

→ ACMF - the Calibration and Monitoring Facility of ESA's Atmospheric Dynamics Mission ADM-Aeolus



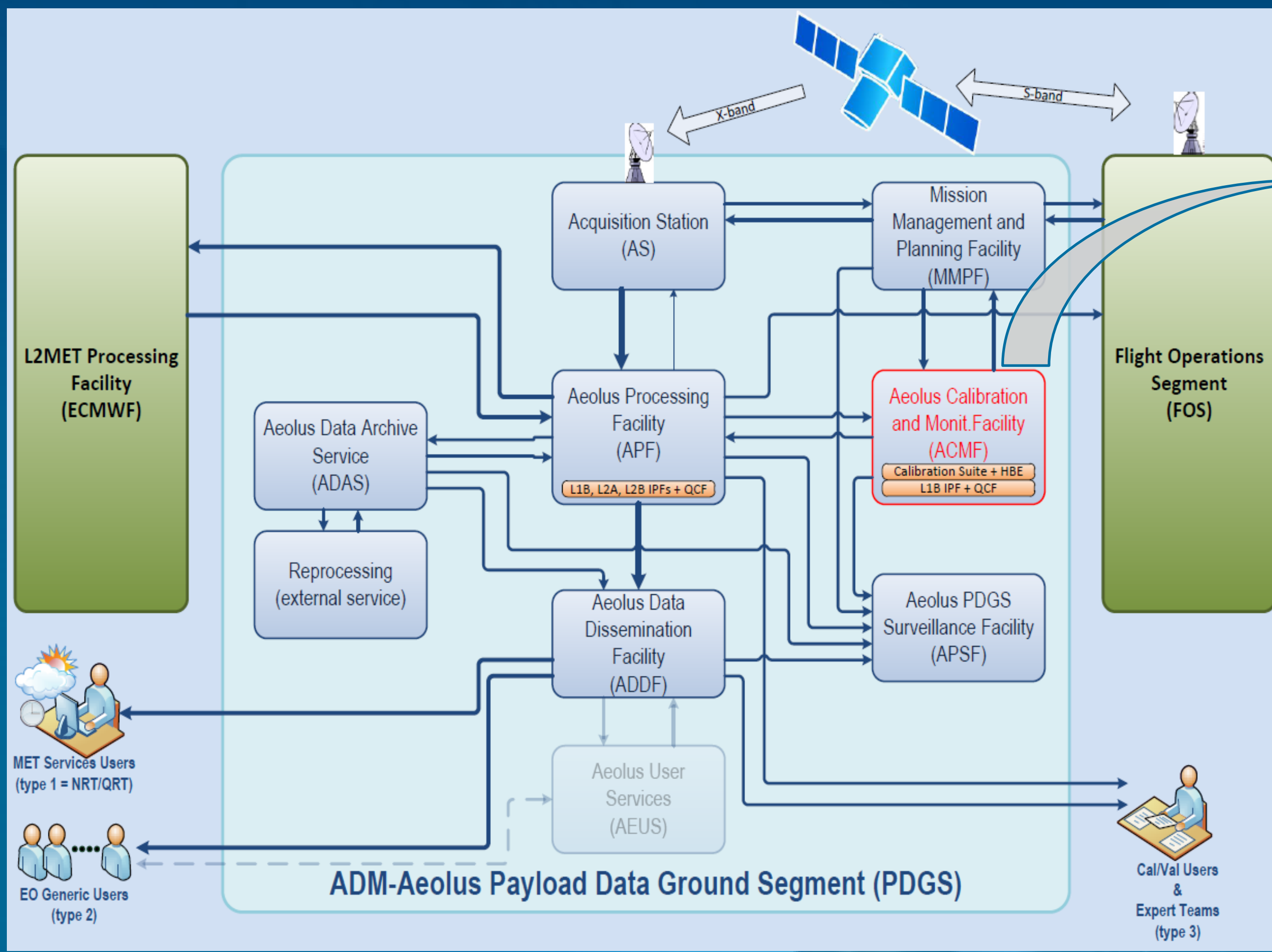
→ ESA'S WIND MISSION

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→ Abstract

ESA's Wind Mission ADM-Aeolus is an upcoming Earth Explorer Satellite from ESA's Living Planet Programme, carrying the Doppler Wind Lidar ALADIN, dedicated to global wind profile measurements. The Aeolus Calibration and Monitoring Facility is located in ESA ESRIN and it is part of the Aeolus Payload Data Ground Segment (PDGS). It will be in charge of the generation and archiving of calibration and auxiliary Aeolus mission products needed for the Level 1 and Level 2 wind data generation. Moreover, the facility includes in-orbit maintenance algorithms generating files for corrective onboard instrument parameter settings. The facility is involved in both Near Real Time (NRT) and subsequent reprocessing scenarios, providing tools for the interactive, as well as routine and long-term data quality monitoring.

→ ACMF role in the ADM-Aeolus Payload Data Ground Segment



ADM-Aeolus Ground Segment and ACMF role

The Aeolus Calibration and Monitoring Facility (ACMF) is part of the Aeolus Payload Data Ground Segment (PDGS). It is linked to the Aeolus-data Processing (APF), -PDGS Surveillance (APSF), -Mission Management and Planning (MMPF) facilities of the PDGS through file exchange interfaces. The ACMF will support the APF in L1B, L2A and L2B data production by means of instrument auxiliary calibration data generation, configuration management, as well as data dissemination and takes care of the automatic as well as on-demand data monitoring. Furthermore, it will provide the MMPF with a set of on-board parameters (to be transmitted to the satellite payload via the FOS), to optimize the in-flight instrument performance and operation. Finally, it will report to the APSF all the system information needed to spot potential anomalies in the PDGS workflow and data orchestration, actively participating in increasing the PDGS reliability. The ACMF will offer an on demand data analysis environment able to access the full mission data archive. The facility is composed of two main subsystems associated to its high level functionalities: The calibration- (ACMF-OC) and the monitoring subsystem (ACMF-OS/A).

→ ACMF as Calibration Facility: The ACMF-OC Subsystem

The ACMF-OC is in charge for the auxiliary calibration products and payload on board parameters generation. The processing system is compatible to the ESA Generic Instrument Processing Facility guidelines allowing an easy integration of processors developed following ESA guidelines. The ACMF-OC subsystem will provide a set of L1B calibration products as results of processing data from the associated satellite-(calibration)-operation modes :

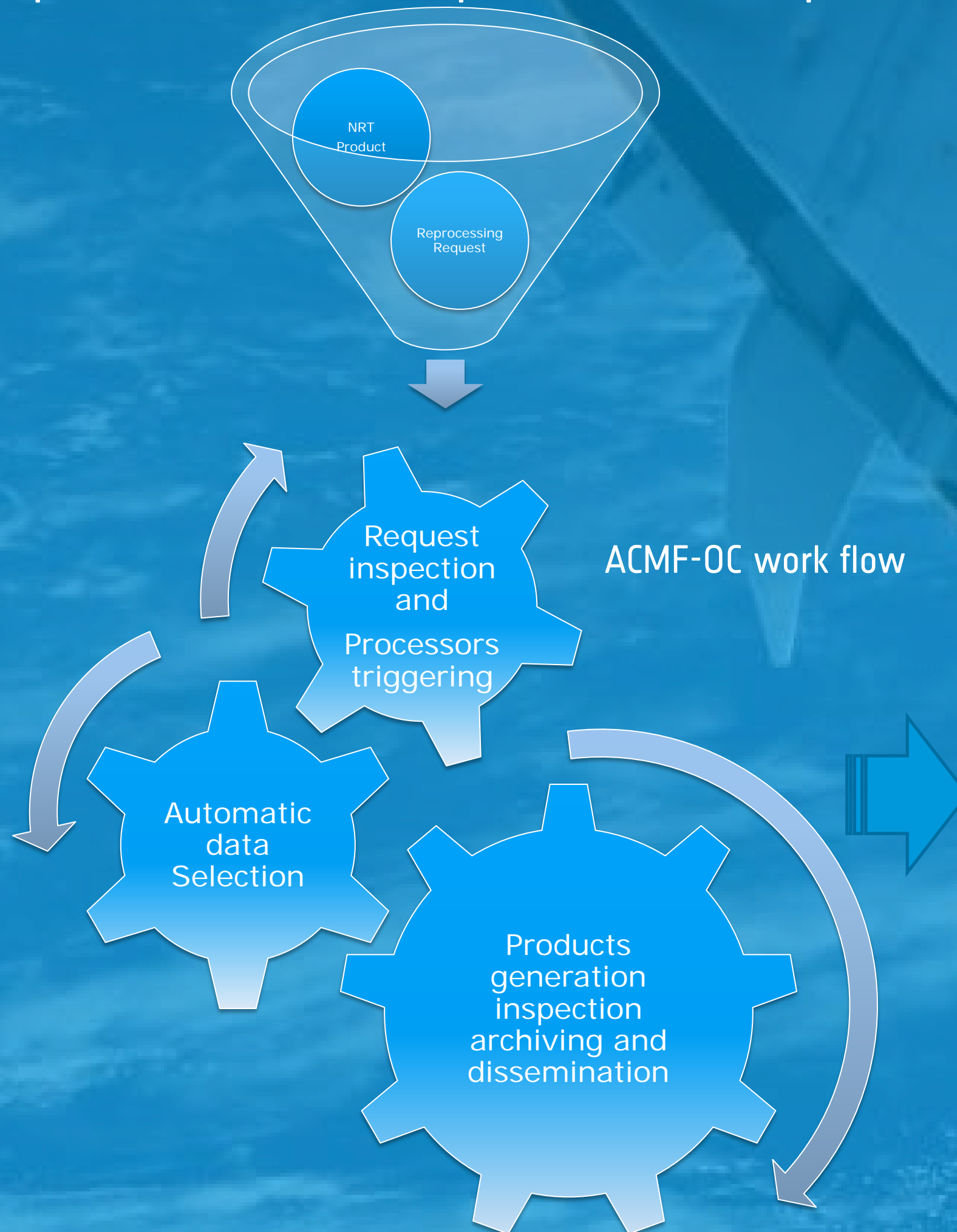
- On-demand calibration
 - Internal Spectral Registration (AUX_ISR_1B)
 - Dark Current Calibration (AUX_DCC_1B)
 - Dark Current in Memory Zone (AUX_DMCZ1B)
 - Instrument Auto Test (AUX_IAT_1B)
 - Off-line Wind Velocity (AUX_OWV_1B)
 - Laser Beam Monitoring (AUX_LBM_1B)
- Routine calibration
 - Instrument Defocus Characterization (AUX_IDC_1B)
 - Mie and Rayleigh Response Calibration (AUX_MRC_1B and AUX_RRC_1B)
 - Zero Wind Calibration (AUX_ZWC_1B)

Four additional processor will support the L1 and L2 processing:

- The HBE providing the Harmonic (wrt orbital phase) Bias coefficient (AUX_HBE_1B)
- The CSR providing the Corrected Rayleigh spectrometers Spectral Registration (AUX_CSR_1B)
- The RBC providing the info needed for the Rayleigh-Brillouin correction scheme (AUX_RBC_L2)
- The CAL providing the CALibration function and constants for the processing of the "optical" data from Aeolus signal (AUX_CAL_L2).

On top of the calibration products generation, a subset of routine and maintenance algorithms, suggested by the instrument provider, will be run to provide a set of instrument setting parameters for the optimal ALADIN operation.

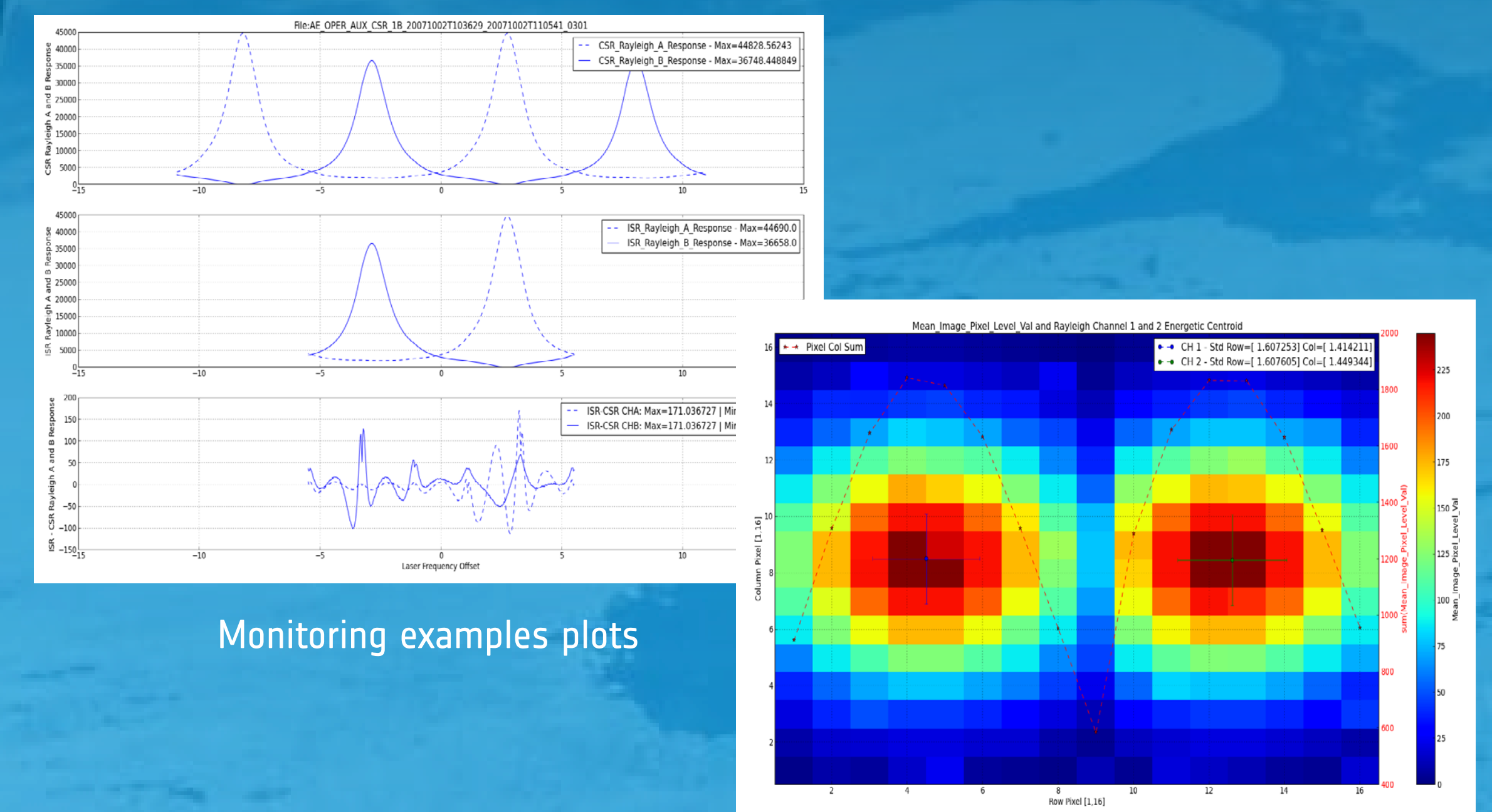
The ACMF-OC has been designed to support both Near Real Time and Reprocessing scenarios at the same time, allowing a safe handling of the two processing flows and prioritizing the NRT data production over the reprocessing one. Moreover, it supports a proper baseline and processors versions handling



L1B	CSR
AUX_DCC_1A/B AUX_DCMZ1A/B AUX_IAT_1A/B AUX_IDC_1A/B AUX_IRC_1A AUX_ISR_1A/B AUX_MRC_1B AUX_NOU_1A AUX_OWV_1A/B AUX_RRC_1B AUX_ZWC_1B AUX_LBM_1B	AUX_CSR_1B AUX_PRR_1B
	CAL
	AUX_CAL_L2
	RBC
	AUX_RBC_L2
HBE	CTI
AUX_HBE_1B	Calibration Table

→ ACMF as Monitoring Facility: The ACMF-OS/A Subsystems

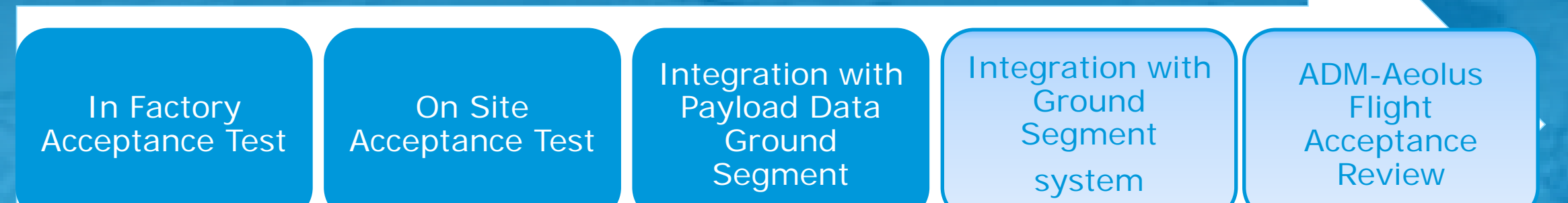
The ACMF-OS enables to screen, via a set of pre-defined analysis, the products received and produced by the Aeolus PDGS, thus providing a first level of anomaly detection and handling support. In case of a detected anomaly, the ACMF-A will offer an interactive and integrated environment to allow the issue investigation and proper routing to the Instrument Experts, Quality Working Groups and the satellite provider. The system has been designed to allow an easy integration of additional monitoring routines coded in different languages (e.g. IDL and Python). The ACMF-OS will prioritize the screening and report generation for data coming from the Near Real Time processing flow and at the same time will take care of the reprocessed products screening.



Monitoring examples plots

→ ACMF Development Status

The ACMF is accepted and integrated in the ADM-Aeolus Payload Data Ground Segment (@ESA ESRIN). A further test campaign is currently on going in view of the upcoming integration in the Aeolus Ground Segment operational environment.



ACMF status and next steps

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