# **QA4EO SAR Implementation**

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CESS

http://sarcv.ceos.org

# **QA4EO Elements in Operational SAR Missions**

- Requirements specification (quality indicators)
- Reference standards (calibration targets)
- QA-processes:
  - Commissioning phase (incl. pre-launch verification)
  - Long-term system monitoring
  - Systematic product QA





#### **Requirements Specification**

# CSAR and Transponder Requirements



Parameter	CSAR Requirement
Maximum Point Target Radar Cross Section	75 dBm <sup>2</sup>
Transmit polarisation CSAR Receive polarisation Transponder	H or V
Transmit polarisation Transponder Receive polarisation CSAR	H and V
H to V imbalance	15 degrees
Radiometric accuracy	1.0 dB (3σ)
Radiometric stability	0.5 dB (3σ)
Time Delay	
Accuracy of the antenna pattern estimation or accuracy of the transponder receiver mode	<ul><li>0.1 dB within the swath</li><li>1.0 dB at -20 dB level with respect to the maximum</li><li>0.2 dB of absolute gain</li></ul>
Dynamic range of the receiver mode	
Pixel·localisation	2.5 - 10 m (3σ) depending on the mode

well-defined quality indicators



www.DLR.de/HR • VG 5 <CEOS 2013-10, S-1A CAL Scenario> • <Satellite-SAR-Systems> • <Calibration> • <Schwerdt> Commissioning Phase

## **In-Orbit Calibration Plan**



## **Elevation Antenna Model Verification over Rainforest**



 Homogeneous RCS

Commissioning Phase

- ScanSAR-Mode Several Beams measured during one Pass
- across an Area of 750 km x 750 km

Accuracy of Shape and Beam-to-Beam Gain Offset





27-July-2011 Schwerdt, Folie 6

## Radiometric stability from transponder data

### Long-Term System Monitoring

#### DGCF, 2000-present, from all transponders

 $DGCF(dB) = RCS_{true} - RCS_{est}$ 





## **Point Target Analysis – Radiometric Stability**



## **TMSP Daily Production QA Web Page**

005509 L1B NSG TSX1 1940 2013-10-08T191912.02600	SM	s	strip_012	0	AUTO_APPROVED	Undefined	 ок	0	0	0	▲
010120 L1B NSG TDX1 12001 2013-10-08T102930.35300	SM	s	strip_007	o	AUTO_APPROVED	Undefined	 ок	0	0	0	1
010153 L1B NSG TDX1 12017 2013-10-08T220951.08785	SM	s	strip_012	o	AUTO_APPROVED	Undefined	 ок	0	0	0	
010512 L1B NSG TDX1 12018 2013-10-08T230232.50328	SM	s	strip_019	0	AUTO_APPROVED	Undefined	 ок	0	0	0	
010528 L1B NSG TDX1 12022 2013-10-08T230214.21260	SM	s	strip_007	0	AUTO_APPROVED	Undefined	 ок	0	0	0	
010844 L1B NSG TDX1 12016 2013-10-08T230049.57302	SL	s	spot_057	o	AUTO_APPROVED	Undefined	 ок	0	0	0	5.5
010942 L1B NSG TDX1 11981 2013-10-08T013928.92375	SM	s	strip_009	0	AUTO_APPROVED	Undefined	 ок	0	0	0	
011322 L1B NSG TSX1 1926 2013-10-08T062039.23416	SM	s	strip_013	o	AUTO_APPROVED	Undefined	 ок	0	0	0	
011340 L1B NSG TDX1 12020 2013-10-08T183923.19800	sc	s	scan_007	0	AUTO_APPROVED	Undefined	 !!	0	0	0	
011738 L1B NSG TSX1 1919 2013-10-08T000503.40185	HS	s	spot_079	0	AUTO_APPROVED	Undefined	 ок	0	0	0	
011816 L1B NSG TSX1 1925 2013-10-08T061740.23435	SM	s	strip_010	0	AUTO_APPROVED	Undefined	 ок	0	0	0	
012234 L1B NSG TDX1 11974 2013-10-08T010414.49634	SL	s	spot_077	0	QA_ATTENTION	LIMITED_APPROVAL (set by K.Jahncke: geoFDC, CenOFF 522.12 m, EWP)	 ок	0	0	5	
012520 L1B NSG TDX1 12021 2013-10-08T230743.71100	SM	s	strip_003	0	AUTO_APPROVED	Undefined	 ок	0	0	0	



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# **QA4EO Elements in Operational SAR Missions (cont.)**

#### **Comparison with peers**

 Comparative calibration has been on the agenda of the SAR subgroup since the first meeting in 1989

### **Procedures and Documents Management**

 Implementation of SAR missions follows ECSS or equivalent standards, where documentation is a key topic

## **Data Sharing and Exchange Principles**

• Depends on Data Policy, there is a tendency to free and open access to Level-1b SAR products (e.g. Sentinel-1)



