

PORT OF SPAIN WIS2 TRAINING WORKSHOP · June 2026

WIS2 Downloader

A first look.

Alberto Helguera

WMO Secretariat · WIS Section · ESDP Department

OVERVIEW

Agenda.

01 Introduction & Background

02 Quick Start

03 User Guide

SECTION 01

Introduction.

What WIS2 is, what the Downloader is, and who it's for.

01

What is WIS2?

WMO Information System 2.0

Next-generation framework

For meteorological data exchange across WMO Members.

Replaces the legacy GTS

Successor to the Global Telecommunication System.

Open standards

MQTT · HTTP · WMO Core Metadata Profile, GeoJSON.

Global Broker Network

Public MQTT brokers

Operated by WMO Members worldwide.

WIS2 Notifications

Each message carries a download link to a data file.

Transition period

2025 — 2033. GTS remains operational in parallel.

What is WIS2 Downloader?

An open-source tool for automated data acquisition from WIS2.

Subscribes via MQTT

Connects to WIS2 Global Brokers.

Automatic downloads

Pulls meteorological data files as notifications arrive.

Containerised deployment

Docker & Docker Compose.

Audience

NMHSs, researchers, WIS2 node operators.

KEY DESIGN GOALS

Ease	one command to start
Reliability	dedup · SHA-512 · multi-queuing
Flexibility	wildcards · filter rules · multi-broker
Observability	Prometheus · Grafana

Key features.

Multi-language Web UI

EN · FR · ES · AR · ZH · RU

REST API

Programmatic subscription management.

MQTT topic wildcards

+ single level · # multi-level

Topic search

UI browses the GDC catalogue directly.

Filtering

Pre- and post-download rules by media type or custom condition.

Automatic deduplication

Redis tracks notification IDs.

SHA-512 verification

File integrity checked on every download.

File organisation

```
DownloadPath/YYYY/MM/DD/<filename>
```

Metrics & dashboards

Prometheus + Grafana out of the box.

Horizontal scaling

Multiple workers or subscriber instances.

Key software and standards.

Main
Language



Workers

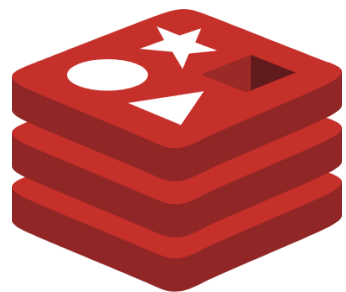


API



Flask

DB



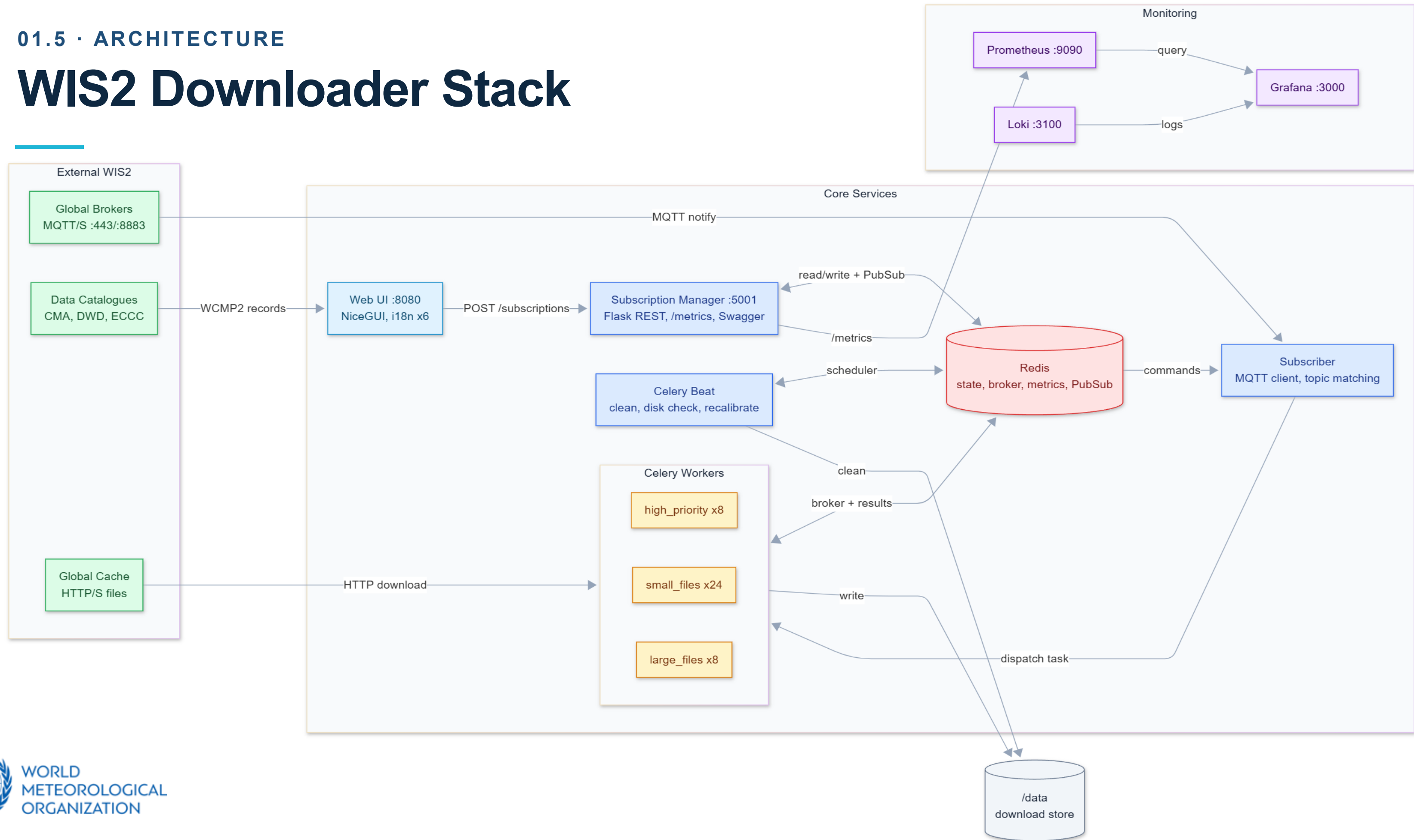
UI



Logging



WIS2 Downloader Stack



SECTION 02

Quick Start.

Installation, first launch, and verifying your first download.

02

System requirements.

SOFTWARE

Docker 20.10 or later

Docker Compose 2.0 or later

HARDWARE · MINIMUM FOR PRODUCTION

4 GB RAM (8 GB recommended)

Sufficient disk space for downloaded data

NETWORK

Outbound access to the WIS2 Global Broker on port 443 (MQTT over TLS).

Internal access to ports 8080 (UI), 5002 (API) and 3000 (Grafana)

PERMISSIONS

Linux — downloads dir owned by the user and group configured

Windows / macOS — Docker handles volume permissions

Installation.

01 Download latest release

```
wget https://github.com/World-Meteorological-Organization/wis2downloader/archive/refs/tags/v1.0.0b1+rc4.tar.gz  
tar -xzf v1.0.0b1+rc4.tar.gz  
cd wis2downloader-*
```

02 Run the setup script

```
bash setup.sh
```

03 Start all services

```
docker compose up -d
```

setup.sh generates .env with a random FLASK_SECRET_KEY and REDIS_PASSWORD.

First steps after launch.

Web interface http://BASE_URL

Browse the WIS2 catalogue or topic tree · create your first subscription.

REST API http://BASE_URL:5002

POST `/subscriptions` to create a subscription programmatically.

Grafana dashboard http://BASE_URL:3000

Monitor download counts, bytes and queue length in real time.

Verify downloads

Files appear in `downloads/YYYY/MM/DD/` immediately.

SECTION 03

User Guide.

Web UI, topics, subscriptions, filters, file organisation and monitoring.

03

Web interface.

SIX MAIN VIEWS

Navigate with **Alt+1** through **Alt+7**.

Dashboard

Tree

Manage Subscriptions

Documentation

Catalogue

Manual Subscription

Settings

Catalogue search

Queries three GDC (Global Discovery Catalogue) endpoints. Full-text and faceted search.

Topic tree browser

Hierarchical view of all available WIS2 topics.

Language switcher

English · French · Spanish · Arabic · Chinese · Russian.

Understanding WIS2 topics.

MQTT TOPIC HIERARCHY

```
{origin|cache}/a/wis2/{centre-id}/data/{data-policy}/{domain}/...
```

WILDCARDS

- + matches a single topic level
- # matches all remaining levels (must be last)

EXAMPLE SUBSCRIPTIONS

```
origin/a/wis2+/data/core/# # all core data from any centre
```

```
origin/a/wis2/ro-roshydromet/data/core/weather/surface-based-observations/#
```

DATA POLICIES

- core** — freely available, no restrictions
- recommended** — available with conditions

Managing subscriptions.

CREATE VIA WEB UI

Enter a topic pattern, an optional target sub-directory, and any filter rules — interactively.

CREATE VIA REST API

POST /subscriptions

```
{ "topic": "origin/a/wis2/+/data/core/#", "target": "mydata" }
```

LIST ACTIVE SUBSCRIPTIONS

GET /subscriptions

DELETE A SUBSCRIPTION

DELETE /subscriptions/{id}

Filtering system.

Optional `filter` object attached to each subscription. Rules evaluated in order — first match wins.

FILTER STAGES

Pre-download

Evaluate the WIS2 notification metadata.

Post-download

Evaluate the downloaded file content.

Default action with no filter provided: **accept**.

BUILT-IN CONDITIONS

accepted_media_types

An allow-list of MIME types.

metadata_id

An include list of dataset IDs.

bbox

Bounding box in which the notification location must be included.

pubtime

Date and time range for the publishing time.

Custom conditions can be added according to the dataset definition.

File organisation.

Base directory

`/download-path`

Date-based sub-directories

`download-path/YYYY/MM/DD/<filename>`

Date derived from download timestamp (UTC).

Optional target sub-directory

Specified per subscription:

`download-path/<target>/YYYY/MM/DD/<filename>`

INTEGRITY GUARANTEES

Original filenames preserved

No renaming, no slugifying.

Duplicate detection

Redis tracks notification IDs to avoid re-downloading.

SHA-512 verification

Checksum verified against notification metadata.

Thank you.

Questions, contributions and issue reports welcome.

PROJECT

github.com/World-Meteorological-Organization/wis2downloader

Alberto Helguera

WMO Secretariat · WIS Section · Infrastructure Department