OCEAN
TRACKING NETWORK

# Data Management for Animal Tracking Activities

**IOOS DMAC 2015**
**Jon Pye**
**@OceanTracking**

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**“OTN is a biological observing system of the UN’s Global Ocean Observing System.”** Following on from the Census of Marine Life (CoML), OTN has the Global Ocean Observing System (GOOS) mandate for integrating acoustic receiver array data from all of the world oceans plus the Mediterranean Sea and Great Lakes.

The Global Ocean Observing System

GOOS

- GOOS Webinars
- GOOS Updates
- Home
- News
- Structure of GOOS
- What Is GOOS?
- GOOS Regional Alliances
- GOOS Programmes
- GOOS Systems

Many separate observing systems comprise the GOOS. These vary from a few buoys operated by a research lab, to intergovernemental cooperations which organize globe spanning efforts. The GOOS seeks to find the value of associating these many systems together to create a value greater than the separate parts. By integrating disparate systems the unique data and distribution systems of each can become part of a greater system, enhancing the value and utility of the individual systems as well as creating a global view of the earth's oceans.

# OTN is a global network built on partnerships

Strategic receiver arrays deployed in **collaboration** with independent **partners** to ensure effective monitoring and stewardship of our valued aquatic resources

Data partnerships built on intelligent open access and interoperability

Fostering new technology development and innovative use of existing technology

OCEAN TRACKING NETWORK

OTN-affiliated receivers
Locations as of June 2014

Collaborations with over 100 tagging projects sharing at least a subset of their tagging metadata with OTN

Ever-expanding global network of acoustic receivers listening for over 90 different key animal species

# Standards Based/Best Practices

OTN follows international standards, including:

- *OBIS (DarwinCore)
- Open Geospatial Consortium (OWS)


We are also dedicated to open-source platforms: PostgreSQL / PostGIS, Plone CMS, R, Python

IOOS / NERACOOS / IMOS / OTN developed and implemented Marine Metadata Initiative (MMI) Registered Animal Acoustic Telemetry (AAT) Exchange standard

- Minimal **required** field set with large *optional* field set allows assumptions to be made without excluding data sources
- AAT will facilitate ingestion for modelers (NetCDF)

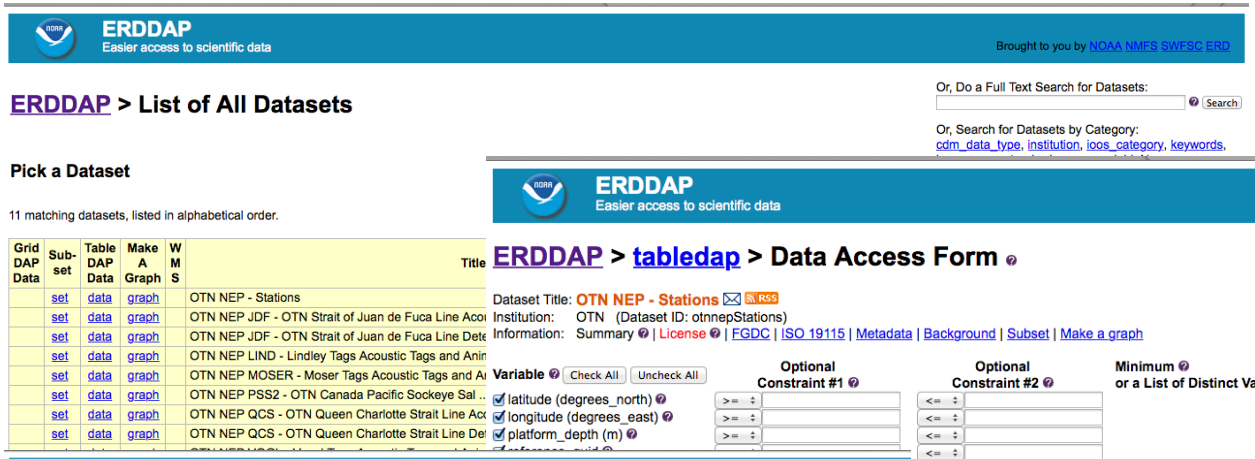
* : Ocean Biogeographic Information System (iobis.org)

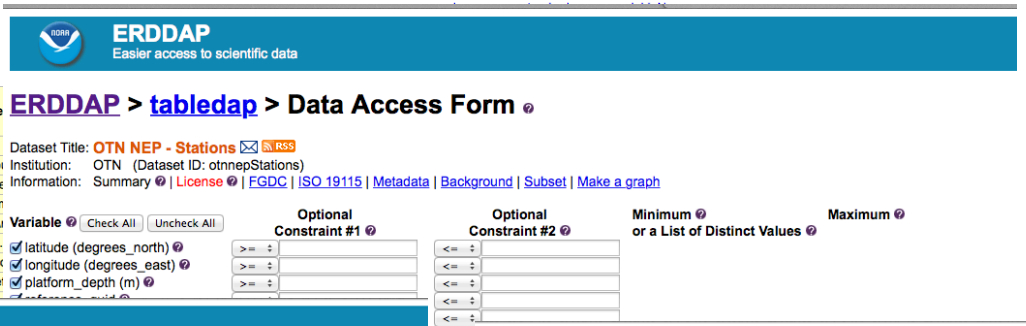
# IOOS® Z-GRAM – 28 June 2013

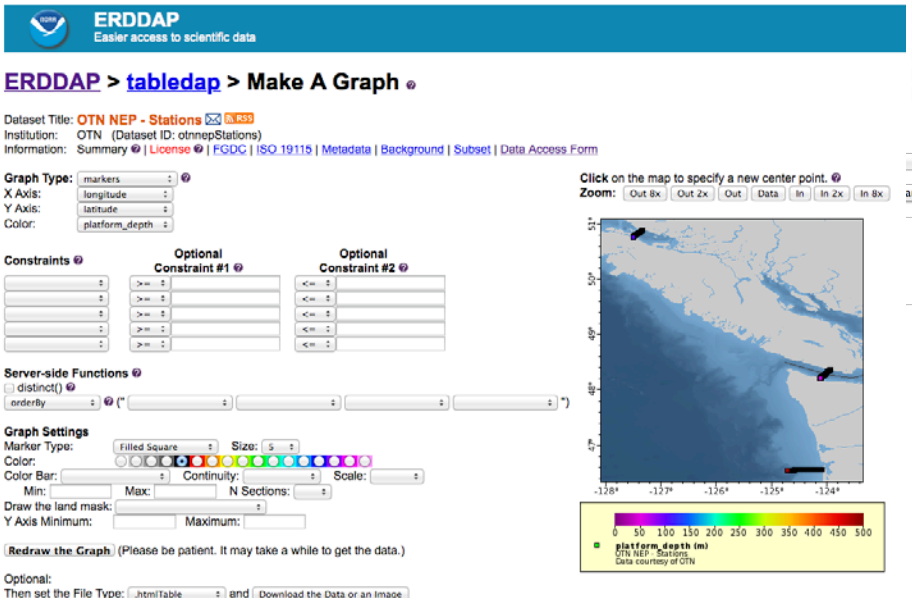
***Animal Telemetry:*** *OTN, a project of Global Ocean Observing System (GOOS), led by Canada, has accepted to adopt the Animal Acoustic Telemetry (AAT) Data solutions recently reconciled by U.S. IOOS, NANOOS, OTN, and Australia's Integrated Marine Observing System (IMOS) and other partners. These data solutions include a) standard AAT data content and standard discovery metadata (based on FGDC and ISO) and b) standard access using ERDDAP and GEOSERVER services. These AAT data solutions are expected to facilitate data exchange between data centers, unite oceanographers and trackers and users getting the data they want in formats they need.*

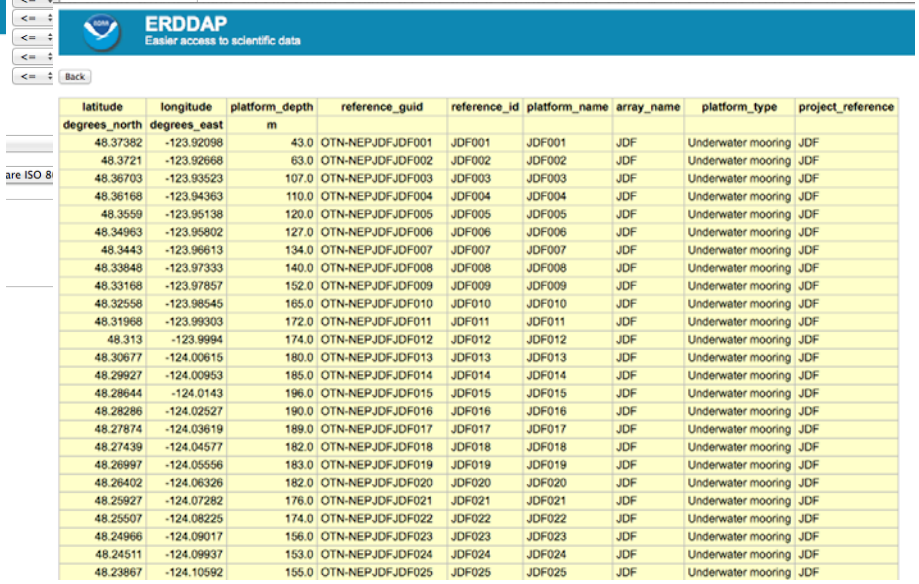
See also: https://code.google.com/p/ioostech/wiki/AnimalAcousticTelData

# In Progress
# IOOS Data Exchange via ERDDAP

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| 48.3721 | -123.92668 | 63.0 | OTN-NEPJDFJDF002 | JDF002 | JDF002 | JDF | Underwater mooring | JDF |
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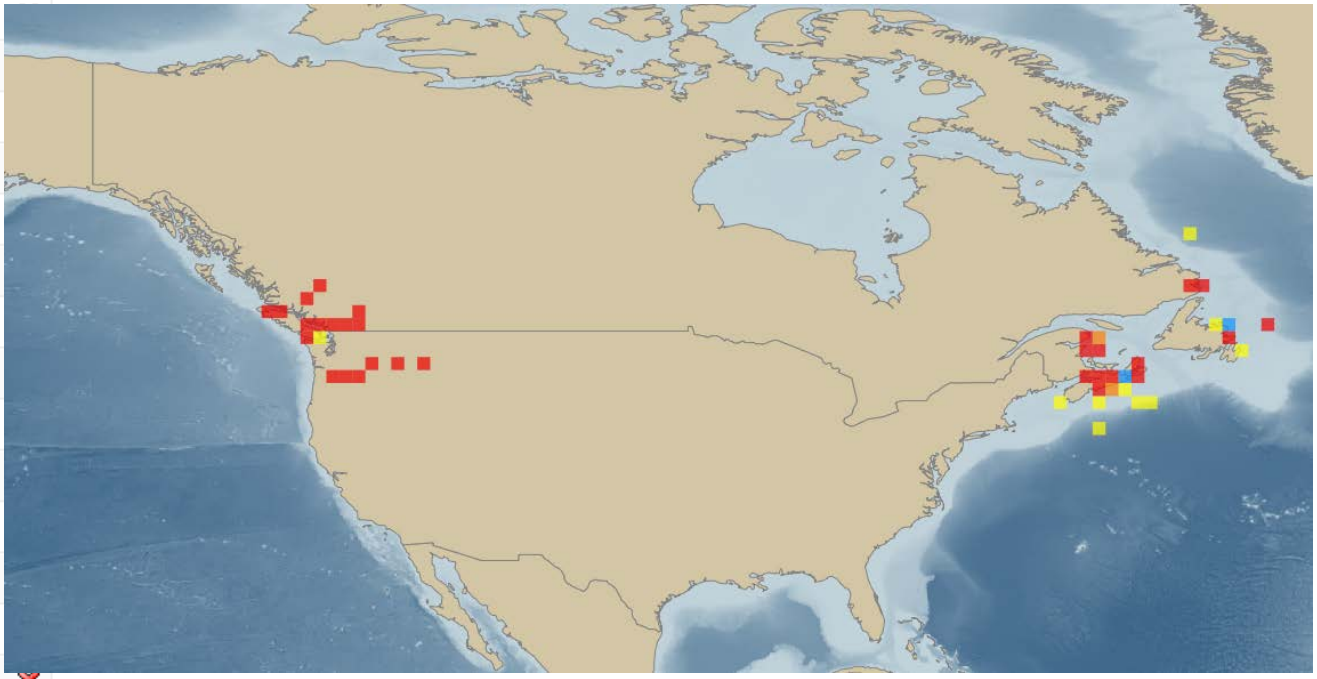
# OTN Data on the Ocean Biogeographic Information System

- OTN Bras d'Or Lakes Array - Tag Release Metadata
- OTN Canada Pacific Sockeye Salmon Tagging Project 2 ...
- OTN Goukou Estuary fish tracking - Tag Release Metadata
- OTN Kintama 2004-2011 tags - Tag Release Metadata
- OTN NS Blue Shark Tracking - Tag Release Metadata
- OTN Ponta do Ouro zambezi shark tracking - Tag Relea...
- OTN Raby Coho Salmon Tagging - Tag Release Metadata
- OTN Shark Spotters shark tracking - Tag Release Meta...
- OTN/ACADIA Minas Passage of the Bay of Fundy fish A...
- OTN/DFO Maritimes Grey seals as bioprobes
- OTN/DFO Maritimes Inner Bay of Fundy Atlantic Salmon ...
- OTN/DFO Maritimes Spiny Dogfish Tagging
- OTN/DFO Maritimes St. Mary's River Salmon Tracking - ...
- OTN/DFO NE Newfoundland Acoustic Array and Atlantic...
- OTN/DFO NL Gilbert Bay Acoustic Telemetry - Tag Rele...
- OTN/DFO-GFC Gulf of St Lawrence Cod Acoustic Tele...
- OTN/DFO: Porbeagle and Blue Sharks - Tag Release M...



- Public tag release metadata for >12k animals / 17 proj.
- Submission process now push-button automated using the OTN Database & Python's **requests** module

Screenshots via iobis.org

**Per OTN**
Animal ta
approved
Registered

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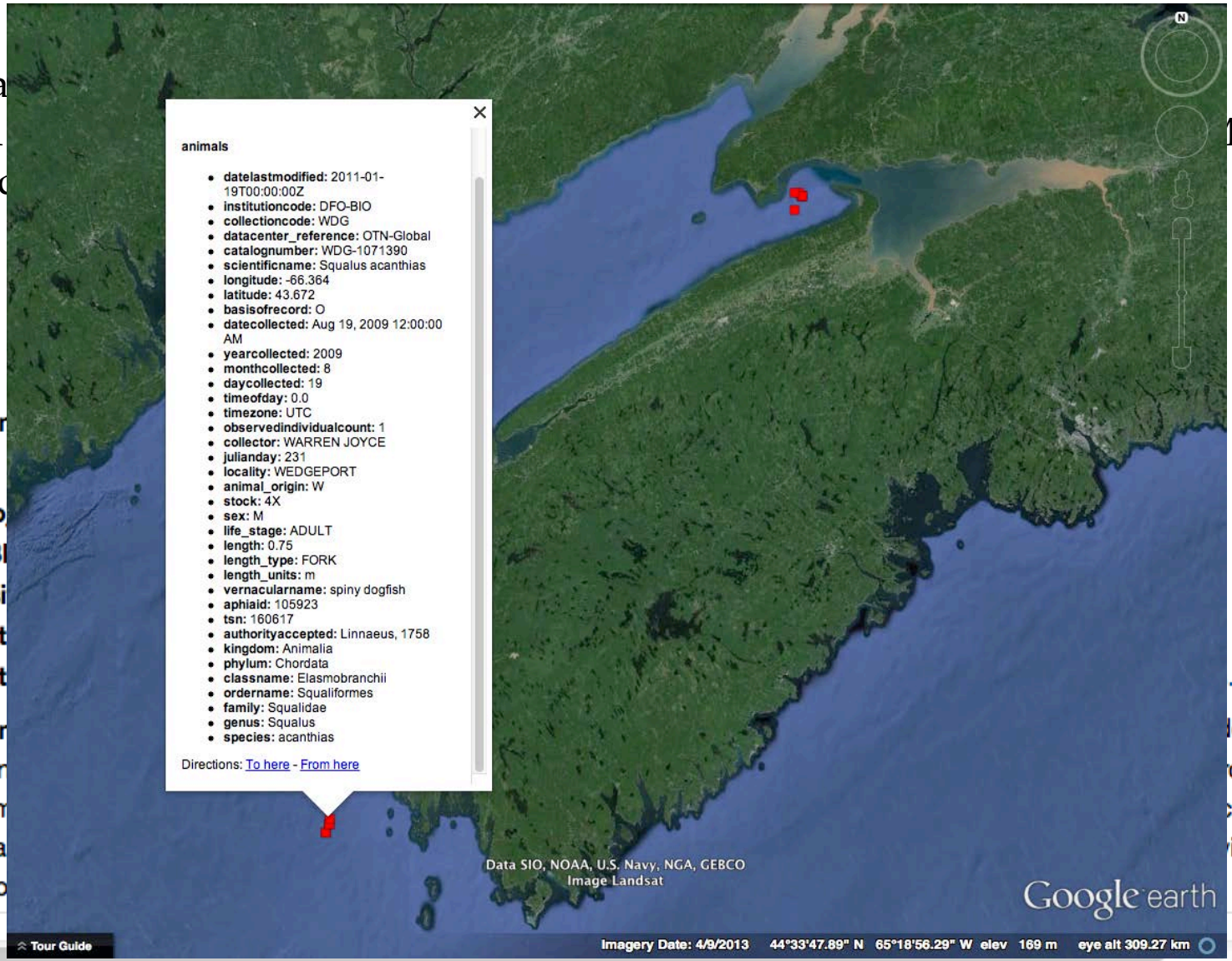


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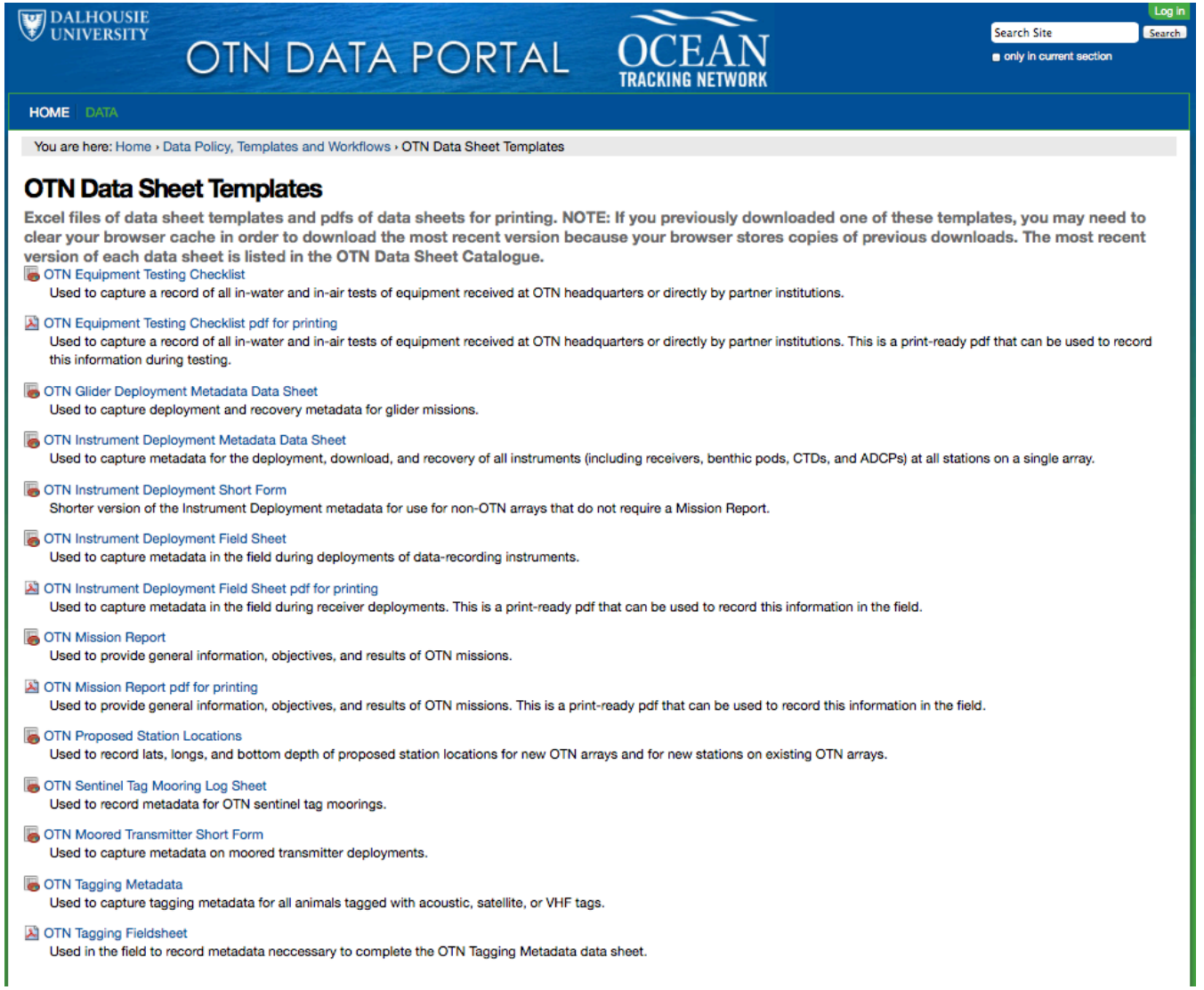
- OTN provides metadata templates (with included data dictionaries for how to complete)
- We will ingest any electronic format (no need to reformat if you already have electronic data)
- "Be conservative in what you do, be liberal in what you accept from others."
  -Jon Postel



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OTN DATA PORTAL

OCEAN TRACKING NETWORK

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HOME | DATA

You are here: Home › Data Policy, Templates and Workflows › OTN Data Sheet Templates

## OTN Data Sheet Templates

**Excel files of data sheet templates and pdfs of data sheets for printing. NOTE: If you previously downloaded one of these templates, you may need to clear your browser cache in order to download the most recent version because your browser stores copies of previous downloads. The most recent version of each data sheet is listed in the OTN Data Sheet Catalogue.**

OTN Equipment Testing Checklist
Used to capture a record of all in-water and in-air tests of equipment received at OTN headquarters or directly by partner institutions.

OTN Equipment Testing Checklist pdf for printing
Used to capture a record of all in-water and in-air tests of equipment received at OTN headquarters or directly by partner institutions. This is a print-ready pdf that can be used to record this information during testing.

OTN Glider Deployment Metadata Data Sheet
Used to capture deployment and recovery metadata for glider missions.

OTN Instrument Deployment Metadata Data Sheet
Used to capture metadata for the deployment, download, and recovery of all instruments (including receivers, benthic pods, CTDs, and ADCPs) at all stations on a single array.

OTN Instrument Deployment Short Form
Shorter version of the Instrument Deployment metadata for use for non-OTN arrays that do not require a Mission Report.

OTN Instrument Deployment Field Sheet
Used to capture metadata in the field during deployments of data-recording instruments.

OTN Instrument Deployment Field Sheet pdf for printing
Used to capture metadata in the field during receiver deployments. This is a print-ready pdf that can be used to record this information in the field.

OTN Mission Report
Used to provide general information, objectives, and results of OTN missions.

OTN Mission Report pdf for printing
Used to provide general information, objectives, and results of OTN missions. This is a print-ready pdf that can be used to record this information in the field.

OTN Proposed Station Locations
Used to record lats, longs, and bottom depth of proposed station locations for new OTN arrays and for new stations on existing OTN arrays.

OTN Sentinel Tag Mooring Log Sheet
Used to record metadata for OTN sentinel tag moorings.

OTN Moored Transmitter Short Form
Used to capture metadata on moored transmitter deployments.

OTN Tagging Metadata
Used to capture tagging metadata for all animals tagged with acoustic, satellite, or VHF tags.

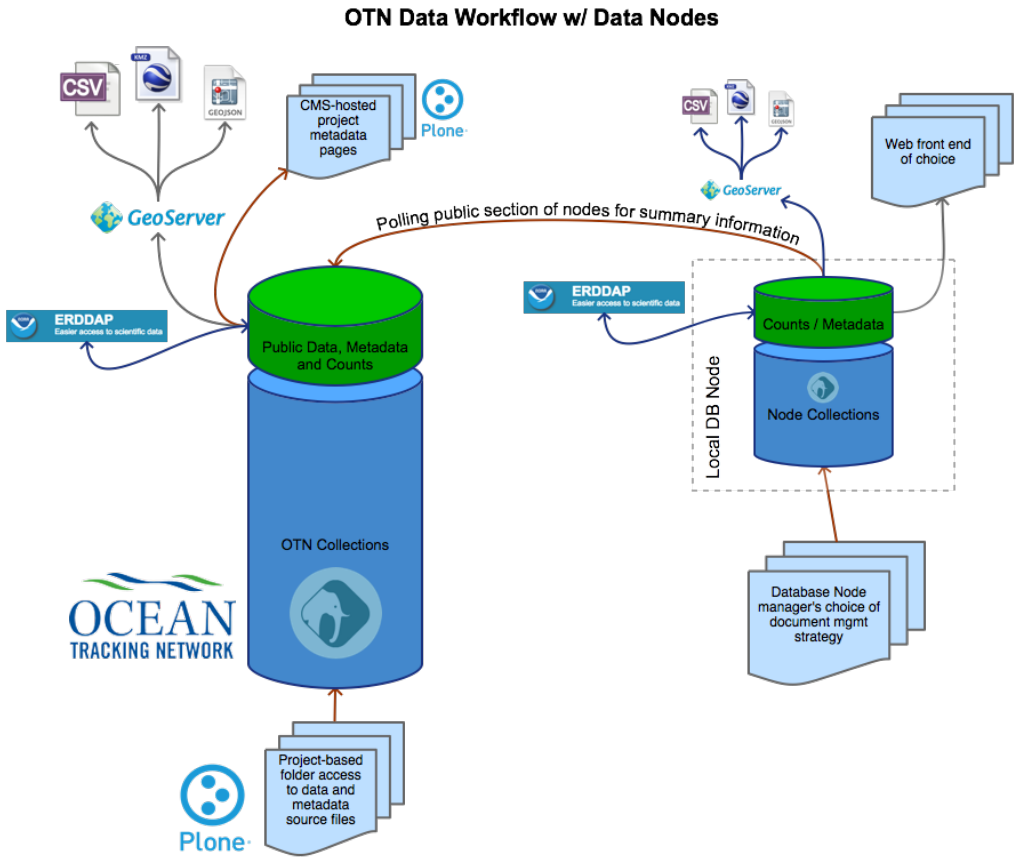
OTN Tagging Fieldsheet
Used in the field to record metadata neccessary to complete the OTN Tagging Metadata data sheet.

# OTN Database, Nodes, and Public Data

Due to stakeholders' privacy concerns, only data in the public sphere of the OTN DB can be exported to ERDDAP

Scripts written to reformat station deployment metadata and animal release metadata into AAT formats served via Geoserver and ERDDAP

Focus is now on generalizing these helper/translator scripts for Data Node / general use




Data loading and processing scripts managed in GitLab

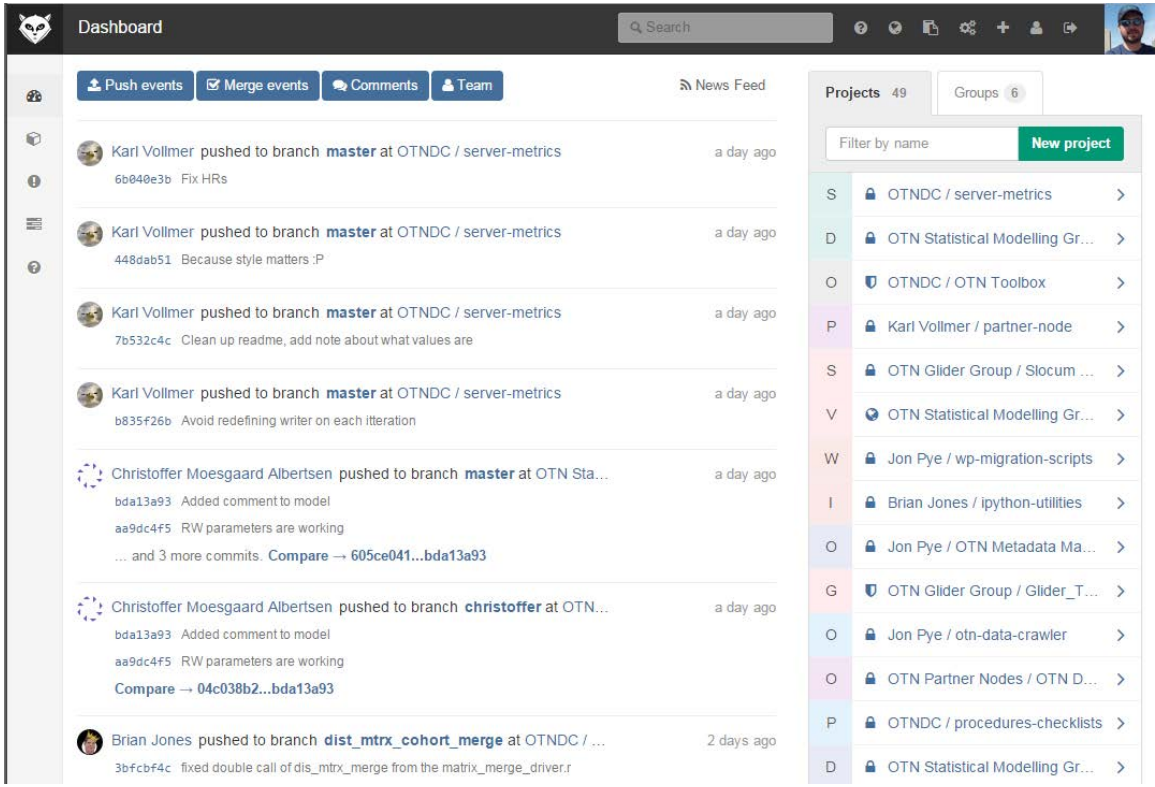
# GitLab

**GitHub-style code repository host**

- Issues/Milestones/Comments
- Forking/Merging
- Web-based Diffs
- Permissions and Private / Semi-Private repositories
- Code attribution, retention, distribution

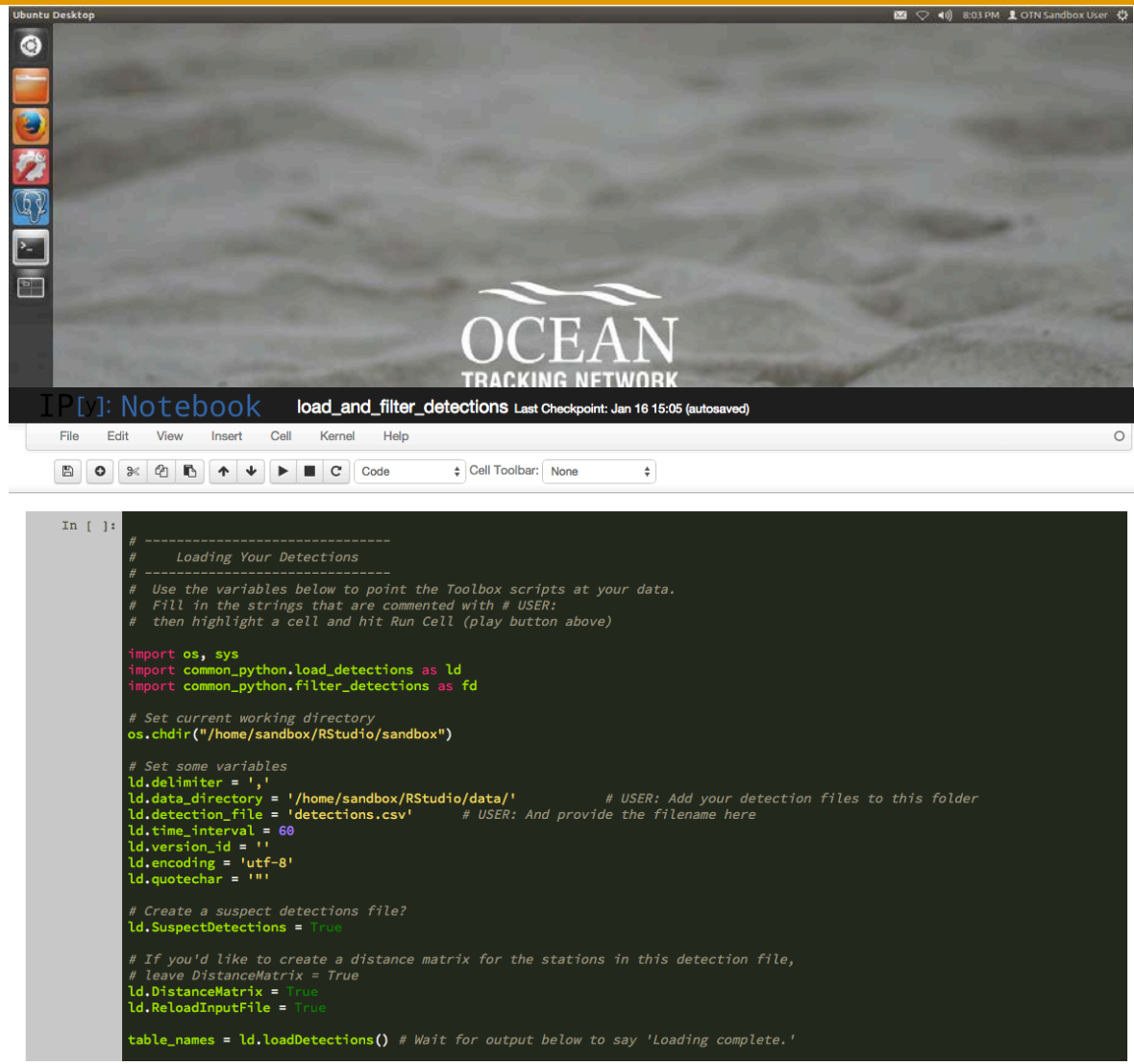
**Some projects on the OTN GitLab:**

- OTN Toolbox
- OTN Metadata Formatters
- Partner DB Node Puppet deployment
- OTNDC Data Loading / QA .ipynbs
- OTN Glider Tools
- OTN Tagging Mobile Application
- Statistical Modelling of Animal Paths
- Graduate work for OTN HQP



# OTN Sandbox VM

- **Vagrant Cloud-registered VM**
  - Plug and play platform to enable collaborative development among OTN researchers
  - VM eliminates* compatibility issues
  - Vagrant versioning and deployment
- **Supports the growing OTN Toolbox**
  - Station Distance Matrix operations
  - White-Mihoff False Filtering
  - Interval aggregation of detections
  - Cohort identification
- **Python / RStudio environments**
  - iPython Notebook
  - Geospatial Data Tools
  - Full IOOS Python Vis. environment
  - Template Model Builder
  - Geospatial Data Tools
  - CoastWatch Xtractomatic




* Software compatibility issues are handled by VM maintainer

**Summing up:**

- AAT-compliant data available now for OTN **stations** via our GeoServer
- Public Detection / Release data can be made available pending end of embargo periods
- Currently working on reconfiguring ERDDAP as a part of our Data Partner Node deployment
- We at OTN see great value in supporting this standard, and welcome future collaborations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