***Component Specifications: PHAROS***

**Document ID:** PHAROS-DOC-COMPONENT\_SPECS  
**Version:** 0.0.1  
**Status:** Draft  
**Author:** Alexandros P. Liaskos  
**Last Updated:** 16/9/2025

Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Author | Summary of Changes |
| 0.0.1 | 16/9/2025 | Alexandros P. Liaskos | Initial draft of the document. |

Introduction

This document provides a detailed specification for each currently proposed component within the PHAROS project suite.

Component ID Naming Convention

|  |  |  |
| --- | --- | --- |
| Key/Part | Description | Currently Available Values |
| [PROJECT\_IDENTIFIER] | The project identifier, static for all components. | PHAROS |
| [OBJECT\_TYPE] | A static key indicating that the ID refers to a component. | COMP |
| [DOMAIN] | The functional domain the component belongs to. | DATACQ, PYRO, HYDRO |
| [COMPONENT\_NAME] | The specific, abbreviated name of the component. | SatAcq, BurnSev, FloodMap, WaterDepth, … |
| [SOFTWARE\_TYPE] | The type of the component software. | CLI, LIB, API, WEB, SPA |
| [LANGUAGE] | A two-letter abbreviation for the primary programming language. | PY, JS, TS |

Component Status Keys

|  |  |  |
| --- | --- | --- |
| Status Key | Lifecycle Stage | Description |
| PLAN-PROP | Planning & Initial | Proposed: The component is a suggested idea, awaiting approval. |
| PLAN-PLND | Planning & Initial | Planned: The component is approved and scheduled for development. |
| PLAN-DRFT | Planning & Initial | Draft: Initial specifications or requirements are being written. |
| DEV-WIP | Active Development | Work In Progress: The component is actively being coded. |
| DEV-REVW | Active Development | In Review: The component is undergoing code or functional review. |
| DEV-TEST | Active Development | Testing: The component is with Quality Assurance (QA) for validation. |
| DEV-ALPHA | Active Development | Alpha: A pre-release version is available for internal testing. |
| DEV-BETA | Active Development | Beta: A pre-release version is available for limited external testing. |
| STABLE-ACTV | Completed & Stable | Active: The component is stable, tested, and ready for production use. |
| STABLE-RLSD | Completed & Stable | Released: The component has been officially deployed in a formal project release. |
| EOL-DEPR | Post-Life (End of Life) | Deprecated: Superseded by a new component but kept for backward compatibility. |
| EOL-RETD | Post-Life (End of Life) | Retired: The component is no longer supported, maintained, or in use. |

Data Acquisition Components

**SatAcq:**

**Component ID:** PHAROS-COMP-DATACQ-SatAcq-CLI-PY

**Status:** DEV-ALPHA

**Type:** CLI Application

**Language:** Python

**Description:** A tool for searching and downloading satellite imagery from Sentinel via the Copernicus Data Space Ecosystem (CDSE) OData API.

Pyro Domain Components

**BurnSev:**

**Component ID:** PHAROS-COMP-PYRO-BurnSev-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** A Python-based tool for burn severity assessment using pre-fire and post-fire Sentinel-2 imagery. Calculates spectral indices (NBR, dNBR, RdNBR) and produces standardized burn severity classifications.

**SmokeDetect:**

**Component ID:** PHAROS-COMP-PYRO-SmokeDetect-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Detects active fires and smoke using Sentinel-3 SLSTR thermal data, implementing hotspot and thermal anomaly algorithms.

**BiomassExtract:**

**Component ID:** PHAROS-COMP-PYRO-BiomassExtract-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Estimates vegetation biomass from Sentinel-2 imagery for fuel load assessment.

**VegMoisture:**

**Component ID:** PHAROS-COMP-PYRO-VegMoisture-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Estimates vegetation water content from Sentinel-2 imagery for fire risk assessment.

**FirePower:**

**Component ID:** PHAROS-COMP-PYRO-FirePower-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Calculates Fire Radiative Power (FRP) from Sentinel-3 SLSTR for fire intensity assessment.

**SmokeTrack:**

**Component ID:** PHAROS-COMP-PYRO-SmokeTrack-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Analyzes smoke plumes from Sentinel-3 SLSTR to assess air quality impact.

**TempExtract:**

**Component ID:** PHAROS-COMP-PYRO-TempExtract-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Extracts land surface temperature from Sentinel-3 SLSTR.

Hydro Domain Components

**FloodMap:**

**Component ID:** PHAROS-COMP-HYDRO-FloodMap-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Maps flood extent using Sentinel-1 SAR imagery through backscatter analysis and change detection.

**WaterDepth:**

**Component ID:** PHAROS-COMP-HYDRO-FloodMap-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Estimates water depth in shallow water bodies using Sentinel-2 optical imagery.

**RainEstimate:**

**Component ID:** PHAROS-COMP-HYDRO-RainEstimate-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Estimates precipitation rates from Sentinel-1 SAR imagery.

**EvapTrans:**

**Component ID:** PHAROS-COMP-HYDRO-EvapTrans-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Calculates evapotranspiration using SEBAL/METRIC algorithms for drought analysis and Sentinel-2 imagery.

**SlopeStability:**

**Component ID:** PHAROS-COMP-HYDRO-SlopeStability-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Analyzes slope stability for landslide susceptibility mapping using DEMs and Sentinel-2 imagery.

**ErosionRisk:**

**Component ID:** PHAROS-COMP-HYDRO-ErosionRisk-CLI-PY

**Status:** PLAN-PROP

**Type:** CLI Application

**Language:** Python

**Description:** Maps soil erosion potential using the RUSLE model, DEMs and Sentinel-2 imagery.