



# MTG IRS IFC Test Plan

17/05/2019

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# Outline

- Introduction
- Test Data Generation Guidelines
- Level 1OP Test Data
- Level 2OP Test Data
- Commissioning Preparation
- Conclusions

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# Introduction

- The IRS IFC Verification and Validation (V&V) is performed in both *pre-* and *post-launch*.
- The *pre-launch* V&V accounts for:
  - Instrument performance verification.
  - Algorithm performance verification: from single processing element to E2E
  - Operational processor implementation verification: provision of input test data and expected output.
- The *post-launch* V&V corresponds to the commissioning.

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# Test Data Generation Guidelines

Test hierarchy	Test scenario	Spatial Coverage	Instrument Configuration
Single algorithm	Nominal seasonal condition	Single pixel	Ideal Instrument
Single APE	Eclipse	Multiple Pixel	Semi-ideal
L1/L2 E2E processor	Manoeuvre	Full Dwell	Real Instrument
L0+L1	Cold Start	Full LAC	
L0+L1+L2	Standard repeat sequence	FD	
	Alternative repeat sequence	Full Day	
	Different longitude		

# Test Data Generation Guidelines: PDG-S

- The Payload Data Generation (PDG-S) will be able to generate L0 data and is delivered in versioned stages:



# Test Data Generation Guidelines: PDG-S

- PDG-S scenario list for V1 AR

Geometric Profile	Date/Time (#1)	Duration	Orbit	Manoeuvre	TED	Orbit Determination	Micro-vibrations	FPM	Scan	TAS scenario
Perfect	D356 (22/12/2015) 00:00-24:00	24h	Orbit 1	No	None	Perfect	None	Perfect	Perfect	-
Reference	D59 (28/02/2015) 00:00-24:00	72h (#1)	Orbit 2	No	PF, IRS, UVN: D59	Orb Det 1	None	Perfect	Perfect	Reference Extended
Nominal	D59 (28/02/2015) 00:00-24:00	24h	Orbit 2	No	PF, IRS, UVN: D59	Orb Det 1	Simulated	Simulated	Simulated	Nominal
Winter	D356 (22/12/2015) 00:00-24:00	24h	Orbit 2	No	PF, IRS, UVN: D356	Perfect	Simulated	Perfect	Perfect	-
Summer	D172 (21/06/2015) 00:00-24:00	24h	Orbit 2	No	PF, IRS, UVN: D172 (SS)	Perfect	Simulated	Perfect	Perfect	-
Eclipse	D79 (20/03/2011) 12:00 D79 -12:00 D80	24h	Orbit 2	No	PF, IRS, UVN: EQ	Orb Det 1	Simulated	Simulated	Simulated	Eclipse
Yaw-Flip	D79 (20/03/2011) 12:00 D79 -12:00 D80	48h	Orbit 2	YF at 9 am	PFI, IRS, UVN: Yaw flip	Orb Det 1	Simulated	Simulated	Simulated	Post Yaw-Flip
NS Manoeuvre (#3)	D356 (22/12/2011) 21:00 D356-21:00 D359 (24 hours for UVN)	18-24 hours	Orbit 2	NS at 9 pm	PF, IRS, UVN: WS	Orb Det 2	Simulated	Simulated	Simulated	Post NS Manoeuvre
EW Manoeuvre (#3)	D59 (28/02/2015) 20:00-24:00	4 hours	#4	EW	PF, IRS, UVN: D59	Perfect	Simulated	Perfect	Perfect	-
RW Offload (#3)	D59 (28/02/2015)	4 hours	#4	RW	PF, IRS, UVN: D59	Perfect	Simulated	Perfect	Perfect	-
High Orbit Inclination	D59 (28/02/2015) 00:00-24:00	24 hours (#1)	Orbit 3	No	PF, IRS, UVN: D59	Orb Det 1	Simulated	Simulated	Simulated	2.5° inclination
Extended Longitude	D59 (28/02/2015) 07:00-13:00	6 hours (#1)	Orbit 4	No	PF, IRS, UVN: D59	Perfect	Simulated	Perfect	Perfect	Extended Longitude
Moon	D82 (22/03/2016) 10:00-13:00	3 hours	Orbit 1	No	PF, IRS, UVN: D82	Perfect	Simulated	Perfect	Perfect	-

# Test Data Generation Guidelines: PDG-S

## Orbit

Orbit 1 = 0° longitude, 0° inclination, 0° eccentricity

Orbit 2 = 0.05° longitude, 1° inclination, 4e-4° eccentricity, ? RA of Ascending Node, ? Argument of perigee

Orbit 3 = 0.05° longitude, 2.5° inclination, 4e-4° eccentricity, ? RA of Ascending Node, ? Argument of perigee

Orbit 4 = 10°E longitude, 1° inclination, 4e-4° eccentricity, ? RA of Ascending Node, ? Argument of perigee

## Orbit Determination

Perfect = Perfect knowledge of the orbit is assumed

Orb Det = Orbit determination on ground

## Micro-vibrations

None = No micro-vibration disturbances are applied

Simulated = Micro-vibration disturbances are applied

## Fine Pointing Mode (FPM)

Perfect = No attitude disturbances are applied

Simulated = Estimated attitude with disturbances

## Scan

Perfect = Estimated scan position is equal to the actual scan position

Simulated = Estimated scan position is as derived from the scan controller telemetry

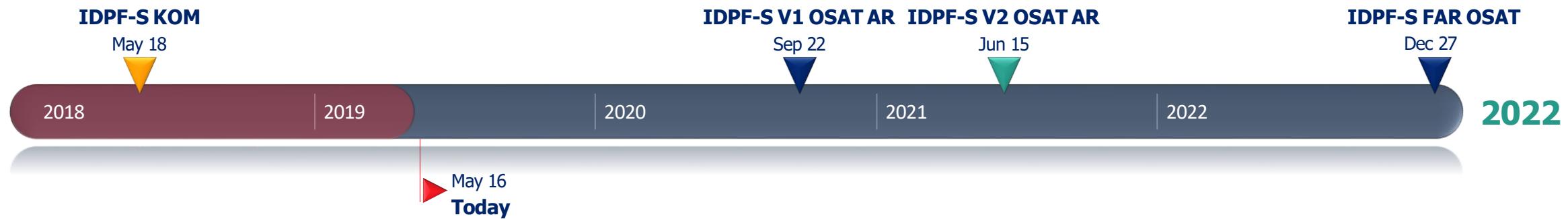
## Thermo-Elastic Distortion (TED)

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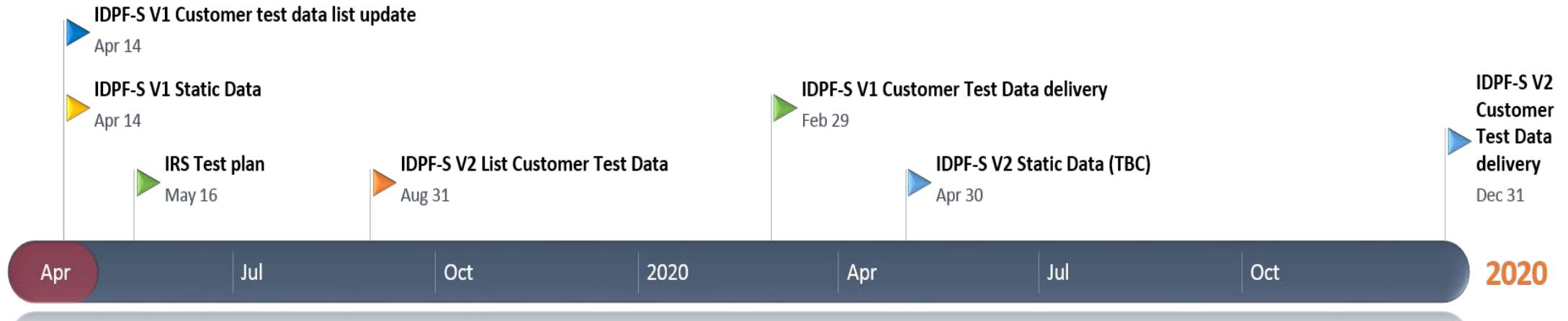
# Level 1 Test Data

- The IDPF-S IRS L1OP is developed accounting for 2 main phases, namely V1 and V2, linked to the PDR and CDR:



# Level 1 Test Data

- **Customer Acceptance Test Data to be developed accordingly:**



# Level 1 Test Data

- The V1 algorithms are listed here:

APE	PS Function	Phase
L1B APE	IDPF-IRS-PRE-PRO-L0X : L0 Parameter Extraction	V1
	IDPF-IRS-PRE-PRO-IDD : Instrument Data Decompression	V1
	IDPF-IRS-PRE-PRO-BIR : Band Image Reconstruction	V1
	IDPF-IRS-PRE-PRO-IDF : Initial Data Flagging	V1
	IDPF-IRS-PRE-PRO-SPG : L1A Spectra Generation	V1
	IDPF-IRS-L1B-EVP-EBE: EV Background Estimation	V1
	IDPF-IRS-L1B-EVP-RAD: Apply Radiometric Correction	V1
	IDPF-IRS-L1B-EVP-SCC: Apply Spectral Correction	V1
	IDPF-IRS-L1B-EVP-IRC: DC Image EV Radiometric Correction	V1
	IDPF-IRS-POP-PCA-CSR : Calculate PC Scores and Residuals	V1
Spectral Shift	IDPF-IRS-L1B-SPC-IIG: Intermediate Interferogram Generation	V1
	IDPF-IRS-L1B-SPC-SFD: Scale Factor Determination	V1
	IDPF-IRS-L1B-SPC-SSP: Short Term Scale Predictor Estimation	V1
	IDPF-IRS-L1B-AUX-DRA: Determine RSF Position and Amplitude	V1
	IDPF-IRS-L1B-AUX-DSP: Determine Spectral Feature Positions	V1

# Level 1 Test Data: V1 AR

<b>Identifier</b>	<b>IRS-L1B-00</b>
<b>Title</b>	L1B APE Test
<b>Summary</b>	V1 test at APE level
<b>Test Purpose</b>	<p>The aim of this test is:</p> <ul style="list-style-type: none"> <li>- to assess the performance of the L1B APE</li> <li>- interfaces between algorithms</li> <li>- the timeliness performances</li> <li>- the correct behaviour of the main algorithms (spectra generation, radiometric correction, spectral correction)</li> </ul>
<b>Test Details</b>	<p>Input:</p> <ul style="list-style-type: none"> <li>- the radiometrically and spectrally perturbed input dwells</li> <li>- the Radiometric calibration coefficients</li> <li>- the spectral calibration coefficients</li> </ul>
<b>Success criteria</b>	Intermediate and final outputs to be provided to EUM to be analysed by EUM scientific team
<b>Data Size</b>	Dwell
<b>Data Generation</b>	IRASS, PDG-S, other
<b>Data Format</b>	NetCDF-4 and/or PDG-S format

<b>EUM IRS1PS Identifier</b>	<b>IDPF-IRS-POP-PCA-CSR : Calculate PC Scores and Residuals</b>
<b>Title</b>	Principal Component
<b>Summary</b>	Hybrid approach test
<b>Test Purpose</b>	Performance of the PCs compression at algorithm level according to the hybrid approach.
<b>Test Details</b>	<p>Input:</p> <ul style="list-style-type: none"> <li>- simulated radiances coming from RTTOV</li> <li>- eigenvector static data will be also provided.</li> </ul>
<b>Success criteria</b>	The expected output shall be generated by the IDPF-S algorithm and TAS will provide it to EUM to be analysed by EUM scientific team.
<b>Data Size</b>	Dwell
<b>Data Generation</b>	RTTOV model
<b>Data Format</b>	NetCDF

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# Level 2 Test Data

- The L2PF Phase 2 is in the finalization of Price conversion negotiation

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# Commissioning Preparation

- A first discussion on the commissioning testing plan generated the following schedule:



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# Conclusions

- The MTG IRS Test Data Plan is a living document.
- The IDPF-S Test Data for V1 AR already defined and To Be Implemented
- The IDPF-S Test Data for V2 AR to be defined by CDR Data Pack (31/09/2019)
- The L2PF Price Conversion is under negotiation, so test data plan to be defined after the output of negotiation
- PDG-S not yet available at EUM

A hand holding a white marker is writing the words "THANK YOU" in large, bold, white letters on a dark green chalkboard. The board is covered with various international words for "thank you" like "Kiitos", "Grazie", "Merci", etc., written in different styles and colors. The background features a faint watermark of a person's face.