

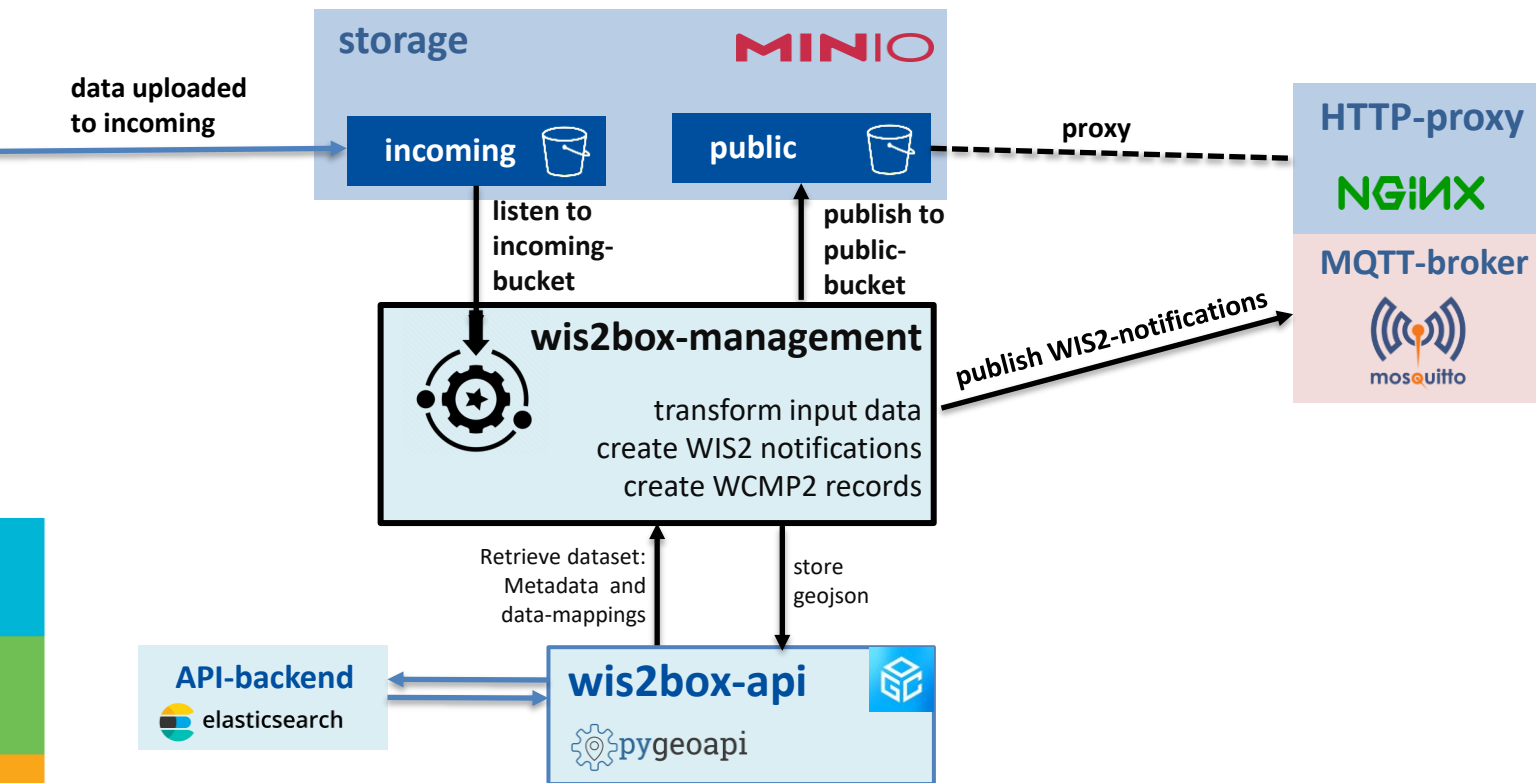
Datasets in wis2box: metadata and data mappings

The Dataset driven approach

wis2box workflow relies on Datasets to publish WIS2 notifications:

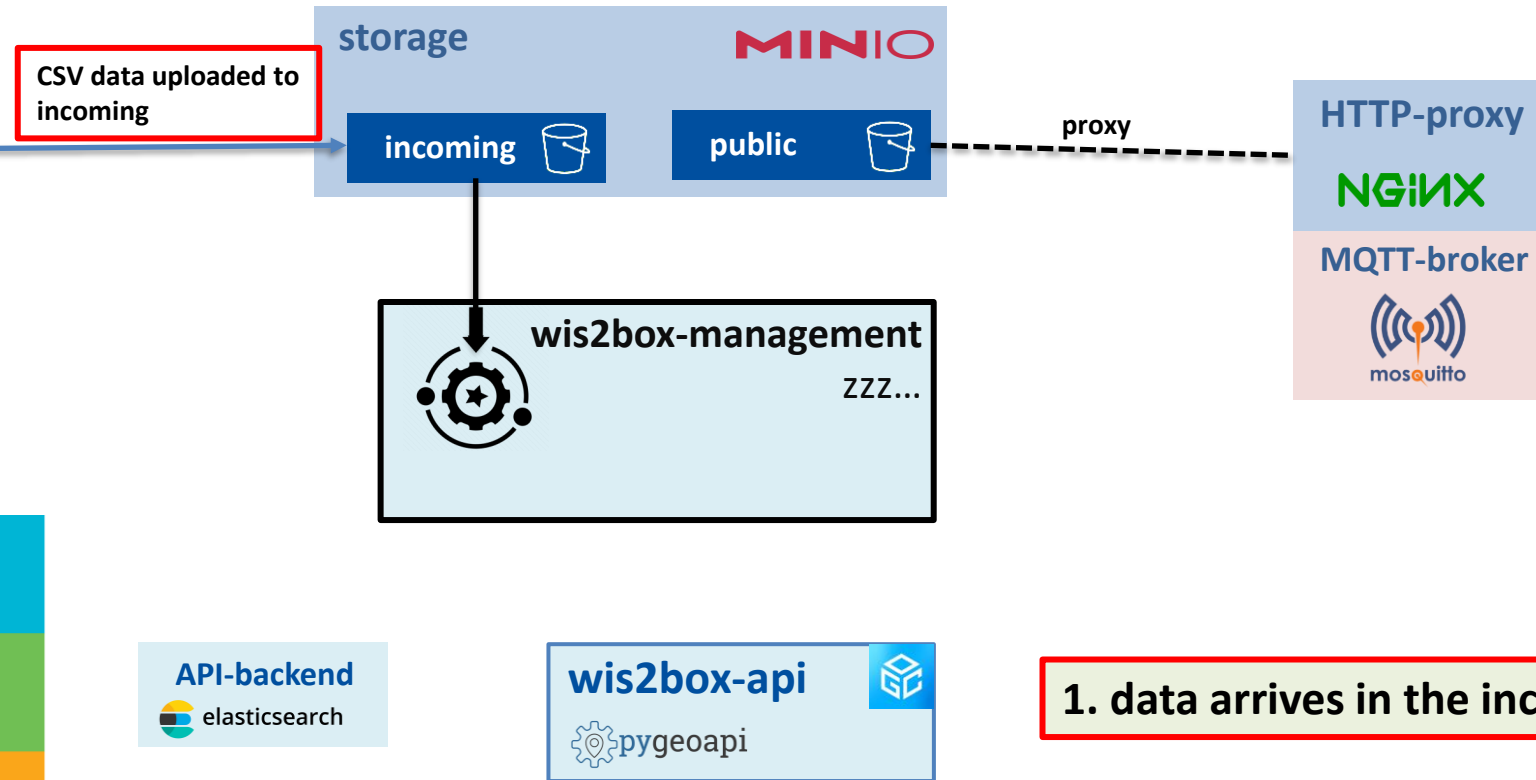
- A Dataset is described by **Discovery Metadata** published as WCMP2-record
- A Dataset connects data and metadata using the **metadata identifier**
- A Dataset defines the **topic hierarchy** to publish the WIS2 data notification
- *wis2box: A Dataset contains **data plugins** used to **transform** and **publish** the data*

Dataset driven approach



Datasets determine the actions taken whenever a file is uploaded to the 'incoming' storage bucket (see next slides)

Dataset driven approach: step-by-step



Dataset driven approach: step-by-step

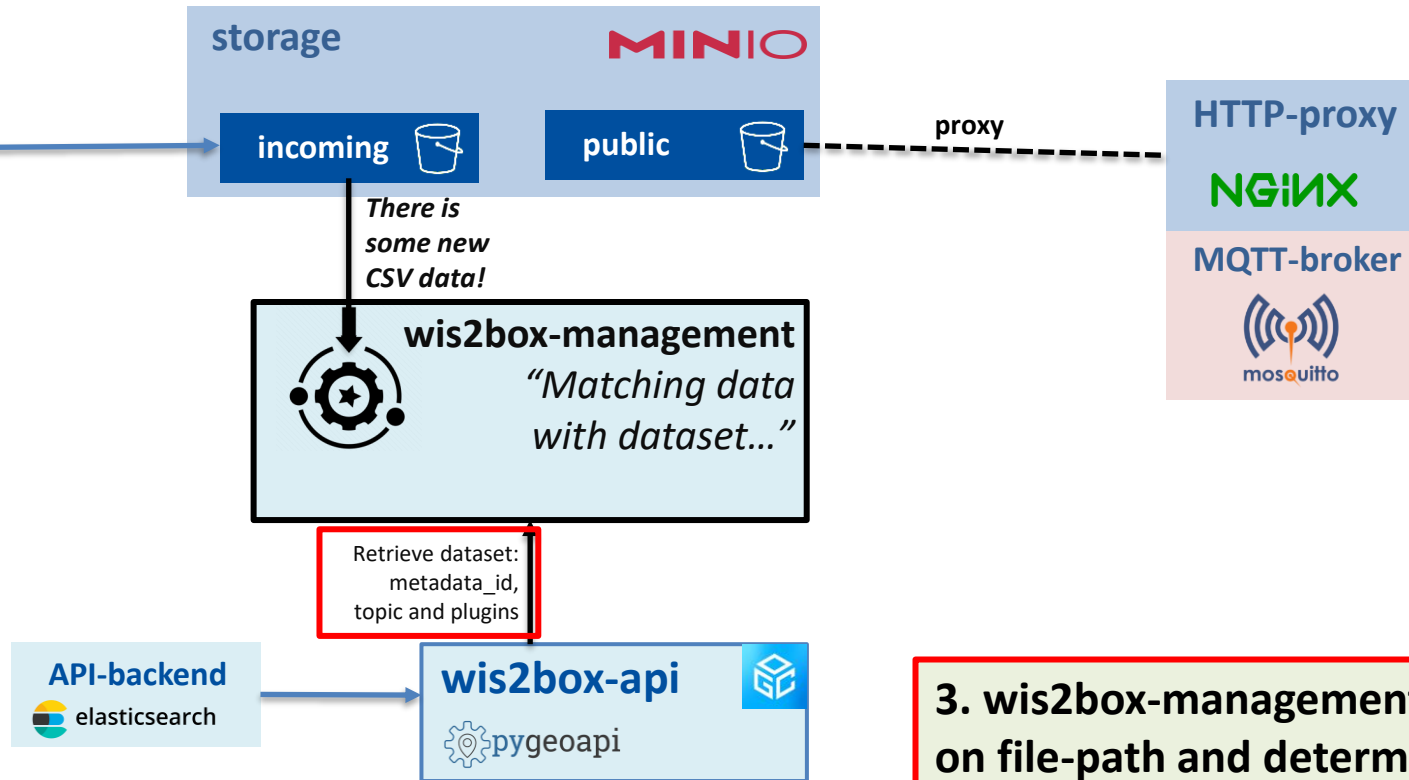


API-backend
elasticsearch

wis2box-api
pygeoapi

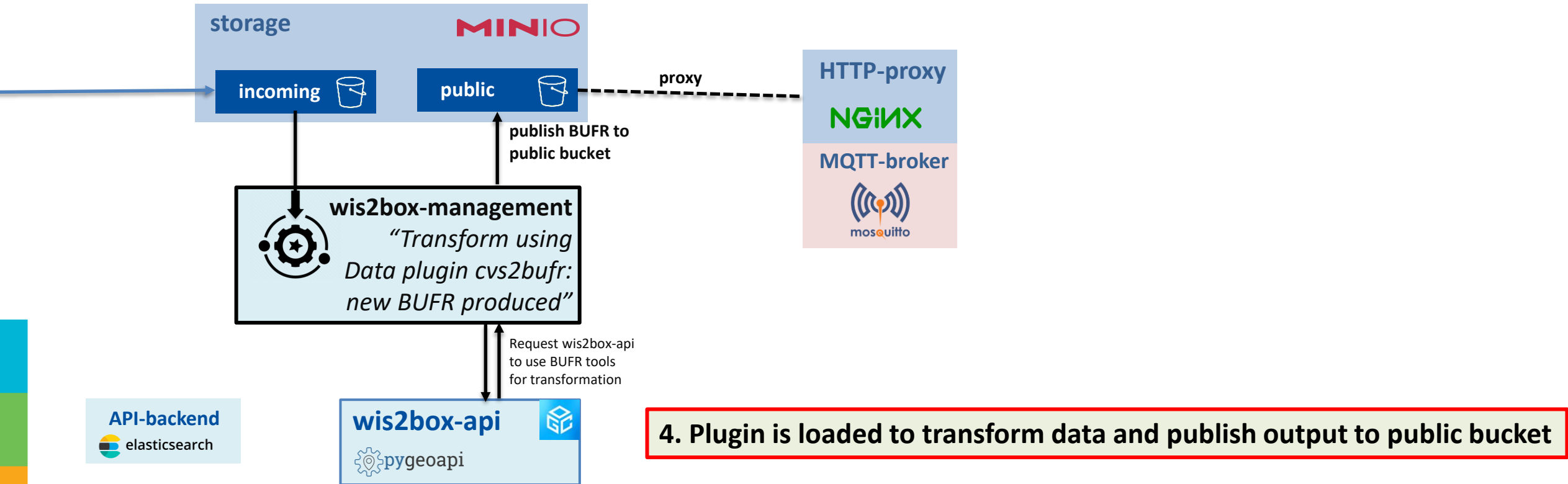
2. MinIO informs wis2box-management new data arrived

Dataset driven approach: step-by-step

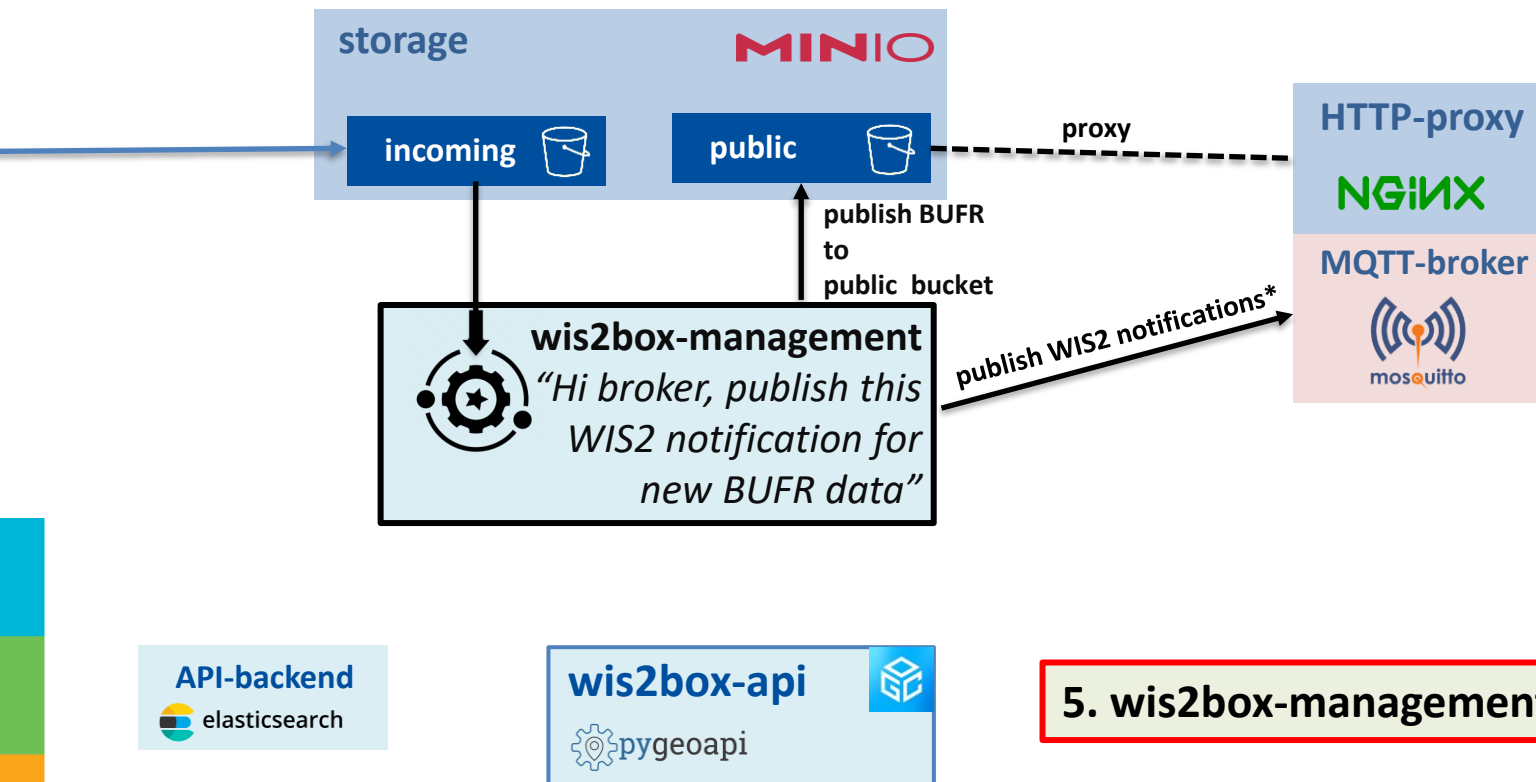


3. wis2box-management matches the incoming data to a dataset based on file-path and determines data plugin to apply

Dataset driven approach: step-by-step



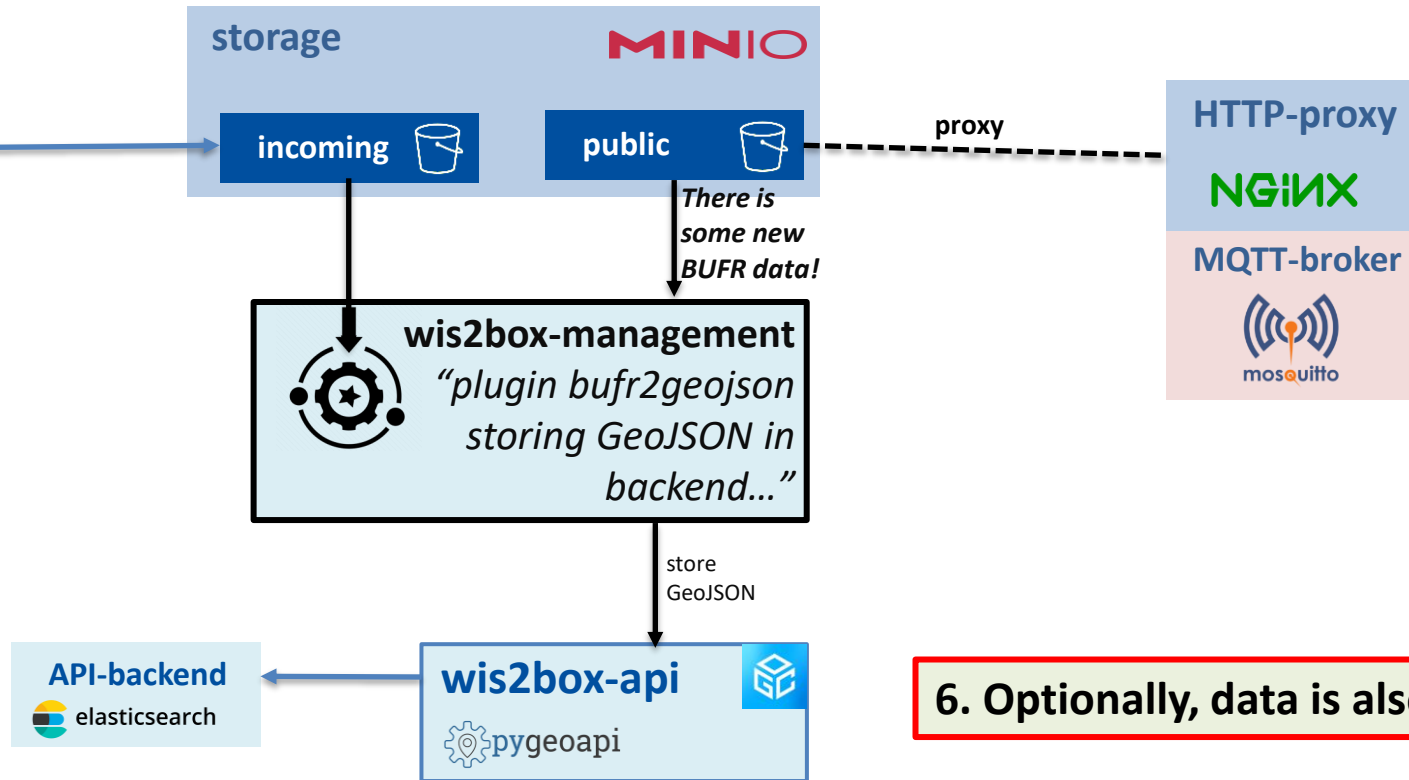
Dataset driven approach: step-by-step



5. wis2box-management publishes data notification on associated topic

* Since the HTTP-proxy exposes wis2box-public bucket as '/data', WIS2 Notifications will use href="[\\$WIS2BOX_URL/data/...](#)"

Dataset driven approach: step-by-step



6. Optionally, data is also stored as GeoJSON in the backend

Datasets in the wis2box

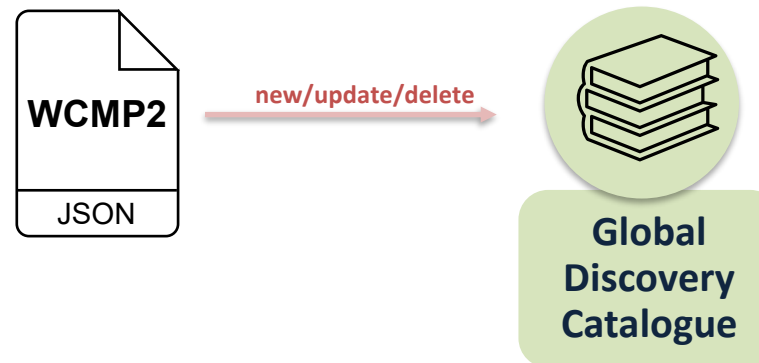
Two ways to configure a new dataset in the wis2box:

- Use the **dataset-editor** in the wis2box-webapp
- ... or share an MCF file with the wis2box-management container and execute '**wis2box dataset publish <file-path>**'

new WCMP2 notification on origin/a/wis2/<centre-id>/metadata
for every new dataset published

update WCMP2 notification on origin/a/wis2/<centre-id>/metadata
for every updated dataset published

delete WCMP2 notification on origin/a/wis2/<centre-id>/metadata
whenever a dataset is unpublished



centre identifier (centre-id)

To define a dataset you have to provide a centre-id for your WIS centre

“The centre identifier (centre-id) is an acronym as proposed by the Member and endorsed by the WMO Secretariat. It is a single identifier comprised of a Top Level Domain (TLD) and centre-name, and represents the Data Publisher, distributor or issuing centre of a given Dataset or data product/granule”

token 1: the TLD (lowercase)

uk-metoffice

br-inmet

cn-cma

id-bmkg

token 2: a descriptive name for the centre (lowercase), may include dashes

Dataset Editor in wis2box-webapp

You will be asked to provide a “**Centre ID**” which will define the metadata-id and centre-id in topic

You will be asked to provide a “**Template**”:

Select a **template** to initialize the dataset with a fixed topic and pre-defined values for keywords and data mappings

Select ‘**other**’ for any types of data you wish to publish, and you will select a topic based on the WIS2 Topic Hierarchy

New dataset: Initial Information ?

Centre ID
int-wmo-example

Template
other

- climate/surface-based-observations/daily
- ocean/surface-based-observations/drifting-buoys
- weather/surface-based-observations/ship
- weather/surface-based-observations/synop
- weather/surface-based-observations/temp

other

Dataset Editor in wis2box-webapp

Data Type = *weather/surface-based-observation/synop*

The Topic Hierarchy is fixed to *.../weather/surface-based-observations/synop*

Please enter some initial information 

Centre ID 

nl-knmi

Data Type 

weather/surface-based-observations/synop

RETURN HOME 

CONTINUE TO F

Centre ID 

it-meteoam

WMO Data Policy 

core

Discipline topic 

weather

Sub-discipline topics (choose one) 

surface-based-observations/synop

☐ experimental (free-text topic)

Topic Hierarchy 

origin/a/wis2/it-meteoam/data/core/weather/surface-based-observations/synop



WORLD
METEOROLOGICAL
ORGANIZATION



Data Type = *other*

Please enter some initial information 

Centre ID

br-inpe-test

Data Type

other

RETURN HOME 

CONTINUE TO FORM 

prediction/analysis/medium-range/probabilistic/global

prediction/analysis/medium-range/probabilistic/limited-area

prediction/analysis/nowcasting/deterministic/global

prediction/analysis/nowcasting/deterministic/limited-area

prediction/analysis/nowcasting/probabilistic/global

prediction/analysis/nowcasting/probabilistic/limited-area

Sub-discipline topics (choose one)

prediction/analysis/medium-range/probabilistic/global

Topic Hierarchy

origin/a/wis2/it-meteoam/data/core/weather/prediction/analysis/medium-range/probabilistic/global

Discipline topic

weather

☐ experimental (free-text topic)

Dataset Editor in wis2box-webapp

Dataset Editor Form

Please choose a dataset

Dataset

Dataset loaded successfully.

Metadata Editor

Dataset Identification

Title

Hourly synoptic observations from fixed-land stations (SYNOP) (br-inmet)

Description

Observation data from automatic weather stations

Identifier

urn:wmo.md:br-inmet:surface-based-observations.synop

Centre ID

br-inmet

WMO Data Policy

core

Topic Hierarchy

br-inmet/data/core/weather/surface-based-observations/synop

Earth System Disciplines

Weather

Keywords (3 minimum)

+

observations

temperature

visibility

precipitation

pressure

clouds

snow depth

evaporation

radiation

wind

total sunshine

humidity

Temporal Properties

2024-06-05

End Date in UTC

☒ Dataset ongoing

Resolution

1

Unit

hour(s)

Spatial Properties

Choose an automatic bounding box (optional)

Brazil

Your country may not have an automatic bounding box

North Latitude

5.24448639

West Longitude

-73.9872354

East Longitude

-34.7299934

South Latitude

-33.7683777

Step 1. Define metadata and validate form

Step 2. Define data plugins

Step 3. Submit the dataset for publication

Contact Information of the Data Provider

Organization Name

WMO

URL

https://wmo.int

Country

Switzerland

Email

wis2-support@wmo.int

Phone number (optional)

RESET FORM

VALIDATE FORM

Dataset Mappings Editor

Plugins in use	File extension	File pattern		
BUFR data converted to BUFR	bin	^.*\.bin\$	UPDATE	DELETE
FM-12 data converted to BUFR	txt	^.*_(\d{4})(\d{2}).*\.txt\$	UPDATE	DELETE
BUFR data converted to BUFR	b	^.*\.b\$	UPDATE	DELETE
CSV data converted to BUFR	csv	^.*\.csv\$	UPDATE	DELETE
BUFR data converted to GeoJSON	bufr4	^WIGOS_(\d+\d+-\d+-\d+)_.*\.bufr4\$	UPDATE	DELETE

ADD A PLUGIN

Authentication Token

wis2box auth token for 'processes/wis2box'

EXPORT AS JSON

SUBMIT

Datasets using YAML and the command line

Dataset records in wis2box can also be defined by a completing a YAML configuration file. Using the pygeometa project metadata control file (MCF) format:

```
mcf:
  version: 1.0

metadata:
  identifier: urn:wmo:md:cd-brazza_met_centre:surface-weather-observations
  hierarchylevel: dataset

identification:
  title: Surface weather observations from Republic of Congo
  abstract: Surface weather observations from Republic of Congo
  dates:
    creation: 2023-03-26
  keywords:
    default:
      keywords:
        - surface weather
        - temperature
        - observations
    wmo:
      keywords:
        - weather
      keywords_type: theme
      vocabulary:
        name: Earth system disciplines as defined by the WMO Unified Data Policy, Resolution 1 (Cg-Ext(2021), Annex 1.
        url: https://codes.wmo.int/topic-hierarchy/earth-system-discipline
  extents:
    spatial:
      bbox: [11.0937728207,-5.03798674888,18.4530652198,3.72819651938]
      crs: 4326
    temporal:
      begin: 2023-03-26
      end: null
      resolution: P1H
  url: https://example.org/malawi-surface-weather-observations
  wmo_data_policy: core
```

```
contact:
  host:
    organization: Congo National Meteorological Service (DMN)
    url: https://www.dirmet.cg
    individualname: Firstname Lastname
    positionname: Position Name
    address: P.O. Box 208
    city: Brazzaville
    administrativearea: null
    postalcode: null
    country: Republic of Congo
    email: you@example.com
```

```
wis2box:
  retention: P30D
  topic_hierarchy: dz-alger_met_centre/data/core/weather/surface-based-observations/synop
  country: dza
  centre_id: dz-alger_met_centre
  data_mappings:
    plugins:
      bufr4:
        plugin: wis2box.data.bufr4.ObservationDataBUFR
        notify: true
        buckets:
          - ${WIS2BOX_STORAGE_INCOMING}
          - file-pattern: '^.*\bufr4$'
        plugin: wis2box.data.bufr2geojson.ObservationDataBUFR2GeoJSON
        buckets:
          - ${WIS2BOX_STORAGE_PUBLIC}
          - file-pattern: '^WIGOS_(\d-\d+-(\d+-(\d+)-\d+)-.*\bufr4$'
```

MCF can be published using the ‘wis2box dataset publish’ command available in the wis2box-management container:
wis2box dataset publish /data/wis2box/metadata-MCF.yml

When using MCF, the user is responsible to ensure all required fields are present and contain valid entries

wis2box data plugins



Data Mappings map a specific dataset to a set of data plugins

Data plugins use an abstract model/approach to enable extensibility and reuse

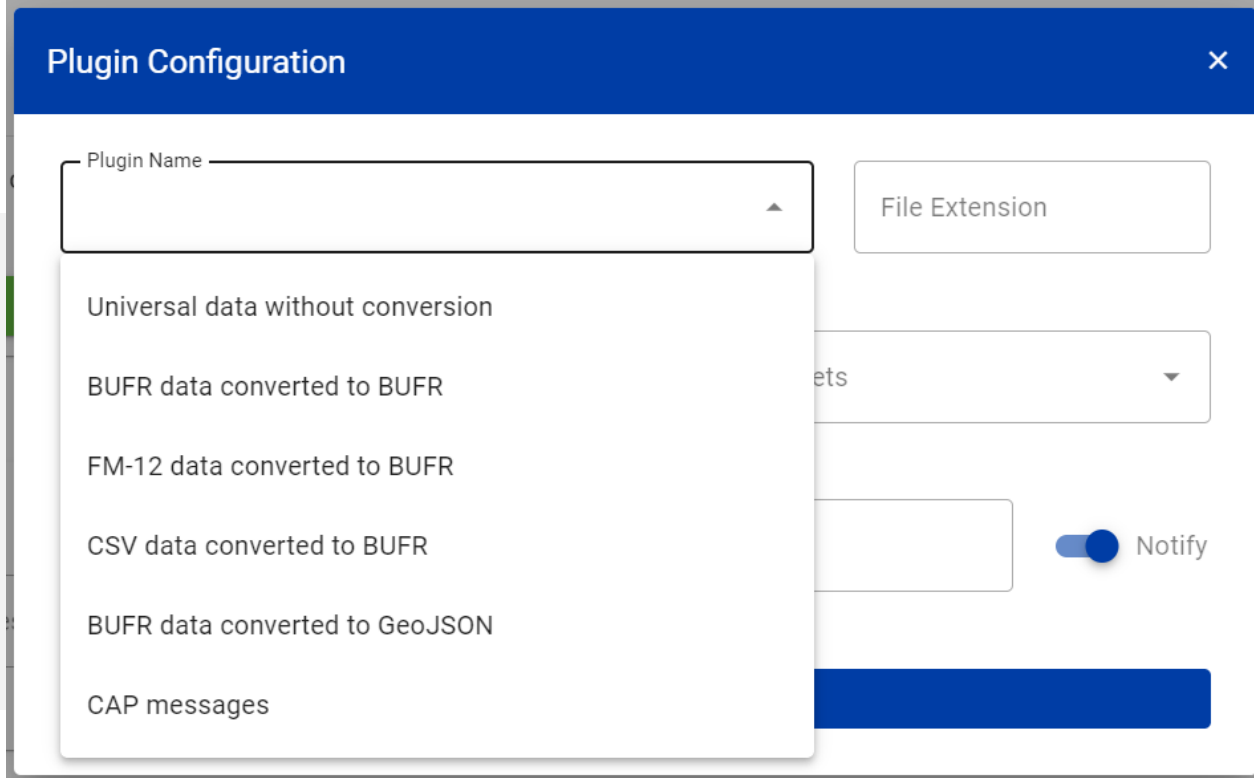
A data plugin defines the actions taken to **transform** and **publish** the data

See github.com/wmo-im/wis2box/tree/main/wis2box-management/wis2box/data

wis2box data plugins

wis2box contains the following built-in data plugins:

- wis2box.data.universal.UniversalData
- wis2box.data.cap_message.CAPMessageData
- wis2box.data.bufr4.ObservationDataBUFR
- wis2box.data.synop2bufr.ObservationDataSYNOP2BUFR
- wis2box.data.csv2bufr.ObservationDataCSV2BUFR
- wis2box.data.bufr2geojson.ObservationDataBUFR2GeoJSON



The screenshot shows a 'Plugin Configuration' dialog box with a blue header and a close button (X) in the top right corner. Inside the dialog, there is a 'Plugin Name' dropdown menu that is open, displaying a list of options: 'Universal data without conversion', 'BUFR data converted to BUFR', 'FM-12 data converted to BUFR', 'CSV data converted to BUFR', 'BUFR data converted to GeoJSON', and 'CAP messages'. To the right of the dropdown is a 'File Extension' input field. Below the dropdown is another dropdown menu with the text 'ets' and a downward arrow. To the right of this is a 'Notify' toggle switch, which is currently turned on. At the bottom of the dialog is a solid blue button.

Developers are encouraged to contribute new data plugins to wis2box!

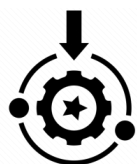
wis2box data plugins: synop2bufr

File containing SYNOP
messages (FM-12)

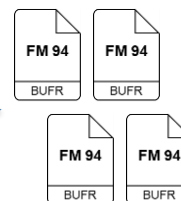


Station list

synop2bufr



One or more
BUFR files



bufr2geojson



GeoJSON

Plugin Name

- Universal data without conversion
- BUFR data converted to BUFR
- FM-12 data converted to BUFR**
- CSV data converted to BUFR
- BUFR data converted to GeoJSON
- CAP messages

plugins:

txt:

- plugin: wis2box.data.synop2bufr.ObservationDataSYNOP2BUFR
- notify: true
- file-pattern: '^*(\d{4})(\d{2}).*\.txt\$'

bufr4:

- plugin: wis2box.data.bufr2geojson.ObservationDataBUFR2GeoJSON
- file-pattern: '^WIGOS_(\d-\d+-\d+-\w+)_.*\bufr4\$'

wis2box data plugins: csv2bufr

Tabulated CSV data from
observing station, including
location

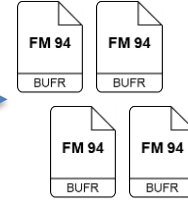


Station list

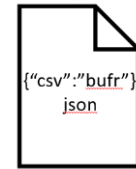
csv2bufr



One or more
BUFR files



bufr2geojson



mapping template



GeoJSON

Plugin Name

- Universal data without conversion
- BUFR data converted to BUFR
- FM-12 data converted to BUFR
- CSV data converted to BUFR**
- BUFR data converted to GeoJSON
- CAP messages

plugins:

csv:

- plugin: wis2box.data.csv2bufr.ObservationDataCSV2BUFR
- template: aws-template.json
- notify: true
- file-pattern: '^.*\.csv\$'

bufr4:

- plugin: wis2box.data.bufr2geojson.ObservationDataBUFR2GeoJSON
- file-pattern: '^WIGOS_(\d-\d+-\d+-\d+)_.*\.bufr4\$'

wis2box data plugins: bufr2bufr

File containing one or more
BUFR subsets

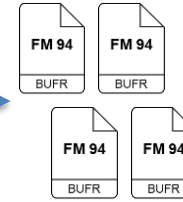
BUFR processing
(extraction of subsets)

One or more
BUFR files

bufr2geojson



Station list



GeoJSON

Plugin Name

Universal data without conversion

BUFR data converted to BUFR

FM-12 data converted to BUFR

CSV data converted to BUFR

BUFR data converted to GeoJSON

CAP messages

plugins:

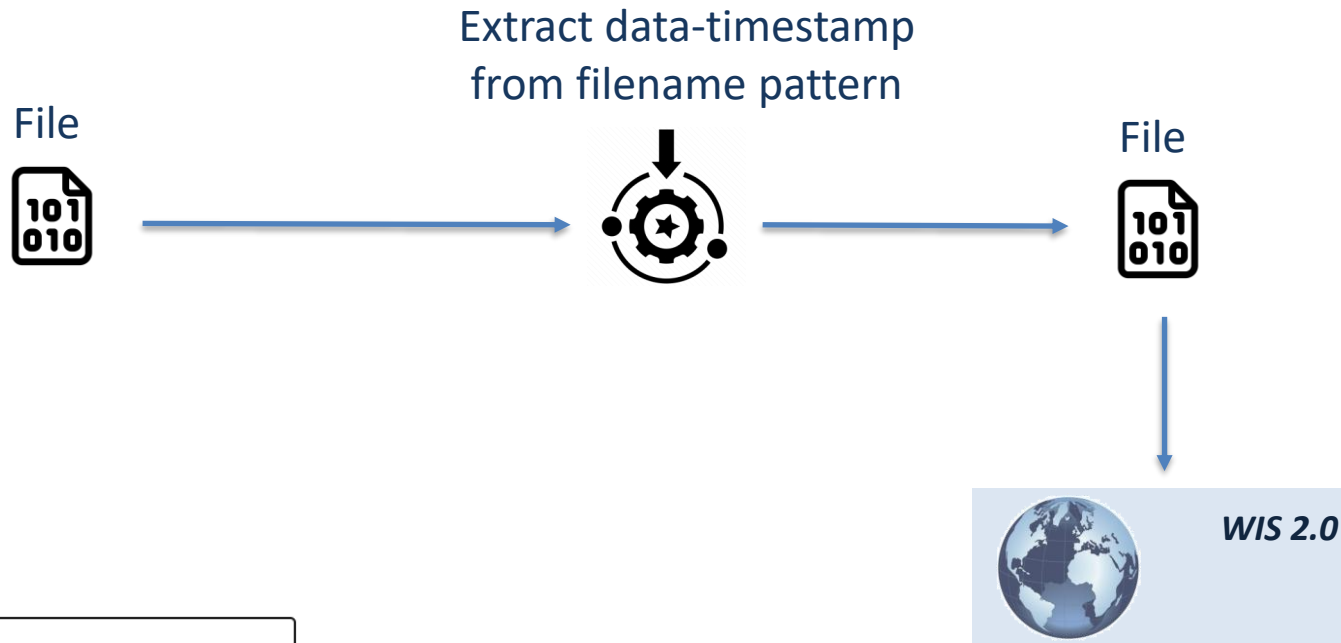
bin:

- plugin: wis2box.data.bufr4.ObservationDataBUFR
- notify: true
- file-pattern: '^.*\.bin\$'

bufr4:

- plugin: wis2box.data.bufr2geojson.ObservationDataBUFR2GeoJSON
- file-pattern: '^WIGOS_(\d+-\d+-\d+)_.*\.bufr4\$'

wis2box data plugins: universal/passthrough



Plugin Name

Universal data without conversion

BUFR data converted to BUFR

FM-12 data converted to BUFR

CSV data converted to BUFR

BUFR data converted to GeoJSON

CAP messages

plugins:

grib2:

- plugin: **wis2box.data.universal.UniversalData**

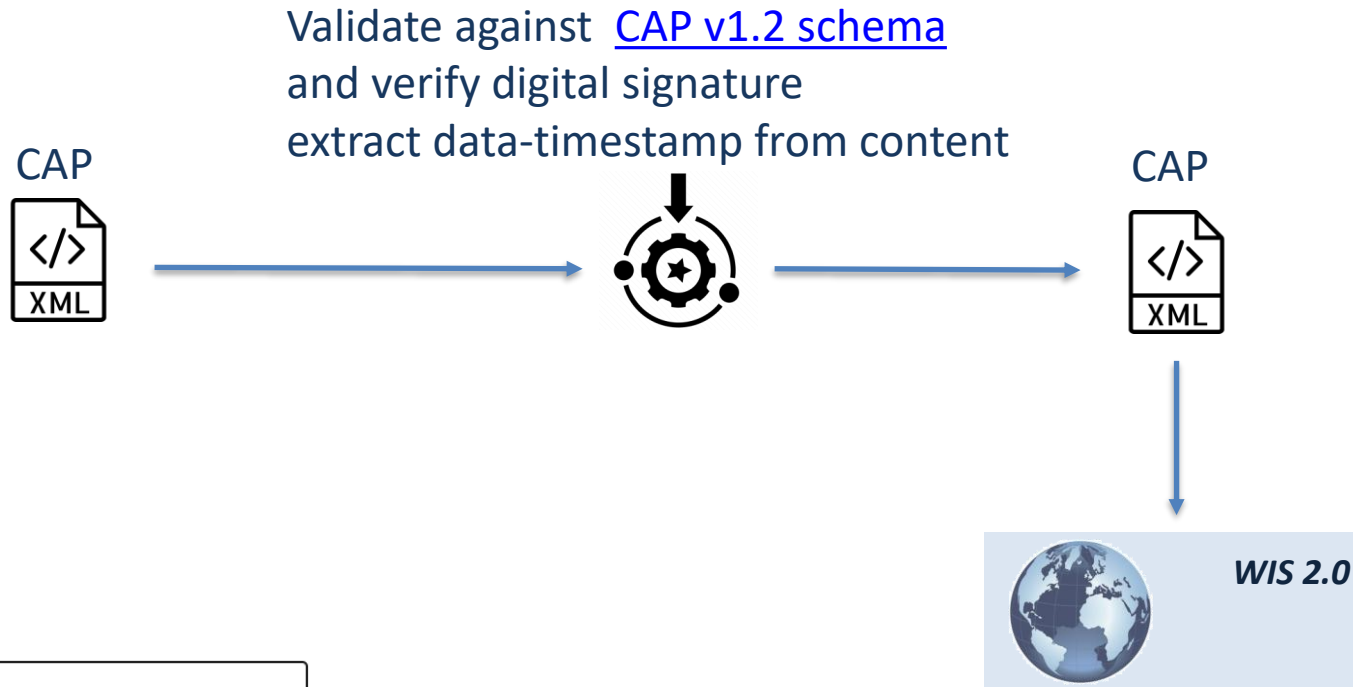
notify: true

buckets:

- **\${WIS2BOX_STORAGE_INCOMING}**

file-pattern: '^.*_(\d{8})\d{2}.*\.grib2\$'

wis2box data plugins: Common Alerting Protocol (CAP)



Plugin Name

- Universal data without conversion
- BUFR data converted to BUFR
- FM-12 data converted to BUFR
- CSV data converted to BUFR
- BUFR data converted to GeoJSON
- CAP messages**

```
plugins:
  xml:
    - plugin: wis2box.data.cap_message.CAPMessageData
      notify: true
      buckets:
        - ${WIS2BOX_STORAGE_INCOMING}
      file-pattern: '^.*\.xml$'
```

Summary

Dataset-driven workflow in wis2box-managment: a corresponding dataset needs to be configured to publish WIS2-notifications for incoming data

Datasets in the wis2box consist of two components:

- **Discovery Metadata** to publish a WCMP2 record for the Global Discovery Catalogue
- **Data Mappings** that define the plugins used to transform and publish the data

Datasets can be configured using the dataset-editor in wis2box-webapp

... or using YAML files and the command line in wis2box-management

Thank you

wmo.int



WORLD
METEOROLOGICAL
ORGANIZATION

