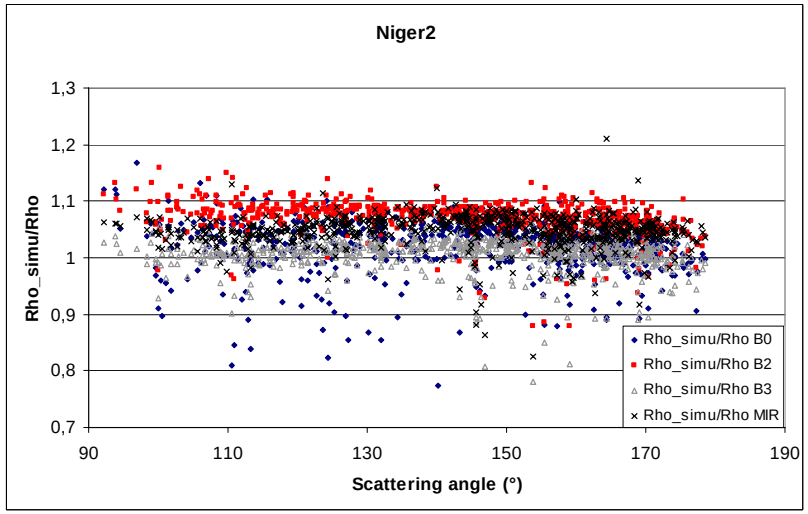
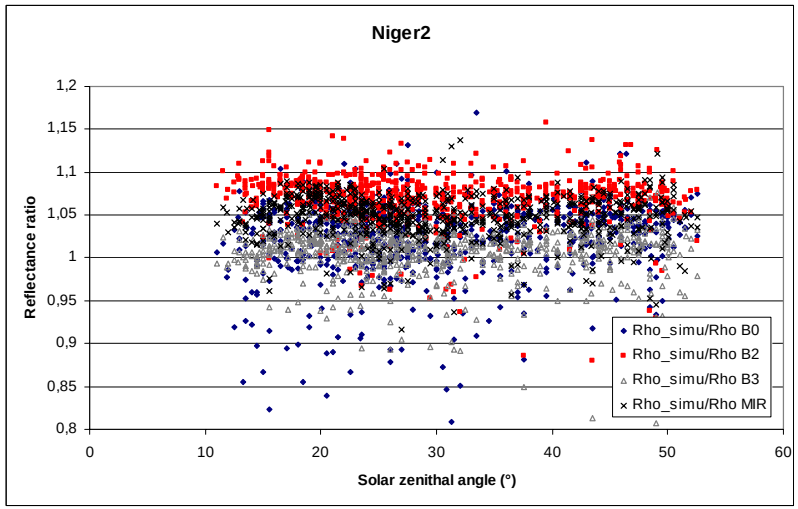
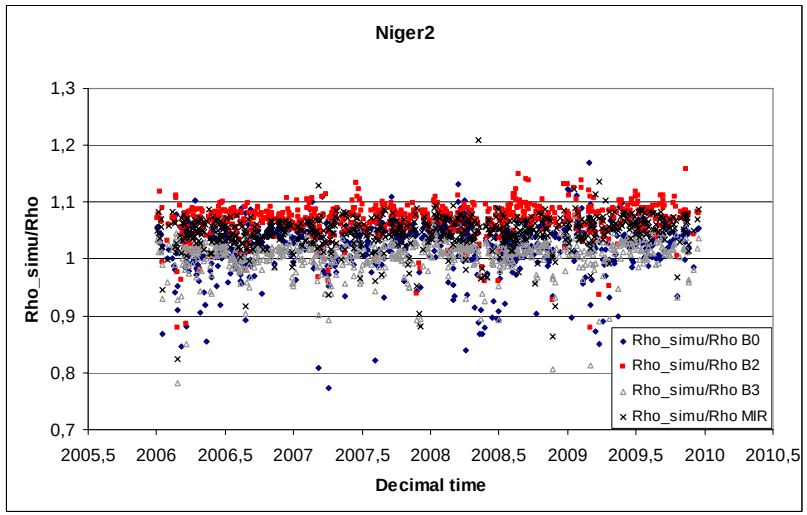
# RESULTS

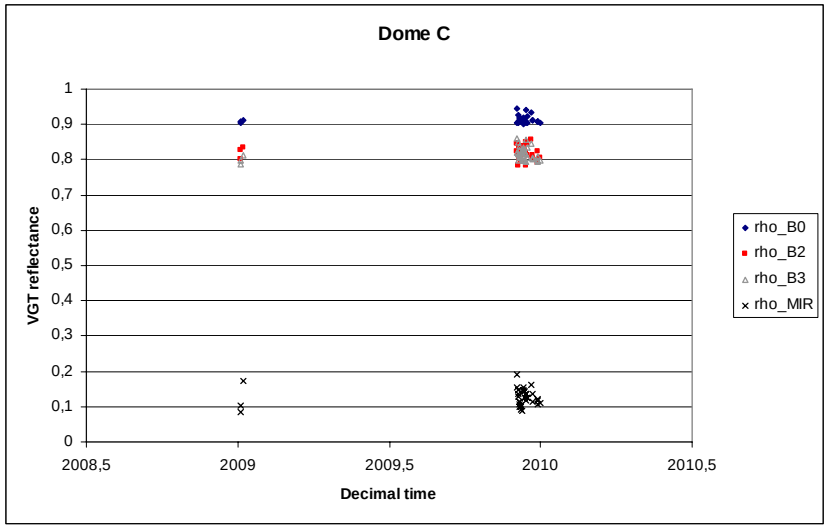

Niger2
Reflectance
Decimal time
rho_B0
rho_B2
rho_B3
rho_MIR

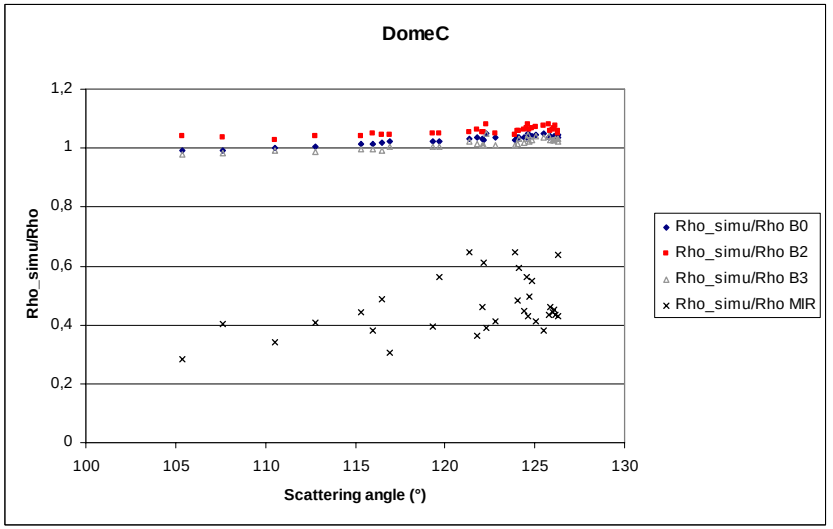

Niger2
Rho_simu/Rho
Scattering angle (°)
Rho_simu/Rho B0
Rho_simu/Rho B2
Rho_simu/Rho B3
Rho_simu/Rho MIR

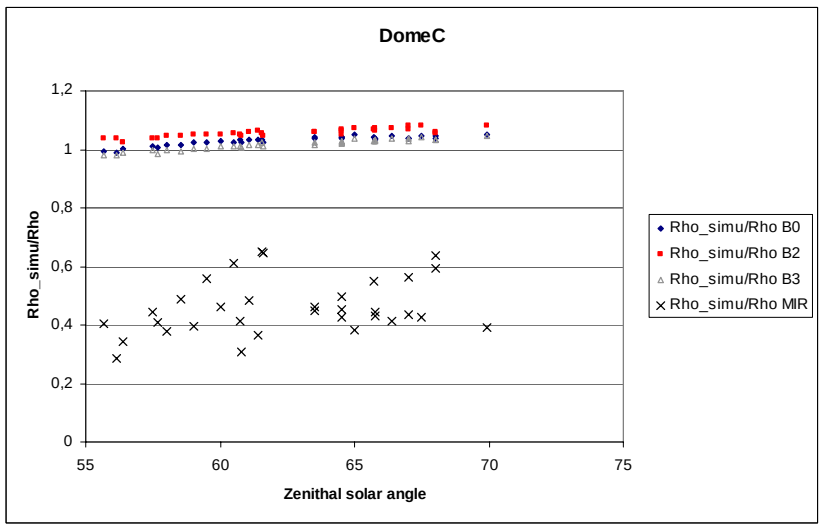

Niger2
Reflectance ratio
Solar zenithal angle (°)
Rho_simu/Rho B0
Rho_simu/Rho B2
Rho_simu/Rho B3
Rho_simu/Rho MIR

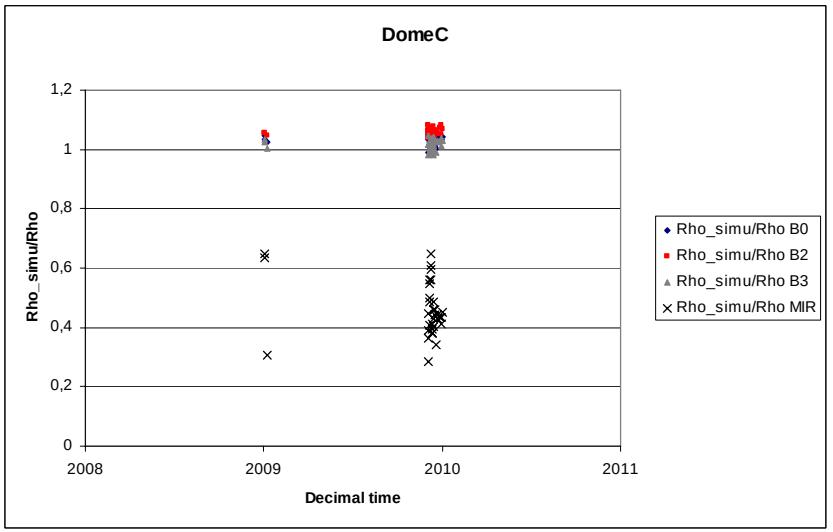

Niger2
Rho_simu/Rho
Decimal time
Rho_simu/Rho B0
Rho_simu/Rho B2
Rho_simu/Rho B3
Rho_simu/Rho MIR

# RESULTS



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# RESULTS

| Mean | number of values | (Rho_simu-Rho)/Rho B0 | (Rho_simu-Rho)/Rho B2 | (Rho_simu-Rho)/Rho B3 | (Rho_simu-Rho)/Rho SWIR |
|---|---|---|---|---|---|
| DomeC | 33 | 0,03 | 0,06 | 0,02 | -0,54 |
| Libya4 | 509 | 0,03 | 0,08 | 0,03 | 0,04 |
| Niger2 | 696 | 0,02 | 0,07 | 0,01 | 0,05 |
| Estimated systematic uncertainty | | 0,08 | 0,08 | 0,08 | 0,08 |

| Standard deviation | number of values | (Rho_simu-Rho)/Rho B0 | (Rho_simu-Rho)/Rho B2 | (Rho_simu-Rho)/Rho B3 | (Rho_simu-Rho)/Rho SWIR |
|---|---|---|---|---|---|
| DomeC | 33 | 0,02 | 0,01 | 0,02 | 0,10 |
| Libya4 | 509 | 0,02 | 0,02 | 0,02 | 0,02 |
| Niger2 | 696 | 0,05 | 0,03 | 0,03 | 0,03 |
| Estimated random uncertainty | | 0,11 | 0,11 | 0,11 | 0,11 |

Similar results for the 3 sites

Small bias in B2 not seen for ALOS B3 (but saturated pixels in the ALOS image)

# RESULTS

## Comparison to CEOS/IVOS WG4 results : consistency

| Libya4 | number of values | (Rho-Rho_simu)/Rho B0 | (Rho-Rho_simu)/Rho B2 | (Rho-Rho_simu)/Rho B3 | (Rho-Rho_simu)/Rho SWIR |
|---|---|---|---|---|---|
| DIMITRI mean | 509 | -0,03 | -0,08 | -0,03 | -0,04 |
| OSCAR mean | | 0,01 | -0,03 | -0,02 | -0,01 |
| SADE/MUSCLE mean | 124 | -0,04 | -0,05 | -0,06 | - |
| DIMITRI standard deviation | | 0,02 | 0,02 | 0,02 | 0,02 |
| OSCAR standard deviation | | 0,03 | 0,01 | 0,01 | 0,02 |
| SADE/MUSCLE standard deviation | | 0,02 | 0,01 | 0,02 | - |

| Niger2 | number of values | (Rho-Rho_simu)/Rho B0 | (Rho-Rho_simu)/Rho B2 | (Rho-Rho_simu)/Rho B3 | (Rho-Rho_simu)/Rho SWIR |
|---|---|---|---|---|---|
| DIMITRI mean | 696 | -0,02 | -0,07 | -0,01 | -0,05 |
| SADE/MUSCLE mean | 180 | -0,03 | -0,04 | -0,04 | |
| DIMITRI standard deviation | | 0,05 | 0,03 | 0,03 | 0,03 |
| SADE/MUSCLE standard deviation | | 0,02 | 0,01 | 0,02 | - |

# CONCLUSION

Simulation accuracy better than 8 % over Libya4 and Niger2

Simulation accuracy better than 8% over Dome C for B0, B2 and B3