argo data management

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Processing BGC-Argo particles and plankton in the aux directory at the Coriolis DAC

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ARGO

part of the integrated global observation strategy

Argo data management
Processing BGC-Argo particles and plankton in the aux directory at the Coriolis DAC

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History of the document

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1.1	September 2019	Marc Picheral	Re-writing
1.1	2019/09/20	Marc Picheral	Editing
1.1	2019/09/23	Marc Picheral	Editing
1.1	2019/10/16	Marc Picheral	QC and process
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1.1	2020/01/26	Marc Picheral	Minor corrections
1.1	2020/09/18	Marc Picheral	Corrections in relation with netCDF specs.
1.1	2020/09/23	Marc Picheral	Corrections in relation with netCDF specs.
1.2	2022/06/20	Marc Picheral	Update firmwares 2022
2.0	2022/10/18	Camille Catalano	New description of data
2.1	2022/12/07	Camille Catalano	1pix and old versions
2.2	2023/02/28	Catherine Schmechtig	Change parameter names and correct configuration parameter names and units
2.3	2023/03/28	Camilla Catalano	Add biovolume and change abundance into concentration
2.4	2023/12/08	Camille Catalano	Details on 2021 grey level old process
2.6	2024/02/01	Catherine Schmechtig, Camille Catalano, jean-Philippe Rannou	Last typos corrected, biovolume corrected

Preamble

This document does not address the issue of quality control (either real-time or delayed mode) for the size and abundance of the particulate matter and plankton. As a preliminary step towards that goal, this document seeks to ensure that all countries deploying floats equipped with UVP6 sensors document the data and metadata related to these floats properly.

1. Introduction

The only method used to date to measure the size and abundance of the Large Particulate Matter (LPM) and zooplankton with sensors mounted on profiling floats is based on imagery.

The only instrument that can be fixed on the outside of a profiling float and connected to ensure power and communication is the UVP6-LP. It is a miniaturization of the UVP5 marketed since 2008, whose data are gathered into the EcoPART database.

The purpose of this document is to introduce the measures provided by the sensor and their post-processing.

2. How does UVP6 works

The UVP6 is a 5Mp digital camera-based instrument. It makes images at a fixed distance from the porthole in a well collimated perpendicular light beam.

The instrument encompasses a specific camera and light which allows high performance using very low power.

The light is produced by a 630 nm flashing laser diode synchronized with the camera. The diode current is regulated to compensate the variations of the seawater temperature.

The camera contains a very low power supervising processor which monitors the system status and communicates with the float. The float selects the proper UVP configuration and triggers the acquisition of the images by sending the pressure and time information. When triggered, the supervising processor activates the processing unit to acquire the image. It then processes it to provide data on each object in the imaged volume. The instrument optionally sorts the larger objects in up to 40 categories using its internal algorithms.

The power required by the instrument is directly correlated with the frequency of the image acquisition. The supervising processor drains less than 20mW. The image acquisition and process require less than 800mW during approximately 0.7 second. The maximum image frequency is thus 1/0.7 Hz.

The instrument transmits its essential metadata when powered and also on purpose when queried by the float.

Thanks to its internal calibration factors Aa and Exp, the instrument converts individual object sizes in pixels into scientific units using the equation:

$$Area_{mm^2} = (Aa \times Area_{pixels}{}^{\wedge EXP}) / 1000000$$

$$ESD_{mm} = 2 \times (Area_{mm^2} / PI)^{\wedge 0.5}$$

$Area_{pixels}$ = measured area after segmentation using the threshold (#pixel)

$Area_{mm^2}$ = measured area converted (mm^2)

ESD_{mm} = equivalent spherical diameter (mm)

The instrument also regularly processes images acquired without light activation in order to measure the internal noise and the possible sun light perturbation in the surface layers.

The synthetic data issued by the image processor are returned to the supervising processor and transferred to the float along with metadata while raw data and images of identified objects are recorded in the 400 Gb memory of the instrument in case of recovery.

These data are:

- Counts of noise in 5 classes.
- Counts of particles in 18 classes ranging from 50.6 µm to more than 2.5 mm.
- Mean grey level of the particles sorted in the 18 classes
- Counts of objects classified in up to 40 categories
- Mean volume of objects classified in up to 40 categories
- Grey level of objects classified in up to 40 categories

The metadata and profile data are processed by the float to provide summed results per pressure slices.

The parking data are averaged by time.

The instrument is internally parametrized using a metadata internal table (for calibration and sensor reference) and up to 10 acquisition tables to set the image acquisition parameters. These tables are standardized for float operations and loaded prior to deployment. The float can select the table according to its dive programming.

The instrument is more detailed in Picheral et al. 2022.

3. UVP6 data processing

3.1. Computed concentrations

The concentrations of LPM and TAXO data are computed at the DAC level from the slice particles and objects count (NB_SIZE_SPECTRA_PARTICLES and NB_OBJECTS_CATEGORY), the number of images in the slice (NB_IMAGE_PARTICLES and NB_IMAGE_CATEGORY) and the imaged volume CONFIG_UvpImageVolume_L. The results are concentration in #/L.

CONCENTRATION_LPM (#/L) = NB_SIZE_SPECTRA_PARTICLES / (NB_IMAGE_PARTICLES * CONFIG_UvpImageVolume_L)

CONCENTRATION_CATEGORY (#/L) = NB_OBJECT_CATEGORY / (NB_IMAGE_CATEGORY * CONFIG_UvpImageVolume_L)

3.2. Computed biovolume

The biovolumes of TAXO data are computed at the DAC level from the slice concentrations of TAXO data (CONCENTRATION_CATEGORY), the average volume of objects in the slice and the uncalibrated pixel size. The result is in µm^3/mL.

BIOVOLUME_CATEGORY (µm^3/mL) = CONCENTRATION_CATEGORY * OBJECT_MEAN_VOLUME_CATEGORY * Pixel_Size^3 / 1000

3.3. One-pixel size objects

Data about objects with a size of one pixel (class 1) is also transmitted but is very noisy. The signal-to-noise ratio S/N is most of the time far less that one. The noise is mostly from the instrument, can be variable and so is difficult to subtract.

It is strongly not recommended to use this data. It will be utilized to monitor the S/N, for sun light impact for example.

3.4. Sun light impact quality control

The data might be polluted by external light, like the sun when the instrument is close to the surface. The black data can be used to check the LPM data and to detect the usable pressure range where using the LPM and TAXO data.

The second class of BLACK_NB_SIZE_SPECTRA_PARTICLESis analyzed to identify the inflexion of the vertical profile which indicate the limit of the sun light perturbation. Polluted data should be removed.

3.5. Pressure offset

Depending on where the sensor is mounted on the float, the UVP6 and the CTD are not sampling the same water. This distance between the CTD pressure sensor and the UVP6 imaged field is reported in the METADATA and permits to adjust the pressure indicated in the data vectors.

The CONFIG_UvpVerticalPressureOffset_dbar variable from the hardware metadata gives this offset to apply to the data pressure.

PRES_ ADJUSTED = **PRES** - **CONFIG_UvpVerticalPressureOffset_dbar**

3.6. Taxonomic classes

The taxonomic classes are defined by the taxonomic metadata. For each class an Ecotaxa ID is given. The identified taxonomic class corresponds to this Ecotaxa ID and some of the children classes

(https://ecotaxa.obs-vlfr.fr/api/docs#/Taxonomy%20Tree/query_taxa). Precisions can be found in the Ricour F. (2023).

4. Description of DAC metadata and data

The sensor provides metadata and data that are transmitted by the float. They are sorted in four vectors. The tree last ones are function of pressure:

- Metadata
- Black data (i.e. noise)
- Large Particulate data
- Taxonomic data

In addition, there is also the data processed at DAC level.

4.1. Metadata

Each sensor is individually calibrated by the manufacturer and each instrument goes along with a calibration file. A UVP web database (http://uvpdb.ecotaxa.org/app/login.php) stores all sensor information including calibrations which are freely available.

The metadata are transmitted by the float at the beginning of each mission and are archived along with the data, because they are absolutely necessary for the process of the concentrations from the transmitted counts.

The metadata are used by the instrument to define the acquisition parameters and to internally process the measurements.

The use of the metadata is described in the data processing section of this document.

Crucial configuration metadata parameters are highlighted in **bold** in the following tables.

The instrument metadata are spread in one Hardware table, ten Acquisition tables and twoTaxonomic tables. The float piloting application permits to select one of the ten Acquisition table for each of the depth zone. An acquisition table can point to one of the Taxonomic tables.

4.1.1. Taxonomic classes

The taxonomic classes configured in the float are provided within the following parameters (see https://ecotaxa.obs-vlfr.fr/api/docs#/Taxonomy%20Tree/query_taxa).

ARGO NAME	Type	Explanation
UVP_ECOTAXA_NAMES	text	Coma separated list of ECOTAXA taxon names managed in the current file
UVP_ECOTAXA_IDS	text	Coma separated list of ECOTAXA taxon Ids managed in the current file

4.1.2. Sensor metadata

UVP6 NAME	ARGO NAME	Type	Explanation
Camera_ref	**SENSOR_SERIAL_NO**	**Text**	**Sensor serial number (XXXXXXLP)**
	SENSOR	Text	PARTICLES_PLANKTON_CAMERA
	SENSOR_MAKER	Text	HYDROPTIC
	SENSOR_MODEL	Text	UVP6-LP

4.1.3. Configuration parameters relative to hardware (version > 2022.01)

UVP6 NAME	ARGO NAME	Type	Units	Explanation
Acquisition_mode	CONFIG_UvpAcquisitionMode_NUMBER	integer		0: SUPERVISED mode, 1: AUTONOMOUS mode (including CTD mode), 2: TIME-programmed mode
Default_acquisition_configuration	CONFIG_UvpAcquisitionModeDefault	text		Name of the acquisition configuration automatically launched when Acquisition_mode = 1
Delay_after_power_up_on_time_mode	CONFIG_UvpDelayPowerModeTime_minutes	integer	minute	Optional delay before starting image acquisition when Acquisition_mode = 1 (AUTONOMOUS)
Light_ref	CONFIG_UvpLightSn	text		Light unit serial number
Correction_table_activation	CONFIG_UvpCorrectionTableActivation_NUMBER	integer		Selection of the lighting correction LUT -> 0: no correction, 1: light unit correction #1, 2: light unit correction #2 (default : 1)
Time_between_lighting_trigger_and_acquisition	CONFIG_UvpLightTriggerAcquisitionTime_usec	integer	µS	Delay between light unit trigger and image sensor shutter
Pressure_sensor_ref	CONFIG_UvpPresSn	text		Pressure sensor serial number (empty if no sensor installed)
Pressure_offset	**CONFIG_UvpVerticalPressureOffset_dbar**	**float**	**dbar**	**Vertical distance between the image plan and the pressure measurement point (>0 if pressure sensor above image field, if undefined, set 999)**
Storage_capacity	CONFIG_UvpStorageCapacity_Mbyte	integer	MB	SD card storage capacity, automatically updated by

				UVP6 when parameters are modified, do not edit
Minimum_remaining_memory_for_thumbnail_saving	CONFIG_UvpMinSecuredForThumbSavingCapacity_Mbyte	integer	MB	Minimal memory remaining in the SD card to keep saving images or vignettes, do not edit
Baud_Rate	CONFIG_UvpBaudRateCode_NUMBER	integer		UVP6 RS232 baud rate selection -> 0: 9600 bauds, 1: 19200 bauds, 2: 38400 bauds
Black_level	**CONFIG_UvpBlackLevel_NUMBER**	integer	12 bits gray level	Image sensor black level parameter
Shutter	**CONFIG_UvpShutter_usec**	integer	µS	Image sensor integration time (shutter)
Gain	**CONFIG_UvpGain_dB**	integer	dB	Image sensor gain, do not edit
Threshold	**CONFIG_UvpThreshold_NUMBER**	integer	8 bits gray scale	Threshold for image segmentation (pixels <= Threshold are considered background)
Aa	**CONFIG_UvpSizeToPixelsConversionAa_um^2**	integer	µM²	Calibration parameter (corresponding area in the scene represented by each pixel)
Exp	**CONFIG_UvpSizeToPixelsConversionExp**	float		Calibration parameter (adjusting for specular reflections)
Pixel_Size	**CONFIG_UvpPixelSize_um**	integer	µM	Uncalibrated pixel size (side of the pixel in the image field)
Image_volume	**CONFIG_UvpImageVolume_L**	float	L	Image volume
Calibration_date	CONFIG_UvpCalibrationDate_YYYYMMDDHHMM	date	YYYYMMDDHHMM	Calibration date for the values in this table
Last_parameters_modification	CONFIG_UvpLastUpdateConfigDate_YYYYMMDDHHMM	date	YYYYMMDDHHMM	Automatically updated by UVP6 when hardware parameters are modified
Operator_email	CONFIG_UvpHardwareEmail	text	email	Identification of the operator filling this configuration table
Min_esd_class_01	CONFIG_UvpMinEsdClass01_um	float	µM	Lower Equivalent Spherical Diameter for class 01
Min_esd_class_02	CONFIG_UvpMinEsdClass02_um	float	µM	Lower Equivalent Spherical Diameter for class 02
…	…	…	…	…
Min_esd_class_17	CONFIG_UvpMinEsdClass17_um	float	µM	Lower Equivalent Spherical Diameter for class 17
Min_esd_class_18	CONFIG_UvpMinEsdClass18_um	float	µM	Lower Equivalent Spherical Diameter for class 18

Firmware_version	UVP_FIRMWARE_VERSION	text	verYYYY.nn	Firmware version : prefix, year and no

4.1.4. Configuration parameters (per acquisition zone) relative to acquisition (version > 2022.01)

UVP6 NAME	ARGO NAME	Type	Units	Explanation
Configuration_name	CONFIG_UvpDepthZone<N>AcqConfName	text		Name used to launch this configuration
PT_mode	CONFIG_UvpDepthZone<N>PtMode_NUMBER	integer		0: Triggered by vector, 1: Asks for pressure and time, 2: Use UVP6 Acquisition_frequency, 3: CTD mode (mandatory Pressure Sensor)
Acquisition_frequency	CONFIG_UvpDepthZone<N>SampleRateMax_hertz	float	Hz	Acquisition frequency (maximum value)
Frames_per_bloc	**CONFIG_UvpDepthZone<N>FramesPerBloc_NUMBER**	**integer**	**frame**	**Nb of frames to accumulate and synthesize to send**
Pressure_for_auto_start	CONFIG_UvpDepthZone<N>PressureAutoStart_dbar	integer	dbar	When in CTD mode (PT_mode= 3), pressure value to automatically start the acquisition
Pressure_difference_for_auto_stop	CONFIG_UvpDepthZone<N>PressureAutoStop_dbar	integer	dbar	When in CTD mode (PT_mode= 3), pressure drop from deepest value to automatically stop the acquisition
Result_sending	CONFIG_UvpDepthZone<N>ResultSending_LOGICAL	boolean		0/false: results are never sent - 1/true: synthesized results are sent through RS232 after each bloc
Save_synthetic_data_for_delayed_request	CONFIG_UvpDepthZone<N>SyntheticDataSaving_LOGICAL	boolean		0/false: do not save - 1/true: save synthetic data for a potential delayed request (useful only for troubleshooting)
Save_images	CONFIG_UvpDepthZone<N>SavingImages_NUMBER	integer		How to save Images -> 0: don't save, 1: save whole raw image, 2: save selected vignettes only
Vignetting_lower_limit_size	CONFIG_UvpDepthZone<N>MinVignettingLimitESD_um	integer	µM	When saving vignettes (Save images= 2), minimum object size (ESD) to save vignette, utilizes Aa and Exp, (default : 645)
Appendices_ratio	CONFIG_UvpDepthZone<N>AppendicesRatio	float		When saving vignettes (Save images= 2), vignette size to actual object size ratio (default : 1.5)

Interval_for_measuring_background_noise	CONFIG_UvpDepthZone<N>BackgroundNoiseBloc_NUMBER	integer	bloc	Background noise measured every 'interval' (bloc acquired without flashing). Disabled if zero
Image_nb_for_smoothing	CONFIG_UvpDepthZone<N>FrameNumberForSmoothing_NUMBER	integer	frame	Nb of images to measure temperature (for safety stop) and average particle abundance for the analog output
Analog_output_activation	CONFIG_UvpDepthZone<N>AnalogOutput_LOGICAL	boolean		Activation of the particle abundance analog output : 0/false: disabled - 1/true
Gain_for_analog_out	CONFIG_UvpDepthZone<N>AnalogOutputGain_NUMBER	integer	object	Smoothed number of counted objects for 5 volts analog output voltage
Maximal_internal_temperature	CONFIG_UvpDepthZone<N>TemperatureMax_degC	integer	°C	Maximum internal temperature to cause a security stop
Operator_email	CONFIG_UvpDepthZone<N>ConfigAcqEmail	text	email	Identification of the operator filling this configuration table
Aux_mode	CONFIG_UvpDepthZone<N>AuxOutputMode_NUMBER	integer		Auxiliary output activation mode (0 : disabled, 1 : enabled all sequence, 2 : enabled during Aux_param_1 at the start of the acquisition and before the start of the sequence, during Aux_param_2 after the sequence and before the end of the acquisition and 3 : enabled and no image processed during the sequence)
Aux_param_1	CONFIG_UvpDepthZone<N>AuxOutputStartDuration_seconds	integer	second	Duration of activation for mode 2 at the start of the acquisition
Aux_param_2	CONFIG_UvpDepthZone<N>AuxOutputEndDuration_seconds	integer	second	Duration of activation for mode 2 at the end of the acquisition
Taxo_conf	CONFIG_UvpDepthZone<N>TaxoTable	text		Taxonomic classification configuration for this acquisition ("NO_RE" when embedded recognition is disabled)
Remaining_memory	CONFIG_UvpDepthZone<N>RemainingMemory_Mbyte	integer	MB	SD card remaining memory at the start of the acquisition

4.1.5. Configuration parameters for parking drift phase relative to acquisition (version > 2022.01)

UVP6 NAME	ARGO NAME	Type	Units	Explanation

Configuration_name	CONFIG_UvpParkDriftPhaseAcqConfName	text		Name used to launch this configuration
PT_mode	CONFIG_UvpParkDriftPhasePtMode_NUMBER	integer		0: Triggered by vector, 1: Asks for pressure and time, 2: Use UVP6 Acquisition frequency, 3: CTD mode (mandatory Pressure Sensor)
Acquisition_frequency	CONFIG_UvpParkDriftPhaseSampleRateMax_hertz	float	Hz	Acquisition frequency (maximum value)
Frames_per_bloc	**CONFIG_UvpParkDriftPhaseFramesPerBloc_NUMBER**	integer	frame	Nb of frames to accumulate and synthesize to send
Pressure_for_auto_start	CONFIG_UvpParkDriftPhasePressureAutoStart_dbar	integer	dbar	When in CTD mode (PT_mode= 3), pressure value to automatically start the acquisition
Pressure_difference_for_auto_stop	CONFIG_UvpParkDriftPhasePressureAutoStop_dbar	integer	dbar	When in CTD mode (PT_mode= 3), pressure drop from deepest value to automatically stop the acquisition
Result_sending	CONFIG_UvpParkDriftPhaseResultSending_LOGICAL	boolean		0/false: results are never sent - 1/true: synthesized results are sent through RS232 after each bloc
Save_synthetic_data_for_delayed_request	CONFIG_UvpParkDriftPhaseSyntheticDataSaving_LOGICAL	boolean		0/false: do not save - 1/true: save synthetic data for a potential delayed request (useful only for troubleshooting)
Save_images	CONFIG_UvpParkDriftPhaseSavingImages_NUMBER	integer		How to save Images -> 0: don't save, 1: save whole raw image, 2: save selected vignettes only
Vignetting_lower_limit_size	CONFIG_UvpParkDriftPhaseMinVignettingLimitESD_um	integer	µM	When saving vignettes (Save images= 2), minimum object size (ESD) to save vignette, utilizes Aa and Exp, (default : 645)
Appendices_ratio	CONFIG_UvpParkDriftPhaseAppendicesRatio	float		When saving vignettes (Save images= 2), vignette size to actual object size ratio (default : 1.5)
Interval_for_measuring_background_noise	CONFIG_UvpParkDriftPhaseBackgroundNoiseBloc_NUMBER	integer	bloc	Background noise measured every 'interval' (bloc acquired without flashing). Disabled if zero
Image_nb_for_smoothing	CONFIG_UvpParkDriftPhaseFrameNumberForSmoothing_NUMBER	integer	frame	Nb of images to measure temperature (for safety stop) and average particle abundance for the analog output
Analog_output_activation	CONFIG_UvpParkDriftPhaseAnalogOutput_LOGICAL	boolean		Activation of the particle abundance analog output : 0/false: disabled - 1/true

Gain_for_analog_out	CONFIG_UvpParkDriftPhaseAnalogOutputGain_NUMBER	integer	object	Smoothed number of counted objects for 5 volts analog output voltage
Maximal_internal_temperature	CONFIG_UvpParkDriftPhaseTemperatureMax_degC	integer	°C	Maximum internal temperature to cause a security stop
Operator_email	CONFIG_UvpParkDriftPhaseConfigAcqEmail	text	email	Identification of the operator filling this configuration table
Aux_mode	CONFIG_UvpParkDriftPhaseAuxOutputMode_NUMBER	integer		Auxiliary output activation mode (0 : disabled, 1 : enabled all sequence, 2 : enabled during Aux_param_1 at the start of the acquisition and before the start of the sequence, during Aux_param_2 after the sequence and before the end of the acquisition and 3 : enabled and no image processed during the sequence)
Aux_param_1	CONFIG_UvpParkDriftPhaseAuxOutputStartDuration_seconds	integer	second	Duration of activation for mode 2 at the start of the acquisition
Aux_param_2	CONFIG_UvpParkDriftPhaseAuxOutputEndDuration_seconds	integer	second	Duration of activation for mode 2 at the end of the acquisition
Taxo_conf	CONFIG_UvpParkDriftPhaseTaxoTable	text		Taxonomic classification configuration for this acquisition (“NO_RE” when embedded recognition is disabled)
Remaining_memory	CONFIG_UvpParkDriftPhaseRemainingMemory_Mbyte	integer	MB	SD card remaining memory at the start of the acquisition

4.1.6. Configuration parameters (per acquisition zone) relative to taxonomic classification (version > 2022.01)

These metadata are available only when the embedded classification is implemented in the sensor. A Taxonomic table is unique to one classification model.

UVP6 NAME	ARGO NAME	Type	Unit	Explanation
Configuration_name		text		Name used to set this configuration into the field Taxo_conf, from the Acquisition configuration file
Model_reference	CONFIG_UvpDepthZone<N>TaxoModel	text		Taxonomic classification model to be used. Automatically filled during model creation/export

Max_size_for_classification	CONFIG_UvpDepthZone<N>TaxoMaxSize_NUMBER	integer	pixel	Maximum vignette size to perform the embedded classification
Model_nb_classes	CONFIG_UvpDepthZone<N>TaxoModelNbClass_NUMBER	integer		Number of classes used by the classification model. Automatically filled during model creation/export
Taxo_ID_for_class_00	CONFIG_UvpDepthZone<N>TaxoIdClass00_NUMBER	integer		Ecotaxa taxonomic unique identifier for model's class 00
Taxo_ID_for_class_01	CONFIG_UvpDepthZone<N>TaxoIdClass01_NUMBER	integer		Ecotaxa taxonomic unique identifier for model's class 01
…..				
Taxo_ID_for_class_39	CONFIG_UvpDepthZone<N>TaxoIdClass39_NUMBER	integer		Ecotaxa taxonomic unique identifier for model's class 39

4.1.7. Configuration parameters for parking drift phase relative to taxonomic classification (version > 2022.01)

These metadata are available only when the embedded classification is implemented in the sensor. A Taxonomic table is unique to one classification model.

UVP6 NAME	ARGO NAME	Type	Unit	Explanation
Configuration_name		text		Name used to set this configuration into the field Taxo_conf, from the Acquisition configuration file
Model_reference	CONFIG_UvpParkDriftPhaseTaxoModel	text		Taxonomic classification model to be used. Automatically filled during model creation/export
Max_size_for_classification	CONFIG_UvpParkDriftPhaseTaxoMaxSize_NUMBER	integer	pixel	Maximum vignette size to perform the embedded classification
Model_nb_classes	CONFIG_UvpParkDriftPhaseTaxoModelNbClass_NUMBER	integer		Number of classes used by the classification model. Automatically filled during model creation/export
Taxo_ID_for_class_00	CONFIG_UvpParkDriftPhaseTaxoIdClass00_NUMBER	integer		Ecotaxa taxonomic unique identifier for model's class 00
Taxo_ID_for_class_01	CONFIG_UvpParkDriftPhaseTaxoIdClass01_NUMBER	integer		Ecotaxa taxonomic unique identifier for model's class 01
…..				
Taxo_ID_for_class_39	CONFIG_UvpParkDriftPhaseTaxoIdClass39_NUMBER	integer		Ecotaxa taxonomic unique identifier for model's class 39

4.2. Large particulate matter data

This section details the data acquired when the instrument light is ON.

Large Particulate Matter (LPM) data are transmitted over 18 size classes indicated in the transmitted metadata (µM Equivalent Spherical Diameter (ESD)).

These classes are typically [50.8;64[, [64;80.6[, [80.6;102[, [102;128[, [128;161[, [161;203[, [203;256[, [256;323[, [323;406[, [406;512[, [512;645[, [645;813[, [813;1020[, [1020;1290[, [1290;1630[, [1630;2050[, [2050;2580[, [2580;+∞[but they might change according to the sensor version, calibration and resolution.

The transmitted information is counts and mean grey level of the detected objects in each of the 18 classes. The LPM counts are summed of all processed images in the pressure range (slice) defined by the float programming. The grey level is averaged per object.

The mean pressure of the analyzed images, the mean temperature of the sensor and the number of images are also transmitted along with the data to allow quality check and data processing.

ARGO NAME	Type	Unit	Explanation
NB_IMAGE_PARTICLES	NC_SHORT	count	Number of uvp images in the slice
TEMP_PARTICLES	NC_FLOAT	degree_Celsius	Average uvp temperature of the slice
NB_SIZE_SPECTRA_PARTICLES	NC_INT	count	Number of particles per size class of the slice
GREY_SIZE_SPECTRA_PARTICLES	NC_INT	count	Average grey level per particle per size class

4.3. Black measurement data

This section details the data acquired when the instrument light is OFF.

Black data are transmitted over the first five size classes (µM ESD) indicated in the transmitted metadata.

The transmitted information is only the counts in each of the 5 classes.

The pressure of the image and the temperature of the sensor are also transmitted along with the data to allow quality check and data processing.

ARGO NAME	Type	Unit	Explanation

BLACK_NB_IMAGE_PARTICLES	NC_SHORT	count	Number of uvp images without light in the slice
BLACK_NB_SIZE_SPECTRA_PARTICLES	NC_INT	count	Number of particles without light per class of the slice
BLACK_TEMP_PARTICLES	NC_FLOAT	degree_Celsius	Internal temperature of the UVP6 sensor without light

4.4. Taxonomic data (identification)

The identification is optional and selected when programming the float.

When selected, the identification process is made on large objects (> 645 µm ESD, calibrated) from the same lighted images also processed for LPM. It is thus a selected part of the counted particles that will be processed for classification.

The classification of the large objects is internally performed in up to 40 classes, defined by the classification model and so taxonomic metadata.

The taxonomic data can be summed by the float in the different pressure slices than the LPM data. The number of objects of each taxonomic category in each slice is transmitted as well as the average volume and grey level of those objects. The volume of an object is the spherical equivalent volume in pixel^3, pixel size being provided in the hardware metadata.

The mean pressure of the analyzed images, the mean temperature of the sensor and the number of averaged images are also transmitted along with the data to allow quality check and data processing.

ARGO NAME	Type	Unit	Explanation
INDEX_CATEGORY	NC_BYTE		Index of the taxonomy category
NB_CATEGORY	NC_BYTE	count	Number of different taxonomy categories found in the record
NB_IMAGE_CATEGORY	NC_SHORT	count	Number of uvp images in the slice
NB_OBJECT_CATEGORY	NC_SHORT	count	Number of objects of a specific category in the slice
OBJECT_MEAN_VOLUME_CATEGORY	NC_FLOAT	pixel^3	Average volume per object of a specific category in the slice

OBJECT_MEAN_GREY_LEVEL_CATEGORY	NC_INT		Average grey level per object of a specific category in the slice
ECOTAXA_CATEGORY_ID	NC_INT		Id of the taxonomy category

4.5. DAC processed data

Following the large particulate matter data and the taxonomic data, the concentrations and biovolumes are computed at the DAC level, as well as an adjusted pressure. The computing process is described in section 3 above. There are up to 18 size classes for the large particulate matter data and up to 40 taxonomy categories for the taxonomic data.

ARGO NAME	Type	Unit	Explanation
CONCENTRATION_LPM	NC_FLOAT	#/L	Concentration of particles per size class in the slice
CONCENTRATION_CATEGORY	NC_FLOAT	#/L	Concentration of objects per category in the slice
BIOVOLUME_CATEGORY	NC_FLOAT	micrometer^3/ml	Biovolume of objects per category in the slice

5. Changes from older versions

This document is for a float with a uvp6 with a more recent version than ver2022.01. Older versions have changes in configuration frames. Functioning and data frame stay the same for the UVP6 version 2022.01 (NKE float USEA version 1.02.002). UVP6 version older than 2022.01 does not have embedded classification and the LPM data is averaged by the number of images.

The changes are listed in this section for information.

5.1. UVP6 version 2022.01

The 2022.01 version has small changes in the HWconf frame and the ACQconf frame compared to more recent versions. It misses the *Firmware_version* variable in the HWconf frame and the *Aux_mode, Aux_param_1* and *Aux_param_2* variables in the ACQconf frame.

5.1.1. Configuration parameters relative to hardware:

UVP6 NAME	ARGO NAME	Type	Units	Explanation

Acquisition_mode	CONFIG_UvpAcquisitionMode_NUMBER	integer		0: SUPERVISED mode, 1: AUTONOMOUS mode (including CTD mode), 2: TIME-programmed mode
Default_acquisition_configuration	CONFIG_UvpAcquisitionModeDefault	text		Name of the acquisition configuration automatically launched when Acquisition_mode = 1
Delay_after_power_up_on_time_mode	CONFIG_UvpDelayPowerModeTime_minutes	integer	minute	Optional delay before starting image acquisition when Acquisition_mode = 1 (AUTONOMOUS)
Light_ref	CONFIG_UvpLightSn	text		Light unit serial number
Correction_table_activation	CONFIG_UvpCorrectionTableActivation_NUMBER	integer		Selection of the lighting correction LUT -> 0: no correction, 1: light unit correction #1, 2: light unit correction #2 (default : 1)
Time_between_lighting_trigger_and_acquisition	CONFIG_UvpLightTriggerAcquisitionTime_usec	integer	µS	Delay between light unit trigger and image sensor shutter
Pressure_sensor_ref	CONFIG_UvpPresSn	text		Pressure sensor serial number (empty if no sensor installed)
Pressure_offset	CONFIG_UvpVerticalPressureOffset_dbar	float	dbar	Vertical distance between the image plan and the pressure measurement point (>0 if pressure sensor above image field, if undefined, set 999)
Storage_capacity	CONFIG_UvpStorageCapacity_Mbyte	integer	MB	SD card storage capacity, automatically updated by UVP6 when parameters are modified, do not edit
Minimum_remaining_memory_for_thumbnail_saving	CONFIG_UvpMinSecuredForThumbSavingCapacity_Mbyte	integer	MB	Minimal memory remaining in the SD card to keep saving images or vignettes, do not edit
Baud_Rate	CONFIG_UvpBaudRateCode_NUMBER	integer		UVP6 RS232 baud rate selection -> 0: 9600 bauds, 1: 19200 bauds, 2: 38400 bauds
Black_level	CONFIG_UvpBlackLevel_NUMBER	integer	12 bits gray level	Image sensor black level parameter
Shutter	CONFIG_UvpShutter_usec	integer	µS	Image sensor integration time (shutter)
Gain	CONFIG_UvpGain_dB	integer	dB	Image sensor gain, do not edit
Threshold	CONFIG_UvpThreshold_NUMBER	integer	8 bits gray scale	Threshold for image segmentation (pixels <= Threshold are considered background)
Aa	CONFIG_UvpSizeToPixelsConversionAa_um^2	integer	µM²	Calibration parameter (corresponding area in the

				scene represented by each pixel)
Exp	CONFIG_UvpSizeToPixelsConversionExp	float		Calibration parameter (adjusting for specular reflections)
Pixel_Size	CONFIG_UvpPixelSize_um	integer	µM	Uncalibrated pixel size (side of the pixel in the image field)
Image_volume	CONFIG_UvpImageVolume_L	float	L	Image volume
Calibration_date	CONFIG_UvpCalibrationDate_YYYYMMDDHHMM	date	YYYYMMDDHHMM	Calibration date for the values in this table
Last_parameters_modification	CONFIG_UvpLastUpdateConfigDate_YYYYMMDDHHMM	date	YYYYMMDDHHMM	Automatically updated by UVP6 when hardware parameters are modified
Operator_email	CONFIG_UvpHardwareEmail	text	email	Identification of the operator filling this configuration table
Min_esd_class_01	CONFIG_UvpMinEsdClass01_um	float	µM	Lower Equivalent Spherical Diameter for class 01
Min_esd_class_02	CONFIG_UvpMinEsdClass02_um	float	µM	Lower Equivalent Spherical Diameter for class 02
…	…	…	…	…
Min_esd_class_17	CONFIG_UvpMinEsdClass17_um	float	µM	Lower Equivalent Spherical Diameter for class 17
Min_esd_class_18	CONFIG_UvpMinEsdClass18_um	float	µM	Lower Equivalent Spherical Diameter for class 18

5.1.2. Configuration parameters (per acquisition zone) relative to acquisition:

UVP6 NAME	ARGO NAME	Type	Units	Explanation
Configuration_name	CONFIG_UvpDepthZone<N>AcqConfName	text		Name used to launch this configuration
PT_mode	CONFIG_UvpDepthZone<N>PtMode_NUMBER	integer		0: Triggered by vector, 1: Asks for pressure and time, 2: Use UVP6 Acquisition_frequency, 3: CTD mode (mandatory Pressure Sensor)
Acquisition_frequency	CONFIG_UvpDepthZone<N>SampleRateMax_hertz	float	Hz	Acquisition frequency (maximum value)
Frames_per_bloc	CONFIG_UvpDepthZone<N>FramesPerBloc_NUMBER	integer	frame	Nb of frames to accumulate and synthesize to send
Pressure_for_auto_start	CONFIG_UvpDepthZone<N>PressureAutoStart_dbar	integer	dbar	When in CTD mode (PT_mode= 3), pressure value to automatically start the acquisition

Pressure_difference_for_auto_stop	CONFIG_UvpDepthZone<N>PressureAutoStop_dbar	integer	dbar	When in CTD mode (PT_mode= 3), pressure drop from deepest value to automatically stop the acquisition
Result_sending	CONFIG_UvpDepthZone<N>ResultSending_LOGICAL	boolean		0/false: results are never sent - 1/true: synthesized results are sent through RS232 after each bloc
Save_synthetic_data_for_delayed_request	CONFIG_UvpDepthZone<N>SyntheticDataSaving_LOGICAL	boolean		0/false: do not save - 1/true: save synthetic data for a potential delayed request (useful only for troubleshooting)
Save_images	CONFIG_UvpDepthZone<N>SavingImages_NUMBER	integer		How to save Images -> 0: don't save, 1: save whole raw image, 2: save selected vignettes only
Vignetting_lower_limit_size	CONFIG_UvpDepthZone<N>MinVignettingLimitESD_um	integer	µM	When saving vignettes (Save images= 2), minimum object size (ESD) to save vignette, utilizes Aa and Exp, (default : 645)
Appendices_ratio	CONFIG_UvpDepthZone<N>AppendicesRatio	float		When saving vignettes (Save images= 2), vignette size to actual object size ratio (default : 1.5)
Interval_for_measuring_background_noise	CONFIG_UvpDepthZone<N>BackgroundNoiseBloc_NUMBER	integer	bloc	Background noise measured every 'interval' (bloc acquired without flashing). Disabled if zero
Image_nb_for_smoothing	CONFIG_UvpDepthZone<N>FrameNumberForSmoothing_NUMBER	integer	frame	Nb of images to measure temperature (for safety stop) and average particle abundance for the analog output
Analog_output_activation	CONFIG_UvpDepthZone<N>AnalogOutput_LOGICAL	boolean		Activation of the particle abundance analog output : 0/false: disabled - 1/true
Gain_for_analog_out	CONFIG_UvpDepthZone<N>AnalogOutputGain_NUMBER	integer	object	Smoothed number of counted objects for 5 volts analog output voltage
Maximal_internal_temperature	CONFIG_UvpDepthZone<N>TemperatureMax_degC	integer	°C	Maximum internal temperature to cause a security stop
Operator_email	CONFIG_UvpDepthZone<N>ConfigAcqEmail	text	email	Identification of the operator filling this configuration table
Taxo_conf	CONFIG_UvpDepthZone<N>TaxoTable	text		Taxonomic classification configuration for this acquisition (“NO_RE” when embedded recognition is disabled)
Remaining_memory	CONFIG_UvpDepthZone<N>RemainingMemory_Mbyte	integer	MB	SD card remaining memory at the start of the acquisition

5.1.3. Configuration parameters for parking drift phase relative to acquisition:

UVP6 NAME	ARGO NAME	Type	Units	Explanation
Configuration_name	CONFIG_ParkDriftPhaseAcqConfName	text		Name used to launch this configuration
PT_mode	CONFIG_UvpParkDriftPhasePtMode_NUMBER	integer		0: Triggered by vector, 1: Asks for pressure and time, 2: Use UVP6 Acquisition_frequency, 3: CTD mode (mandatory Pressure Sensor)
Acquisition_frequency	CONFIG_UvpParkDriftPhaseSampleRateMax_hertz	float	Hz	Acquisition frequency (maximum value)
Frames_per_bloc	CONFIG_UvpParkDriftPhaseFramesPerBloc_NUMBER	integer	frame	Nb of frames to accumulate and synthesize to send
Pressure_for_auto_start	CONFIG_UvpParkDriftPhasePressureAutoStart_dbar	integer	dbar	When in CTD mode (PT_mode= 3), pressure value to automatically start the acquisition
Pressure_difference_for_auto_stop	CONFIG_UvpParkDriftPhasePressureAutoStop_dbar	integer	dbar	When in CTD mode (PT_mode= 3), pressure drop from deepest value to automatically stop the acquisition
Result_sending	CONFIG_UvpParkDriftPhaseResultSending_LOGICAL	boolean		0/false: results are never sent - 1/true: synthesized results are sent through RS232 after each bloc
Save_synthetic_data_for_delayed_request	CONFIG_UvpParkDriftPhaseSyntheticDataSaving_LOGICAL	boolean		0/false: do not save - 1/true: save synthetic data for a potential delayed request (useful only for troubleshooting)
Save_images	CONFIG_UvpParkDriftPhaseSavingImages_NUMBER	integer		How to save Images -> 0: don't save, 1: save whole raw image, 2: save selected vignettes only
Vignetting_lower_limit_size	CONFIG_UvpParkDriftPhaseMinVignettingLimitESD_um	integer	µM	When saving vignettes (Save images= 2), minimum object size (ESD) to save vignette, utilizes Aa and Exp, (default : 645)
Appendices_ratio	CONFIG_UvpParkDriftPhaseAppendicesRatio	float		When saving vignettes (Save images= 2), vignette size to actual object size ratio (default : 1.5)
Interval_for_measuring_background_noise	CONFIG_UvpParkDriftPhaseBackgroundNoiseBloc_NUMBER	integer	bloc	Background noise measured every 'interval' (bloc acquired without flashing). Disabled if zero

Image_nb_for_smoothing	CONFIG_UvpParkDriftPhaseFrameNumberForSmoothing_NUMBER	integer	frame	Nb of images to measure temperature (for safety stop) and average particle abundance for the analog output
Analog_output_activation	CONFIG_UvpParkDriftPhaseAnalogOutput_LOGICAL	boolean		Activation of the particle abundance analog output : 0/false: disabled - 1/true
Gain_for_analog_out	CONFIG_UvpParkDriftPhaseAnalogOutputGain_NUMBER	integer	object	Smoothed number of counted objects for 5 volts analog output voltage
Maximal_internal_temperature	CONFIG_UvpParkDriftPhaseTemperatureMax_degC	integer	°C	Maximum internal temperature to cause a security stop
Operator_email	CONFIG_UvpParkDriftPhaseConfigAcqEmail	text	email	Identification of the operator filling this configuration table
Taxo_conf	CONFIG_UvpParkDriftPhaseTaxoTable	text		Taxonomic classification configuration for this acquisition ("NO_RE" when embedded recognition is disabled)
Remaining_memory	CONFIG_UvpParkDriftPhaseRemainingMemory_Mbyte	integer	MB	SD card remaining memory at the start of the acquisition

5.2. UVP6 version 2021 and older

This section is valid for ver2021 and older.

The 2020 firmware version is the first stable version of the UVP6 firmware and has been widespread with the first functioning unit. It has been simplified and improved to optimized the interaction with autonomous vectors. It has the same missing variables as the ver2022.01 with additional variables: *Time_between_lighting_power_up_and_trigger* and *IP_adress* for the HWconf; *Blocs_per_PT, Limit_lpm_detection_size, Minimum_object_number* and *Taxo_flag* for the ACQconf.

This version does not have any embedded classification option. No taxonomic configurations and frames exist. Data at DAC level provided directly the concentrations averaged per images.

5.2.1. Configuration parameters relative to hardware :

UVP6 NAME	ARGO NAME	Type	Units	Explanation
Acquisition_mode	CONFIG_UvpAcquisitionMode_NUMBER	integer		0: SUPERVISED mode, 1: AUTONOMOUS mode (including CTD mode), 2: TIME-programmed mode
Default_acquisition_configuration	CONFIG_UvpAcquisitionModeDefault	text		Name of the acquisition configuration automatically launched when Acquisition_mode = 1

Delay_after_power_up_on_time_mode	CONFIG_UvpDelayPowerModeTime_minutes	integer	minute	Optional delay before starting image acquisition when Acquisition_mode = 1 (AUTONOMOUS)
Light_ref	CONFIG_UvpLightSn	text		Light unit serial number
Correction_table_activation	CONFIG_UvpCorrectionTableActivation_NUMBER	integer		Selection of the lighting correction LUT -> 0: no correction, 1: light unit correction #1, 2: light unit correction #2 (default : 1)
Time_between_lighting_power_up_and_trigger	CONFIG_UvpLightWarmUpTime_usec	integer	µS	Delay between light unit powering and trigger
Time_between_lighting_trigger_and_acquisition	CONFIG_UvpLightTriggerAcquisitionTime_usec	integer	µS	Delay between light unit trigger and image sensor shutter
Pressure_sensor_ref	CONFIG_UvpPresSn	text		Pressure sensor serial number (empty if no sensor installed)
Pressure_offset	CONFIG_UvpVerticalPressureOffset_dbar	float	dbar	Vertical distance between the image plan and the pressure measurement point (>0 if pressure sensor above image field, if undefined, set 999)
Storage_capacity	CONFIG_UvpStorageCapacity_Mbyte	integer	MB	SD card storage capacity, automatically updated by UVP6 when parameters are modified, do not edit
Minimum_remaining_memory_for_thumbnail_saving	CONFIG_UvpMinSecuredForThumbSavingCapacity_Mbyte	integer	MB	Minimal memory remaining in the SD card to keep saving images or vignettes, do not edit
Baud_Rate	CONFIG_UvpBaudRateCode_NUMBER	integer		UVP6 RS232 baud rate selection -> 0: 9600 bauds, 1: 19200 bauds, 2: 38400 bauds
IP_adress		text		UVP6 IP address for Ethernet communication
Black_level	CONFIG_UvpBlackLevel_NUMBER	integer	12 bits gray level	Image sensor black level parameter
Shutter	CONFIG_UvpShutter_usec	integer	µS	Image sensor integration time (shutter)
Gain	CONFIG_UvpGain_dB	integer	dB	Image sensor gain, do not edit
Threshold	CONFIG_UvpThreshold_NUMBER	integer	8 bits gray scale	Threshold for image segmentation (pixels <= Threshold are considered background)
Aa	CONFIG_UvpSizeToPixelsConversionAa_um^2	integer	µM²	Calibration parameter (corresponding area in the scene represented by each pixel)

Exp	CONFIG_UvpSizeToPixelsConversionExp	float		Calibration parameter (adjusting for specular reflections)
Pixel_Size	CONFIG_UvpPixelSize_um	integer	µM	Uncalibrated pixel size (side of the pixel in the image field)
Image_volume	CONFIG_UvpImageVolume_L	float	L	Image volume
Calibration_date	CONFIG_UvpCalibrationDate_YYYYMMDDHHMM	date	YYYYMMDDHHMM	Calibration date for the values in this table
Last_parameters_modification	CONFIG_UvpLastUpdateConfigDate_YYYYMMDDHHMM	date	YYYYMMDDHHMM	Automatically updated by UVP6 when hardware parameters are modified
Operator_email	CONFIG_UvpHardwareEmail	text	email	Identification of the operator filling this configuration table
Min_esd_class_01	CONFIG_UvpMinEsdClass01_um	float	µM	Lower Equivalent Spherical Diameter for class 01
Min_esd_class_02	CONFIG_UvpMinEsdClass02_um	float	µM	Lower Equivalent Spherical Diameter for class 02
…	…	…	…	…
Min_esd_class_17	CONFIG_UvpMinEsdClass17_um	float	µM	Lower Equivalent Spherical Diameter for class 17
Min_esd_class_18	CONFIG_UvpMinEsdClass18_um	float	µM	Lower Equivalent Spherical Diameter for class 18

5.2.2. Configuration parameters (per acquisition zone) relative to acquisition:

UVP6 NAME	ARGO NAME	Type	Units	Explanation
Configuration_name	CONFIG_UvpDepthZone<N>AcqConfName	text		Name used to launch this configuration
PT_mode	CONFIG_UvpDepthZone<N>PtMode_NUMBER	integer		0: Triggered by vector, 1: Asks for pressure and time, 2: Use UVP6 Acquisition_frequency, 3: CTD mode (mandatory Pressure Sensor)
Acquisition_frequency	CONFIG_UvpDepthZone<N>SampleRateMax_hertz	float	Hz	Acquisition frequency (maximum value)
Frames_per_bloc	CONFIG_UvpDepthZone<N>FramesPerBloc_NUMBER	integer	frame	Nb of frames to accumulate and synthesize to send
Blocs_per_PT	CONFIG_UvpDepthZone<N>BlocsPerPt_NUMBER	integer	bloc	Nb of blocs to acquire before a new acquisition or asking for a new pressure information
Pressure_for_auto_start	CONFIG_UvpDepthZone<N>PressureAutoStart_dbar	integer	decibar	When in CTD mode (PT_mode= 3), pressure value

				to automatically start the acquisition
Pressure_difference_for_auto_stop	CONFIG_UvpDepthZone<N>PressureAutoStop_dbar	integer	decibar	When in CTD mode (PT_mode= 3), pressure drop from deepest value to automatically stop the acquisition
Result_sending	CONFIG_UvpDepthZone<N>ResultSending_LOGICAL	boolean		0/false: results are never sent - 1/true: synthesized results are sent through RS232 after each bloc
Save_synthetic_data_for_delayed_request	CONFIG_UvpDepthZone<N>SyntheticDataSaving_LOGICAL	boolean		0/false: do not save - 1/true: save synthetic data for a potential delayed request (useful only for troubleshooting)
Limit_lpm_detection_size	CONFIG_UvpDepthZone<N>LpmDetectionLimitESD_um	Integer	um	Minimum size (ESD) to count and analyze objects, utilizes Aa and Exp, (default : 10)
Save_images	CONFIG_UvpDepthZone<N>SavingImages_NUMBER	integer		How to save Images -> 0: don't save, 1: save whole raw image, 2: save selected vignettes only
Vignetting_lower_limit_size	CONFIG_UvpDepthZone<N>MinVignettingLimitESD_um	integer	µM	When saving vignettes (Save_images= 2), minimum object size (ESD) to save vignette, utilizes Aa and Exp, (default : 645)
Appendices_ratio	CONFIG_UvpDepthZone<N>AppendicesRatio	float		When saving vignettes (Save_images= 2), vignette size to actual object size ratio (default : 1.5)
Interval_for_measuring_background_noise	CONFIG_UvpDepthZone<N>BackgroundNoiseBloc_NUMBER	integer	bloc	Background noise measured every 'interval' (bloc acquired without flashing). Disabled if zero
Image_nb_for_smoothing	CONFIG_UvpDepthZone<N>FrameNumberForSmoothing_NUMBER	integer	frame	Nb of images to measure temperature (for safety stop) and average particle abundance for the analog output
Analog_output_activation	CONFIG_UvpDepthZone<N>AnalogOutput_LOGICAL	boolean		Activation of the particle abundance analog output : 0/false: disabled - 1/true
Gain_for_analog_out	CONFIG_UvpDepthZone<N>AnalogOutputGain_NUMBER	integer	object	Smoothed number of counted objects for 5 volts analog output voltage
Minimum_object_number		integer	object	Smoothed minimum number of objects to cause a security stop (not implemented)
Maximal_internal_temperature	CONFIG_UvpDepthZone<N>TemperatureMax_degC	integer	°C	Maximum internal temperature to cause a security stop

Operator_email	CONFIG_UvpDepthZone<N>ConfigAcqEmail	text		Identification of the operator filling this configuration table
Taxo_flag	CONFIG_UvpDepthZone<N>TaxoAcqFlag_LOGICAL	boolean		Taxonomic classification flag for this acquisition (not implemented)
Remaining_memory	CONFIG_UvpDepthZone<N>RemainingMemory_Mbyte	integer	MB	SD card remaining memory at the start of the acquisition

5.2.3. Configuration parameters for parking drift phase relative to acquisition:

UVP6 NAME	ARGO NAME	Type	Units	Explanation
Configuration_name	CONFIG_UvpParkDriftPhaseAcqConfName	text		Name used to launch this configuration
PT_mode	CONFIG_UvpParkDriftPhasePtMode_NUMBER	integer		0: Triggered by vector, 1: Asks for pressure and time, 2: Use UVP6 Acquisition_frequency, 3: CTD mode (mandatory Pressure Sensor)
Acquisition_frequency	CONFIG_UvpParkDriftPhaseSampleRateMax_hertz	float	Hz	Acquisition frequency (maximum value)
Frames_per_bloc	CONFIG_UvpParkDriftPhaseFramesPerBloc_NUMBER	integer	frame	Nb of frames to accumulate and synthesize to send
Blocs_per_PT	CONFIG_UvpParkDriftPhaseBlocsPerPt_NUMBER	integer	bloc	Nb of blocs to acquire before a new acquisition or asking for a new pressure information
Pressure_for_auto_start	CONFIG_UvpParkDriftPhasePressureAutoStart_dbar	integer	decibar	When in CTD mode (PT_mode= 3), pressure value to automatically start the acquisition
Pressure_difference_for_auto_stop	CONFIG_UvpParkDriftPhasePressureAutoStop_dbar	integer	decibar	When in CTD mode (PT_mode= 3), pressure drop from deepest value to automatically stop the acquisition
Result_sending	CONFIG_UvpParkDriftPhaseResultSending_LOGICAL	boolean		0/false: results are never sent - 1/true: synthesized results are sent through RS232 after each bloc
Save_synthetic_data_for_delayed_request	CONFIG_UvpParkDriftPhaseSyntheticDataSaving_LOGICAL	boolean		0/false: do not save - 1/true: save synthetic data for a potential delayed request (useful only for troubleshooting)
Limit_lpm_detection_size	CONFIG_UvpParkDriftPhaseLpmDetectionLimitESD_um	Integer	um	Minimum size (ESD) to count and analyze objects, utilizes Aa and Exp, (default : 10)
Save_images	CONFIG_UvpParkDriftPhaseSavingImages_NUMBER	integer		How to save Images -> 0: don't save, 1: save whole raw image, 2: save selected vignettes only

Vignetting_lower_limit_size	CONFIG_UvpParkDriftPhaseMinVignettingLimitESD_um	integer	µM	When saving vignettes (Save images= 2), minimum object size (ESD) to save vignette, utilizes Aa and Exp, (default : 645)
Appendices_ratio	CONFIG_UvpParkDriftPhaseAppendicesRatio	float		When saving vignettes (Save_images= 2), vignette size to actual object size ratio (default : 1.5)
Interval_for_measuring_background_noise	CONFIG_UvpParkDriftPhaseBackgroundNoiseBloc_NUMBER	integer	bloc	Background noise measured every 'interval' (bloc acquired without flashing). Disabled if zero
Image_nb_for_smoothing	CONFIG_UvpParkDriftPhaseFrameNumberForSmoothing_NUMBER	integer	frame	Nb of images to measure temperature (for safety stop) and average particle abundance for the analog output
Analog_output_activation	CONFIG_UvpParkDriftPhaseAnalogOutput_LOGICAL	boolean		Activation of the particle abundance analog output : 0/false: disabled - 1/true
Gain_for_analog_out	CONFIG_UvpParkDriftPhaseAnalogOutputGain_NUMBER	integer	object	Smoothed number of counted objects for 5 volts analog output voltage
Minimum_object_number		integer	object	Smoothed minimum number of objects to cause a security stop (not implemented)
Maximal_internal_temperature	CONFIG_UvpParkDriftPhaseTemperatureMax_degC	integer	°C	Maximum internal temperature to cause a security stop
Operator_email	CONFIG_UvpParkDriftPhaseConfigAcqEmail	text	email	Identification of the operator filling this configuration table
Taxo_flag	CONFIG_UvpParkDriftPhaseTaxoAcqFlag_LOGICAL	boolean		Taxonomic classification flag for this acquisition (not implemented)
Remaining_memory	CONFIG_UvpParkDriftPhaseRemainingMemory_Mbyte	integer	MB	SD card remaining memory at the start of the acquisition

5.2.4. Particles data at DAC level

The particles data at the DAC level was different. The actual particles numbers were average per UVP6 images, as shown below.

Be careful, the grey data of large particulate matter of this version is wrong due to a mathematical mistake into the computing. The grey level was summed and divided by the number of uvp6 frame (so the number of uvp6 image in that version) and not the weighted average on the number of particles. It must be flagged as bad data (QC flag 4) and should not be used.

LPM data:

ARGO NAME	Type	Unit	Explanation
NB_SIZE_SPECTRA_PARTICLES_PER_IMAGE	NC_FLOAT	count/# analysed images	Averaged number of particles per size class
GREY_SIZE_SPECTRA_PARTICLES	NC_INT	count	Average grey level per particle per size class
TEMP_PARTICLES	NC_FLOAT	degree_Celsius	Average uvp temperature of the slice
NB_IMAGE_PARTICLES	NC_SHORT	count	Number of uvp images in the slice

Black data:

ARGO NAME	Type	Type/Unit	Explanation
BLACK_NB_IMAGE_PARTICLES	NC_SHORT	count	Number of uvp images without light in the slice
BLACK_NB_SIZE_SPECTRA_PARTICLES	NC_INT	count	Number of particles without light per class of the slice
BLACK_TEMP_PARTICLES	NC_FLOAT	degree_Celsius	Internal temperature of the UVP6 sensor without light

Computing the concentrations:

The data process for LPM concentrations still need to be computed with the sampled volume using the Image_volume metadata to get results in #/L.

CONCENTRATION_LPM (#/L) = NB_SIZE_SPECTRA_PARTICLES_PER_IMAGE / CONFIG_UvpImageVolume_L

6. References

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