

PORT OF SPAIN WIS2 TRAINING WORKSHOP · June 2026

# WIS2-in-a-box Overview

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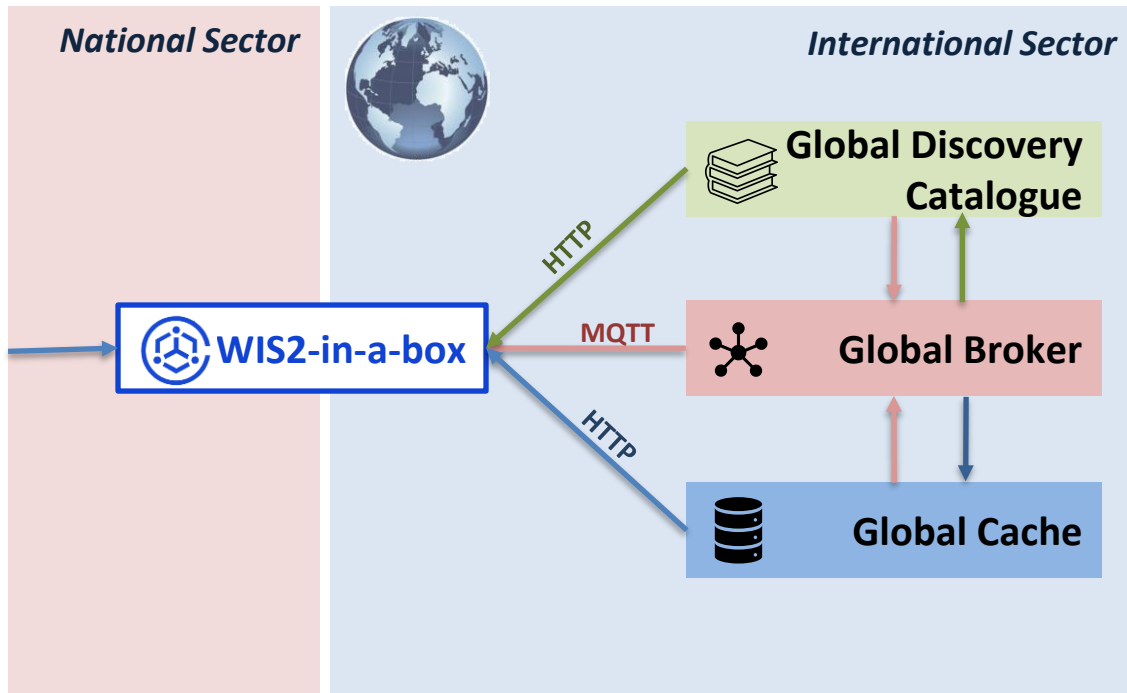
**Maaike Limper**

WMO Secretariat · WIS Section · ESDP Department

# What is WIS2-in-a-box ?

**WIS2-in-a-box (wis2box) is an open-source software stack that can be installed on a server to setup a WIS2 Node**

The wis2box-software includes all services required to run a WIS2 Node ... *and more !*



## How to turn on wis2box-instance into a WIS2 Node:

- HTTP and MQTT traffic on the server hosting the wis2box-stack must be routed to the public internet
- MQTT-endpoint and centre-id must be recorded in the Global Broker through the *WIS2 Node Registration process*\*

# WIS2 in a box

- WIS2 in a box (wis2box) is a **Reference Implementation of a WIS2 Node**
- Designed to be **cost-effective** and **low-barrier** to operate\*
- Developed as Docker Compose stack using existing **Free and Open Source** software and wis2box-specific components
  - wis2box source code at: <https://github.com/World-Meteorological-Organization/wis2box>
- Developed by WMO together with Canada to **accelerate the WIS2 implementation**
- Currently over 80 WMO-Members are using wis2box to share data on WIS2

\*wis2box hosting requirements:

- minimum 2 vCPUs with 4GB Memory and 24GB of local storage
- requires Python, Docker and Docker Compose pre-installed
- HTTP and MQTT ports routed to a publicly accessible address
- See documentation at <https://docs.wis2box.wis.wmo.int>

# WIS2 in a box is Free and Open

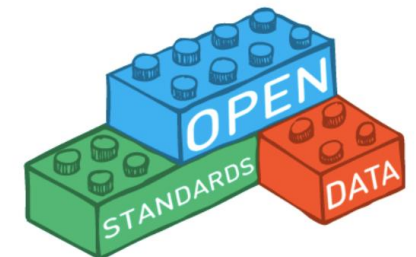
## Free and Open Source Software



## Open Standards



- MQTT
- GeoJSON
- OGC APIs



# Docker and Docker Compose

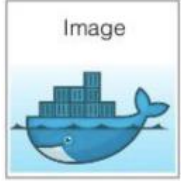
wis2box uses **Docker and Docker Compose** to define a set of services

Using pre-built Docker images to create containers providing a specific service

**NOTE: you do not need to be familiar with Docker to run wis2box**



# Docker and Docker Compose



## Why is wis2box composed as a set of Docker containers?

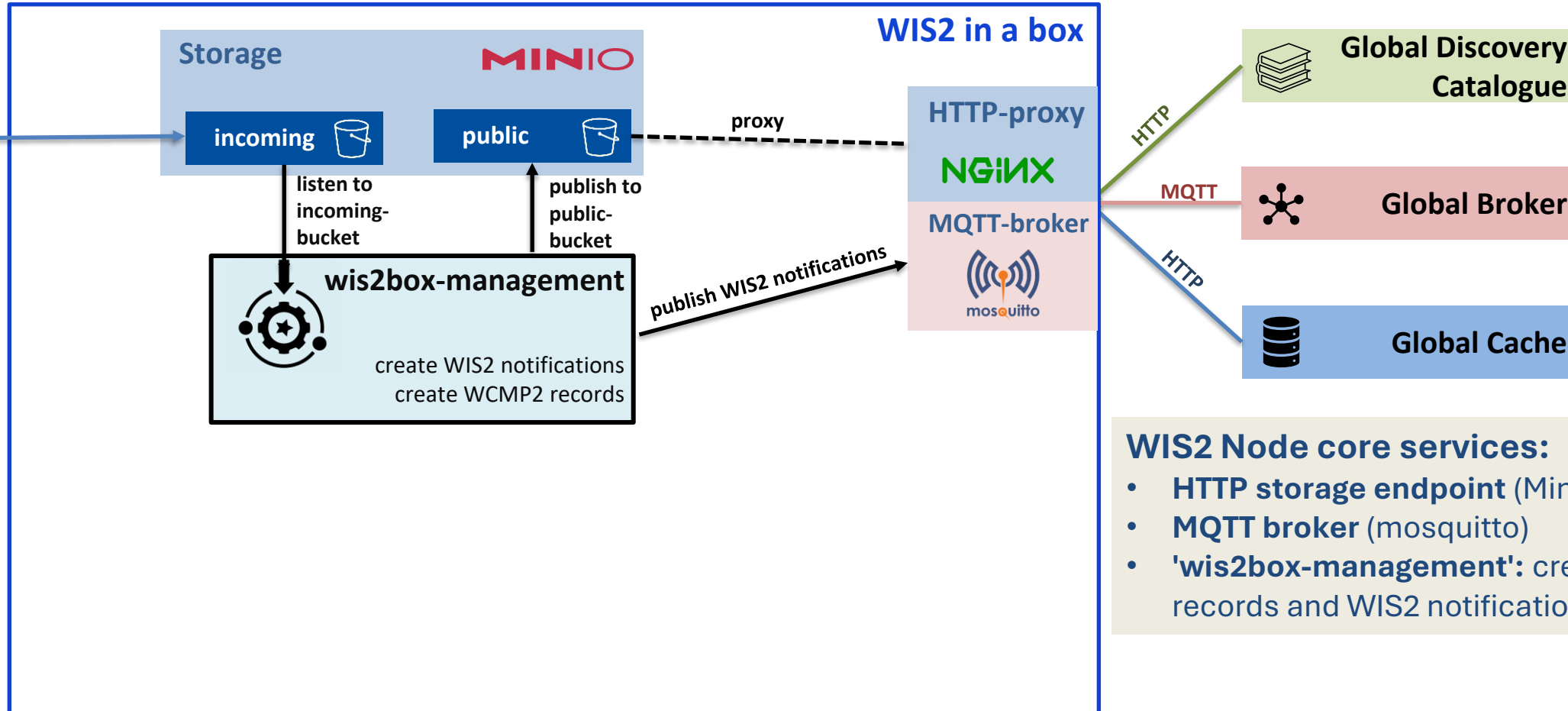
- Docker containers contain all necessary dependencies, libraries, and binaries required to run the service
- Docker containers run on any system with Docker installed, regardless of underlying hardware or operating system
- Docker containers provide process and resource isolation, enhancing security

The Python script 'wis2box-ctl.py' provides a wrapper around Docker Compose commands to interact with wis2box

## Software required on the host to run wis2box:

- **Python**
- **Docker**
- **Docker Compose**

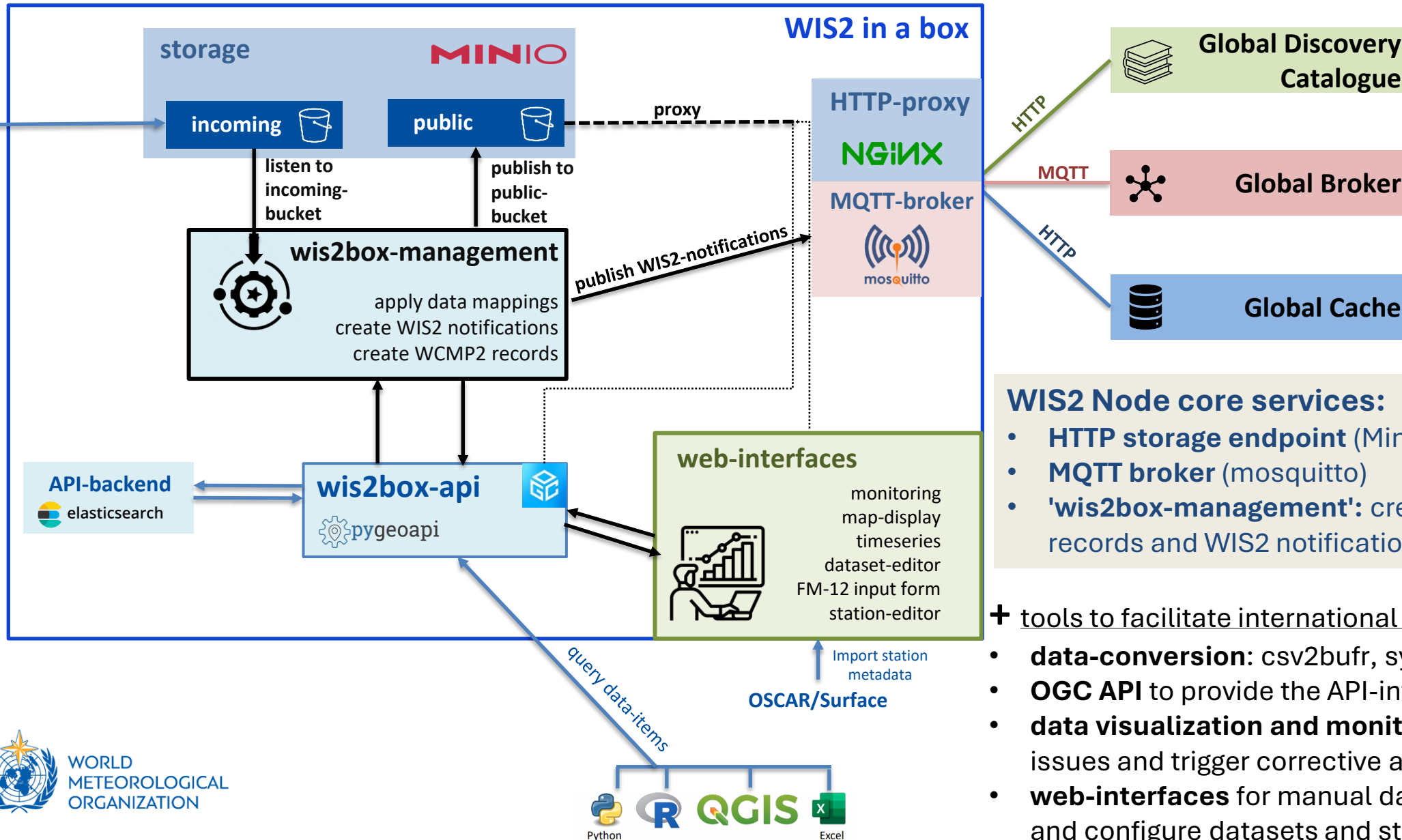
# WIS2 in a box core services



## WIS2 Node core services:

- HTTP storage endpoint (MinIO)
- MQTT broker (mosquitto)
- 'wis2box-management': create WCMP2 records and WIS2 notifications

# WIS2 in a box services



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## + tools to facilitate international data sharing:

- **data-conversion**: csv2bufr, synop2bufr, bufr2bufr
- **OGC API** to provide the API-interface
- **data visualization and monitoring** to detect issues and trigger corrective action
- **web-interfaces** for manual data input (FM-12), and configure datasets and station metadata

# How to setup a WIS2 Node using wis2box

## Step 1: Find a host that can be routed to be public internet

Recommended options:

- Virtual Machine in your local data-centre (same place as other web services)
- Virtual Machine provided by a 3<sup>rd</sup> party (a.k.a. “Cloud”)



## Step 2: Setup your host according to wis2box requirements:

<https://docs.wis2box.wis.wmo.int/en/latest/user/getting-started.html>

The following commands be used to setup the required software on Ubuntu (22.04 LTS) systems:

### Note

Execute the below commands one by one, and do not copy / paste the entire block

```
sudo mkdir -m 0755 -p /etc/apt/keyrings
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor --yes -o /etc/apt/keyrings/docker.gpg
sudo chmod a+r /etc/apt/keyrings/docker.gpg
sudo echo "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable" > /etc/apt/sources.list.d/docker.list
sudo apt-get -y update
sudo apt-get install -y docker-ce docker-compose-plugin unzip python3-pip
sudo pip3 install pip --upgrade
sudo pip3 install pyopenssl --upgrade
sudo pip3 install urllib3==1.26.0
```

## Step 3: Install and setup wis2box on your host:

<https://docs.wis2box.wis.wmo.int/en/latest/user/setup.html>

# How to setup a WIS2 Node using wis2box

A fresh installation of wis2box will have all required services running to start function as wis2box

Before your wis2box can publish anything you must **define some datasets** :

- Using the **dataset-editor** in the wis2box-webapp, or
- Using MCF file (YAML) with CLI in the main container: `wis2box dataset publish <mcf-file>`



**A wis2box-instance becomes a WIS2 Node by completing the WIS2 Node Registration process:**

- A WMO Member's "National Focal Point for WIS Matters" can register a WIS2 Node by providing a centre-id and an MQTT-endpoint

**One wis2box-instance can host multiple WIS2 Nodes**, as the same wis2box-instance can publish data for different centre-ids

- Global Brokers subscribe to registered MQTT-endpoints at `origin/a/wis2/<centre-id>/#` and re-publish all valid MQTT notifications

Notation	Name	Description	Status
ag-antiguamet	ag-antiguamet	Antigua and Barbuda Meteorological Services	stable
ai-metservice	ai-metservice	Caribbean Meteorological Organization (Anguilla)	stable
ar-smn	ar-smn	Servicio Meteorológico Nacional (Argentina)	stable
bb-barbadosmetservices	bb-barbadosmetservices	Meteorological Services (Barbados)	stable



The centre-id along with a centre description is recorded in the WMO Codes Registry for the WIS2 Topic Hierarchy:

[https://codes.wmo.int/wis/topic-hierarchy/\\_centre-id](https://codes.wmo.int/wis/topic-hierarchy/_centre-id)

# WIS2 in a box Overview

## **wis2box is a Free and Open Source Reference Implementation of a WIS2 Node**

- Developers can freely use components of wis2box to adapt existing systems to be WIS 2.0 compliant
- Source code: <https://github.com/World-Meteorological-Organization/wis2box>
- **Feedback by the community is appreciated to help improve wis2box**

## **wis2box is software not hardware, it requires a host on a (virtual) server**

- Minimum system requirements: 2 vCPUs, 4GB Memory, 24GB storage
- Requires Python, Docker and Docker Compose to be pre-installed
- To function as a WIS2 Node, the wis2box-host needs HTTP and MQTT traffic routed to public IP
- Documentation: <https://docs.wis2box.wis.wmo.int>

# Thank you.



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