



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

World Ozone and Ultraviolet Radiation Data Centre (WOUDC)

WMO ET-WDC Update
2019

Tom Kralidis
Senior Systems Scientist
Geospatial and Open Data Systems
Meteorological Service of Canada

WMO Expert Team on World Data Centres
Hampton, Virginia, United States
01 October 2019



Overview

Table of Contents

- Data Centre Status
- 2018 by the Numbers
- Enhancements
- Architecture/Technology
- Interoperability



Data Centre Status

Status

- Renewal operational 2015
- Current operations
 - Contributor support
 - User support
 - Continuous data improvement
 - Data ingest
 - Metadata quality assessment / correction
 - Enhancements
- Key challenge remains incoming data cleansing



Data Centre Status

Organization Overview

- Meteorological Service of Canada
 - Geospatial and Open Data Systems
- Collaboration with ECCC Science and Technology Branch
- WMO
 - WMO SAG Ozone/UV
 - WMO ET-WDC



2018 by the Numbers

Contributors and Stations

- New and Returning Contributors (IPMA, CWBT, Athens, HMS, KMD, INTA)
- New Stations (Graciosa, Athens Academy, Kirchbichl)



2018 by the Numbers

Data Contributions

- Contributor contact validation
- Outstanding data submissions notifications
- WMO support
 - thank you Lorena Moreira!



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

Canada 

Number of Files 2018

Broad-band	123147
OzoneSonde	90117
Lidar	675
Multi-band	91649
TotalOzoneObs	100804
Spectral	269217
UmkehrN14 2.0	9889
RocketSonde	177
TotalOzone	81608
UmkehrN14 1.0	10522
TOTAL	777805



Files Processed 2018

Month	Total Files	% Passed	% Passed With Fixes	% Failed
January	6372	62.96%	90.21%	9.79%
February	838	75.30%	89.50%	10.50%
March	968	67.05%	98.14%	1.86%
April	3964	37.51%	47.17%	52.83%
May	6592	33.07%	37.64%	62.36%
June	3551	94.06%	98.90%	1.10%
July	1453	94.70%	97.73%	2.27%
August	1218	78.33%	95.24%	4.76%
September	858	96.27%	98.95%	1.05%
October	1876	90.35%	96.59%	3.41%
November	694	86.17%	91.35%	8.65%
December	2740	58.98%	61.09%	38.91%
Total	31124	62.22%	73.45%	26.55%



Downloads 2018

Dataset	WAF (number of files)	Dataset Archive Files	Geospatial Web Services (number of requests)
Total ozone obs	2993589	30	1162
Ozonesonde	266959796	31	8977
Total ozone daily obs	9991490	38	7261
Spectral	999597	25	1226
Multi-band	385929	21	538
Broad-band	253428	23	973
Umkehr 2	327136	25	353
Umkehr 1	354592	23	417
Lidar	6212	25	421
RocketSonde	16174	22	281
Total	282,287,943	263	21,609



Website Visits 2018

Year	Visits
2015	17245
2016	59042
2017	98084
2018	547352



Top Hits by Domain 2018

Domain	Hits
ecmwf.int	281487149
noaa.gov	41143661
oma.be	8906628
auth.gr	3185643
nasa.gov	2946676
kishou.go.jp	1694876
(not set)	1492231
archive.org	759360
chonbuk.ac.kr	461577
knmi.nl	304746
...	
total	343804972



Enhancements

Updates

- Trajectory-mapped Ozonesonde dataset for the Stratosphere and Troposphere (TOST)
- Global and zonal total ozone variations estimated from ground-based and satellite measurements
- HTTPS (w/ HTTP -> HTTPS redirect)
- Station Data Summaries
- Non-standard format support tools
 - SHADOZ
 - Umkehr



Interoperability

Distributed Search

- NDACC -> WOUDC
 - Filelist
- Eubrewnet -> WOUDC
 - Filelist
- Data Metrics consideration



Interoperability

Data Centre Interoperability project (DCIO)

- Circa 2008
 - Harmonized dataset metadata
 - peering
 - Data discovery
-
- Evolution of DCIO project
 - Reduce problems associated with data duplication
 - Authoritative single source



Interoperability

WIGOS

- Station metadata available as WMDR from WOUDC WFS
- Needs to be pulled by OSCAR/pushed by WOUDC
- Updating to push implementation (via MSC NMHS)
 - WMDR generation: pygeometa <https://github.com/geopython/pygeometa>
 - Publication to OSCAR: pyoscar <https://github.com/wmo-cop/pyoscar>



Interoperability

Key Drivers: Alignment

- World Meteorological Organization
 - Weather, Climate, Water
- Public Access: Canadian Open Data
 - WeatherCAN: Mobile Weather App
 - Canadian Centre for Climate Services (CCCS)
- Government of Canada Geospatial
 - Federal Geospatial Platform (FGP)
- Beyond: GEOSS, etc.



Interoperability

Core Principles

- Standards
- Open Geospatial Consortium (OGC)
- World Wide Web Consortium (W3C)
- International Organization for Standardization (ISO)



Interoperability

Challenges

- Interoperability doesn't happen by accident *
- Architecture of Participation
- Opportunities
 - Pilots
 - Testbeds
 - Seminars/workshops, knowledge transfer

* Cliff Kottman, OGC: <http://www.opengeospatial.org/ogc/honors/kottman>



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

Canada

Architecture

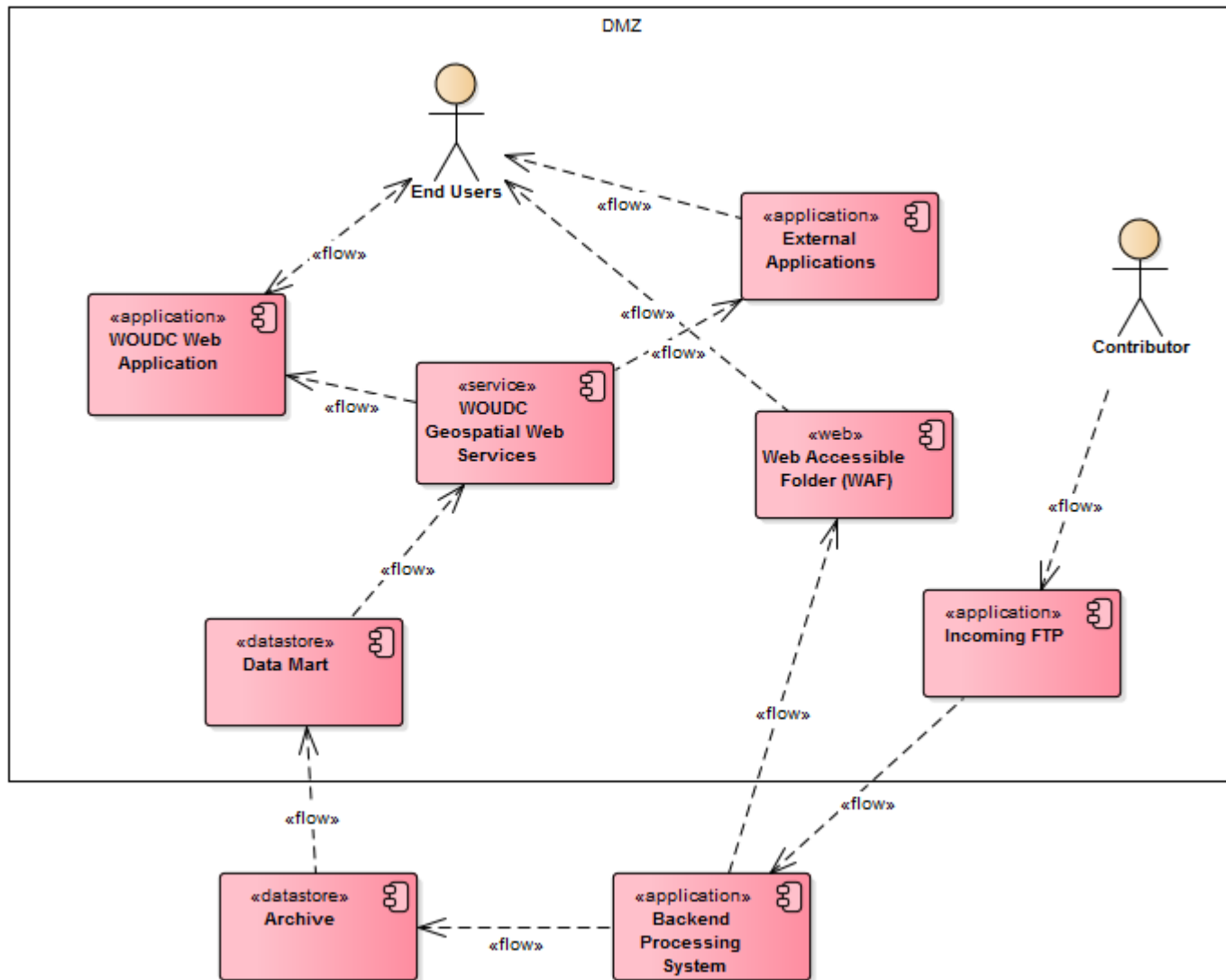
Status

- Consistent with 2015 renewal
- Minor updates
- Plug and Play
- Open Standards First
 - OGC
 - WIS DCPC compatible



Arc

cmp woudc.architecture.system



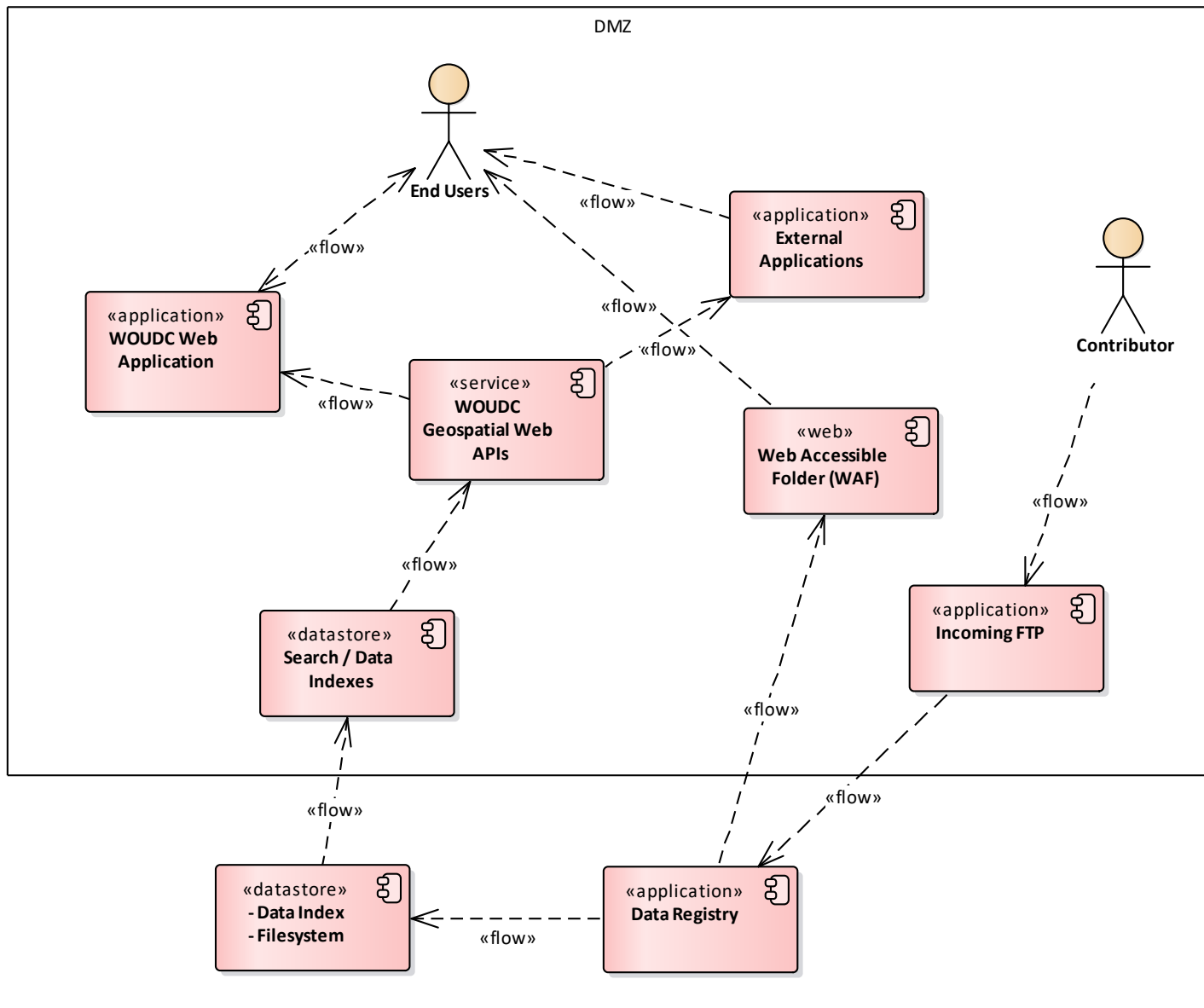
Architecture

Data Registry Concept

- Round trip: data currently shredded into highly normalized RDBMS and put back together again for web access
- Investigation of registry
 - File metadata
 - No actual data storage (files only)
 - Web products created on demand/as required



A



Technology

	Current	Future
Deployment	Debian	Docker
Processing	Python 3	Python 3
Archiving	PostgreSQL+FS	PostgreSQL+FS
Search	PostgreSQL	Elasticsearch
API	MapServer, pycsw	pygeoapi
UI	PHP, JavaScript	Vue.js



Evolving standards

OGC API Development Activity

- W3C [Spatial Data on the Web Best Practices](#)
- Modernization of API standards (Webby)
 - REST
 - JSON/HTML
 - OpenAPI/Swagger
- Resource Oriented Architecture
- Promotion of JSON/GeoJSON and HTML
- Clean break
- Lowers barrier to implementation



Evaluating Standards

Request URL

https://geo.weather.gc.ca/geomet/features/collections/climate-daily/items?f=json&limit=500&startindex=0

Server response

Code	Details
200	<div><div>Response body</div><div><pre>"coordinates": [-134.18333333333334, 59.6], "type": "Feature", "id": "1203255.1994.11.8", "properties": { "STATION_NAME": "GRAHAM INLET", "STN_ID": 1492, "CLIMATE_IDENTIFIER": "1203255", "ID": "1203255.1994.11.8", "LOCAL_DATE": "1994-11-08 00:00:00", "PROVINCE_CODE": "BC", "LOCAL_YEAR": 1994, "LOCAL_MONTH": 11, "LOCAL_DAY": 8, "MEAN_TEMPERATURE": -5.8, "MEAN_TEMPERATURE_FLAG": null, "MIN_TEMPERATURE": -8, "MIN_TEMPERATURE_FLAG": null, "MAX_TEMPERATURE": -3.5, "MAX_TEMPERATURE_FLAG": null, "TOTAL_PRECIPITATION": 0, "TOTAL_PRECIPITATION_FLAG": null, "TOTAL_RAIN": 0, "TOTAL_RAIN_FLAG": null, "TOTAL_SNOW": 0, "TOTAL_SNOW_FLAG": null, }</pre></div><div>Response headers</div><div><pre>access-control-allow-headers: X-PINGOTHER, Content-Type, X-Requested-With access-control-allow-origin: * connection: Keep-Alive content-length: 537066 content-type: application/json date: Mon, 23 Sep 2019 15:47:27 GMT keep-alive: timeout=5, max=100 server: Apache via: 1.1 geo.weather.gc.ca x-powered-by: pygeoapi 0.6.0 x-ua-compatible: IE=Edge</pre></div></div>

Responses

Code	Description	Links
200	successful operation	No links
400	Invalid id supplied	No links

startindex
integer
(query)

The optional startindex parameter indicates the index within the result set from which the server shall begin presenting results in the response document. The first element has an index of 0 (default).

WOUDC WMO ET-WDC Update 2019

Thank You!

@tomkralidis

MSC Geospatial and Open Data Systems
(GODS)



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

Canada 