



Plan

Public Data Release Plan

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Change Record

Issue	Date	Page, Section, Paragraph Affected	Reason, Remarks
0.01	2022-06-13		New document
0.02	2022-06-21		Comments Lind
0.03	2022-07-04	Sections 4 & 5	Comments WG, reduced options
0.04	2022-10-11	Sections 4	Comment WG&SCB, OSP DR0 option selected, limited DRs to targets marked completed by all (not any) Surveys
0.05	2022-11-18	Section 6	Added details on the rules and procedures for the release of non-IWG produced L2 products
0.06	2022-12-08	All	Clean version for ESO
0.07	2023-04-22		Update after feedback ESO and discussion within SCB
1.00	2023-10-02		Released version
1.01	2024-06-25	Document list, added details on 4CP deliverables, DR0 timeline, removed OSP references	Updates addressing RIXes
2.00	2024-07-18		Released version
3.00	2024-10-17	DR0 7 months after T0	Released version

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1 Scope

This Public Data Release Plan provides the schedule and content of the planned data releases by the ESO Science Archive Facility (SAF) and the 4MOST Public Archive (4PA) for the data obtained during the first 5-year survey to be conducted with 4MOST. This document does not cover the Internal Data Releases (IDRs) to the Science Team. It also does not cover the work planning and resourcing needed to execute these data releases (yet). It may be assumed this document becomes an Applicable Document of the Survey Management Plan.

2 Applicable Documents (AD)

The following applicable documents (AD) of the exact issue shown form a part of this document to the extent described herein. In the event of conflict between the documents referenced herein and the contents of this document, the contents of this document are the superseding requirement.

AD ID	Document Title	Document Number	Issue	Date
[AD1]	4MOST Project Planning	VIS-PLA-4MOST-47110-9320-0007	latest	
[AD2]	4MOST Operations and Science Schedule	VIS-PLA-4MOST-47110-9320-0008	latest	

3 Reference Documents (RD)

The following reference documents (RD) contain useful information relevant to the subject of the present document.

RD ID	Document Title	Document Number	Issue	Date
[RD1]	Survey Management Plan: Individual Surveys	VIS-PLA-4MOST-47110-9220-0004	3.00	2024-10-17
[RD2]	IWG7 - Galactic Pipeline (4GP) Requirements Specification	VIS-SPE-4MOST-47110-9237-0001	2.00	2023-11-20
[RD3]	IWG8 - Extragalactic Pipeline (4XP) Requirements Specification	VIS-SPE-4MOST-47110-9238-0001	3.00	2024-07-11
[RD4]	IWG4 - Selection Functions (4SP) Requirements Specification	VIS-SPE-4MOST-47110-9234-0002	1.00	2022-10-11
[RD5]	IWG9 - Object Classification Pipeline (4CP) Requirements Specification	VIS-SPE-4MOST-47110-9239-0001	2.00	2023-11-20



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RD ID	Document Title	Document Number	Issue	Date
[RD6]	Data Release User Manual	TBD		
[RD7]	ESO Science Data Product Standard	ESO-044286	8	2022-03-15
[RD8]	Science Team Policies	MST-POL-PSC-20103-9213-0001	6.00	2023-08-29

4 Public Data Releases Premises

The following assumptions are made with regards to the Public Data Releases:

- Quality controlled data (based on IWG6 QC prescriptions) will be released to the entire Science Team (ST) once every 3 months for all data taken at least 3 months prior to the Internal Data Release (IDR) date.
- A Public Data Release (PDR) shall be based on data that has been available to the Science Team for at least one year. Given that any data is made available for data exploitation through IDRs about three months after the observations were taken, this means that PDRs shall be at least one year and three months after the observations were made for these targets.
- The PDRs will be based on the L1 spectra that pass a minimal set of quality control criteria that ensure the scientific integrity of the spectra (for instance, no spectra will be released where the wavelength calibration has failed).
- The PDRs and any non-IWG data release shall only contain L2 data for targets for which also L1 data are released, but certain subsets of L2 data will cover only a fraction of all targets included in the release, as *only L2 parameter values that pass data curation criteria will be released*.
- This document only deals with the Data Release schedule of the IWG pipeline products. The schedule of Deliverable L2 (DL2) products created by Surveys outside the IWG structure, i.e. DL2-SURV products, needs to be described independently in the Survey Management Plan: Individual Surveys [RD1] (e.g., ToO quick releases). Additional L2 (AL2) products can be released with any PDR as far as they adhere to the 4MOST Public Archive (4PA) standards and procedures.
- In the last PDR all available data that has passed QC shall be released for all targets.
- The content of PDRs shall be independent of whether ST publications have appeared prior to the PDR based on targets in the IDRs.

5 Public Data Releases Schedule

The first 4MOST five-year survey will commence at the conclusion of the Survey Programme Validation (SPV) Phase, which will be called T0 in this document. The exact date cannot be known at this time, but the current best estimate is always available in the 4MOST Project TOP Level Milestone Schedule [AD1], with more details provided about the science and operations activities leading up to this milestone in the 4MOST Operations and Science Schedule [AD2] document.

Figure 1 shows the expected 4MOST Data Release schedule. The time steps increase towards later PDRs to reflect that the incremental value of releases scales roughly with the square root of the number of targets in a data release.

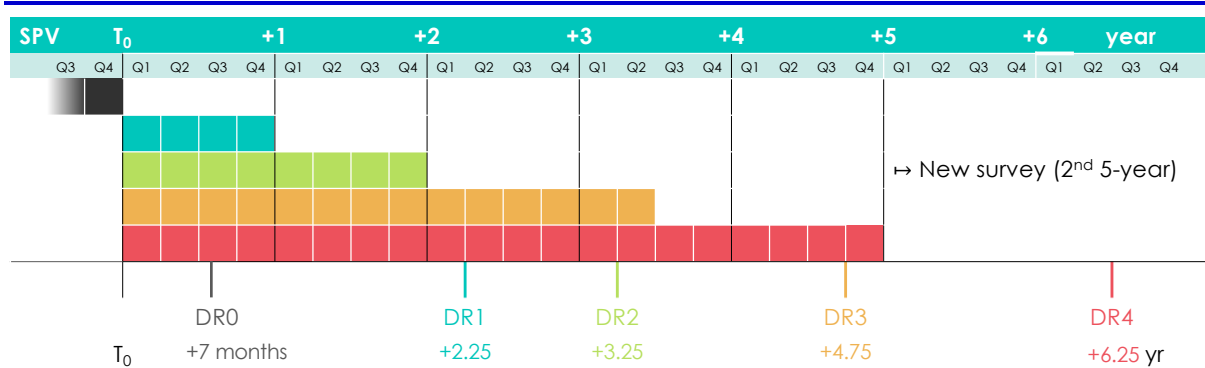


Figure 1: GANTT chart representation of the Public Data Release schedule. Here SPV stands for Survey Programme Validation Phase, to be conducted between completion of instrument commissioning and the official start of the 1st 4MOST five-year survey after the final Operations Readiness Review (T_0). Each block stands for data taken in 3 months of observing time. The number of years after T_0 at which each Data Release is to take place is indicated at the bottom.

6 Public Data Release Contents

The different PDRs shall contain at least the following parameters plus, where appropriate, the associated precisions and uncertainties:

DR0 An early Data Release based on data taken during the SPV. DR0 will contain all targets observed during SPV for Calibration and Science Verification purposes. This release shall contain:

- For all targets released, the 4MOST input target catalogue values relevant to their selection and observing requirements,
- All L1 extracted, calibrated 1D spectra plus the associated quality meta-data/spectra.
- For stellar targets: radial velocities (RV), T_{eff} , $\log(g)$, and $[\text{Fe}/\text{H}]$, as far applicable for each stellar class (e.g., no $[\text{Fe}/\text{H}]$ for White Dwarfs and parameters for pulsating variable stars), and
- For extragalactic targets: Redshifts and the probability of being the correct redshift, best fit template.

DR1 A DR containing targets observed up to 1 year after start of operations. This release shall contain:

- The same parameters as DR0, plus
- For stellar targets adhering to the standard 4GP pipelines: abundances and their uncertainties for the following elements: Li, C, Mg, Ca, Ti, and Fe. Abundances of all other elements will only be released when they pass quality control data curation to be done on a best effort basis,
- For extragalactic targets: D4000 and characterization of selected absorption/emission line indices (H-alpha, H-beta, [OIII] 5007, [OII] 3726, 3729, [NII] 6583) as well as luminosity-weighted average ages of target galaxies (as far as applicable for each target class and on a best effort basis for a given S/N of a targets), and
- For all targets a basic (AGN/Galaxy/QSO/Star/Unknown) classification parameter for all released spectra based on a Machine Learning algorithm.

DR2 A DR containing targets observed up to 2 years after start of operations. This release shall contain:

- The same parameters as DR1, plus
- For stellar targets: all parameters described in the IWG7 - Galactic Pipeline (4GP) Requirements Specification document [RD2] including where detectable, e.g., parameters quantifying variability and/or binarity (RV or spectral features) and stellar activity features, and
- For extragalactic targets: all parameters described in the IWG8 - Extragalactic Pipeline (4XP) Requirements Specification document [RD3] including where detected, identification and/or parametrization of secondary spectral features.
- The geometric selection function parameters for the released targets as described in the IWG4 – Selection Function Pipeline (4SP) Requirements Specification document [RD4].
- For all targets all classification parameters described in the IWG9 – Object Classification Pipeline (4CP) Requirements Specification document [RD5].

DR3 A DR containing targets observed up to 3.5 years after start of operations. This release shall contain:

- The same parameters as DR2, plus
- The geometric and object selection function parameters described in the IWG4 – Selection Function Pipeline (4SP) Requirements Specification document [RD4] of all released targets.

DR4 A DR containing all targets observed for the 5-year survey. This release shall contain:

- The same parameters as DR3, plus
- Any new parameters not described in the current plans for the pipelines described above but developed in during the 5-year survey period and that were not released in one of the previous releases.

The ST as represented by the SCB may decide by unanimous vote to increase the number of parameters beyond the values listed above in any of the PDRs for all targets in a particular class. Some Surveys will be contractually obliged to publish Deliverable L2 (DL2) products not produced by the IWGs as agreed with ESO and captured in the Survey Management Plan (DL2-SURV products). Furthermore, any Survey may decide to publish Additional L2 (AL2) data products. These extra DL2-SURV and AL2 publications shall not be based on L1 data that have not been released yet, unless special permission has been obtained (e.g., transients of TiDES). In the case these non-IWG L2 data products are released through the 4MOST Public Archive or the ESO Science Archive Facility, they shall follow the same data release schedule as described above for the IWG data products and follow the procedures and the preparation and delivery schedule in the Data Release User Manual [RD6] and/or the ESO SAF including its science data standards (ESO-044286, [RD7]). These non-IWG L2 products need to be announced as normal science projects as described in Section 16 of the Science Team Policies [RD8] and the same regulations regarding shared targets apply. However, in the light that these non-IWG data products can only be based on data that will be public at the time of publishing, granting permission for publication these shared targets shall not be unreasonably withheld, especially in the case of DL2-SURV products.



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All released content of the PDRs shall come with full documentation to allow data exploitation by the astronomical community.



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Appendix A List of Acronyms

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4MOST	4-metre Multi-Object Spectroscopic Telescope
4GP	4MOST Galactic Pipeline
4PA	4MOST Public Archive
4SP	4MOST Selection Function Pipeline
4XP	4MOST eXtragalactic Pipeline
AL2	Additional Level 2
DL2	Deliverable Level 2
DL2-SURV	Deliverable Level 2 - Survey (data product not delivered by an IWG, but by a 4MOST Survey)
DR	Data Release
IDR	Internal Data Release
IWG	Infrastructure Working Group
L1	Level 1
L2	Level 2
PDR	Public Data Release
OSP	Operations Start-up Phase
QC	Quality Control
RV	Radial Velocities
SCB	Science Coordination Board
ST	Science Team