

## The Rosetta Science Archive: Status and Plans for Completing and Enhancing the Archive Content

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### Abstract

This presentation will outline the current status of the Rosetta archive, as well as highlighting some of the 'enhanced archiving' activities planned and underway with the various instrument teams on Rosetta to ensure the scientific legacy of the mission.

### 1. Introduction

On 30 September 2016, Rosetta's signal flat-lined, confirming that the spacecraft had completed its incredible mission by landing on the surface of Comet 67P/Churyumov-Gerasimenko. Although this marked an end to the spacecraft's active operations, intensive work is still on-going with instrument teams preparing their final science data increments for delivery and ingestion into ESA's Planetary Science Archive (PSA) [2]. In addition to this, ESA is establishing contracts with a number of instrument teams to enhance and improve their data and documentation in an effort to provide the best long-term archive possible for the Rosetta mission.

### 2. Status of the Rosetta Data in the Planetary Science Archive

All science data from the Rosetta mission are hosted jointly by the Planetary Science Archive (PSA) at ESA (<http://psa.esa.int>) [2], and by NASA's PDS Small Bodies Node (SBN).

The long duration of the Rosetta mission, along with its diverse suite of instrumentation and the range of targets observed throughout its lifetime combine to make this an extremely challenging mission to archive [1]. A number of independent data reviews have taken place over course of the mission in an attempt to track the evolution of the data pipelines from each instrument and ensure that the science data are documented and formatted in the best possible

way to allow end-users to exploit them. The last of these reviews was completed in spring 2016, based on the first science data received from the comet phase. Many issues were raised by the reviewers, and the instrument teams have been working very hard to implement the fixes requested. In many cases this work is ongoing, and for all instruments, the review process has understandably resulted in a slow down of the standard delivery schedule.

Currently, the majority of teams have delivered all of their data from the nominal mission (up to the end of 2015), and are working on their remaining increments from the 1-year mission extension. The aim is to complete the nominal archiving with data from the complete mission by the end of this year, when a full mission archive review will be held. This review will assess the complete data holdings from Rosetta and ensure that the archive is ready for the long-term.

It should be noted that, with the updates being made to the data pipelines as a result of the last review, teams have been asked to re-run all of their older data through the new pipelines to ensure we have consistently the best and most up to date data available in the final archive. This whole exercise is ongoing for all teams, and is expected to be completed this year before the mission archive review takes place.

### 3. Rosetta Enhanced Archiving Activities

The nominal archive deliveries from the Rosetta mission are of excellent quality, and will be of immense interest and use for many decades to come thanks to the efforts of all involved in their production, assessment, storage and dissemination. However, there is, as always, much more to do!

With the resources from the operational mission now coming to an end, ESA has decided to establish a number of contracts for work with the Rosetta instrument teams that will enhance their archive content. Updates are focused on key aspects of an instrument's calibration or the production of higher level data / information, and are therefore very specific to each instrument's needs. These contracts are in the process of being kicked off, and they will run for various lengths depending upon the activities to be undertaken. The full 'archive enhancement' process will run until September 2019, when the post operations activities for Rosetta will come to a close. This presentation will highlight just a few of the activities within the archive enhancement to give a flavour of the updates that can be expected.

Most instrument teams will work on providing a *Science User Guide* for their data, as well as updating calibrations for their data. Several teams will also be generating and delivering higher level processed data and derived products. For example, the VIRTIS team will be working to update both their spectral and geometrical calibrations, and will aim to deliver mapping products to the final archive. Similarly, the OSIRIS team will be improving their calibrations and delivering data additionally in FITS format.

The Rosetta Plasma Consortium (RPC) instrument suite will be working on cross-calibrations that will greatly improve the final data to be delivered from each experiment, as well as a number of activities individual to each instrument (e.g. removal of spacecraft noise from the MAG instrument).

The MIDAS team will similarly be working on instrument cross-calibrations and the production of a dust particle catalog from the comet coma.

The GIADA team will be producing higher-level products in the form of dust environment maps, with products being developed in 3D plus time.

A contract has also been established to produce and deliver data set(s) containing supporting ground-based observations from amateur astronomers. These data were taken simultaneously with Rosetta operations and could provide some important contextual information.

In addition to these contracts, the Rosetta ESA archiving team will be producing calibrated data sets for the NAVCAM instrument, and will be working to

include the latest shape models from the comet into the final Rosetta archive. The Rosetta ESA archiving team are also working on providing a centralized solution to the problem of geometry on the comet for implementation within the final Rosetta data holdings.

## 4. Final Reviews

Following the final incremental deliveries from the nominal archiving, a final 'mission archive review' will be held with independent reviewers to assess the complete Rosetta data holdings. This will be completed at the end of 2017.

A further review is expected in 2019 to assess the deliverables from the archive enhancement phase and ensure that the final Rosetta archive within the PSA is as good as it can be and will allow for scientists to fully exploit the data holdings for decades to come.

## Summary and Conclusions

This presentation will outline the current status of the Rosetta science archive in ESA's PSA and in NASA's PDS. In addition, an overview of the activities planned and underway for enhancement of the archive content will be provided.

With the support of the instrument teams and the completion of the archive enhancement, the Rosetta archive can become an immensely valuable resource for scientists in years to come, and the full scientific potential of the mission can be realized.

## Acknowledgements

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## References

- [1] Barthelemy, M. et al., (2017) Planetary and Space Science (submitted).
- [2] Besse, S. et al., (2017) Planetary and Space Science (submitted);