

IRIS DMC Web Services

These services may be used under IRIS Data Services [Terms of Service](#) in accordance with our [Usage Guidelines](#). Usage of the services and data in publications should cite the services according to our [citation instructions](#) and [data by network](#).

Services implementation: MUSTANG

Introduction

Welcome to the **MUSTANG** data quality metrics web service home page. MUSTANG has six service interfaces described in the request tools table below, each returning different information related to data quality. Navigating to each link provides additional information and usage examples for that service. If you scroll down past the table on this page, you will find a general overview of MUSTANG, links to visualization clients and contact information.

You can also visit our [Quality Assurance home page](#) to learn more about the Quality Assurance team at IRIS Data Services. There you can also find links to our R code for MUSTANG metrics, MUSTANG tools, tutorials (getting started with MUSTANG, using MUSTANG for data quality assurance, analyzing seismic data and metrics using R, interpreting PSDs and their waveforms) and other helpful information.

Each day, IRIS Data Services' miniSEED and PH5 archives are scanned and metrics are calculated for newly arrived data, whether it was acquired recently or in the past. Updates to existing data and metadata trigger recalculation of metrics within a reasonable time frame, as do any improvements we make to our metrics algorithms.

Request tools

Service interface	Version	Summary	Return options
measurements	v.1	The main MUSTANG web service returning measurements for metrics relating to station data quality.	<ul style="list-style-type: none"> • XML (default) • text • CSV • JSON • JSONP
noise-psd	v.1	Returns Power Spectral Density estimates of seismic data and can generate aggregate plots.	<ul style="list-style-type: none"> • Text – CSV • XML • Plot (PNG)
noise-pdf	v.1	Returns Probability Density Functions in frequency `bins` and can generate aggregate plots.	<ul style="list-style-type: none"> • Text – CSV • XML • Plot (PNG)
noise-spectrogram	v.1	Returns seismic spectrogram images based on daily PDF mode values	<ul style="list-style-type: none"> • Plot (PNG)
noise-pdf-browser	v.1	Returns browseable views of Mustang PDF plots and spectrogram plots	<ul style="list-style-type: none"> • Text • JSON • HTML
noise-mode-timeseries	v.1	Returns PDF Modes and Mode Timeline Plots	<ul style="list-style-type: none"> • Text – CSV • XML • Plot (PNG)

Service interface	Version	Summary	Return options
<u>metrics</u>	<u>v.1</u>	The metrics web service returns a description of available metrics in a variety of formats	<ul style="list-style-type: none"> • XML • HTML • XSD • JSON • JSONP
<u>targets</u>	<u>v.1</u>	The targets web service returns a list of stations and channels for a given metric.	<ul style="list-style-type: none"> • Text

Overview

The **Modular Utility for STATistical kNOWLEDGE Gathering** system is an IRIS effort to bring data quality analysis services to data archived at IRIS Data Services. We have a large number of statistical and noise measurements that are produced and stored in the MUSTANG database, and are made directly available to the user community with easy-to-use web service interfaces. We continually cover the entirety of the data archive and process data up to near real-time to provide the most current metrics possible.

MUSTANG is designed along the following principles:

1. *The system is modular:* designed around discrete components (scheduler, calculator, storage and retrieval), MUSTANG can adapt and extend more readily than a single, monolithic system. The components can also be more easily distributed among compute resources, both geographically and in the cloud.
2. *It is service oriented:* data and metric access is performed via web services with established interfaces that are independent of implementation details, keeping system components decoupled. Programs access to metrics through these interfaces, simplifying development of powerful discovery and visualization clients and enabling large-scale automated analyses.
3. *It is extensible:* most metrics calculations are performed using open-source R utilities within a framework that allows for sufficient testing of new metrics prior to inclusion in the production system. Improvements and additions to this R code base continue, and we have begun to share this code with the public via *CRAN*.
4. *Data coverage is comprehensive:* not satisfied to examine recently acquired data sets, MUSTANG`'s mission is to regressively scour the data archives to provide a complete history of seismic data quality for all networks stored at IRIS Data Services.
5. *Metrics are up to date:* MUSTANG improves the accuracy of its metrics by recalculating them whenever data or metadata change. Recalculations are also performed when metrics algorithms themselves are corrected or improved.

Features

MUSTANG provides the user the ability to:

1. view basic amplitude statistics such as mean, max, and median values
2. collect data availability, channel uptime and gap measurements
3. find daily maximum STA/LTA values and their times of occurrence
4. view event-oriented estimates such as signal to noise ratio, channel orientations and polarity checks
5. look at power spectral density and probability density function plots for noise analysis
6. view correlation coefficient metrics related to cross talk and pressure effects detection
7. identify dead or noisy channels
8. gather SEED state of health and activity flag counts
9. collect routine snapshots of real-time data latency

and more.

There are more than 40 separate metrics, and the list is growing. MUSTANG can return measurements to you in XML, text, CSV, and JSON formats using a REST-ful web service interface.

You can sort retrieved metrics by date, station name, metric value and more. You can also request only results within specified date or measurement ranges.

For more information about currently documented metrics, please consult the [‘measurements’](#) service link above and click on the *red* “Current list of all metrics” button. To begin querying for measurements, try using the [‘Builder’](#) tool accessible by clicking on the ‘hard hat’ button. Note that the **noise metrics**, such as noise PSDs and PDFs, run in separate services found at the **Request Tools** table near the top of this page. Noise metrics are special for the additional features needed to characterize them.

Access

MUSTANG is accessible from a web browser, command line, or a client tool designed to talk to MUSTANG services. You can easily write your own client if you are familiar with **curl, wget, or an HTTP code library**. We are working on, and interested in, client tools to make MUSTANG more accessible and useful. Examples are:

1. **MUSTANG Databrowser** – <http://ds.iris.edu/mustang/databrowser> (charts of metrics, including time series scatter plots and box plots)
2. **LASSO** – <http://lasso.iris.edu> (tabular views of metrics and ranking)
3. **Noise PDF Browser** – <http://service.iris.edu/mustang/noise-pdf-browser/1/> (views of multiple PDF plots in one window)
4. **Mustangular** – (Univ. of Washington) – <http://ds.iris.edu/mustang/mustangular> (map-based graphical views of metrics)

Our utility, IRIS System for Portable Assessment of Quality (ISPAQ), allows users to run MUSTANG-style metrics on miniSEED data residing on their own systems:

1. **ISPAQ** – <http://GitHub.com/iris-edu/ispaq>

Citations and DOIs

To cite the MUSTANG system or reference the use of MUSTANG metrics:

- Assuring the Quality of IRIS Data with MUSTANG
Robert Casey, Mary E. Templeton, Gillian Sharer, Laura Keyson, Bruce R. Weertman, Tim Ahern
Seismological Research Letters (2018) 89 (2A): 630-639.
DOI: <https://doi.org/10.1785/0220170191>

Feedback and Discussion

The best way to foster discussion about MUSTANG or report an issue is to sign up for our **mustang-users** mailing list via the IRIS Data Services Message Center :

<http://ds.iris.edu/message-center/topic/mustang-users/>

To receive MUSTANG-related announcements from IRIS, we invite you to sign up for our **mustang-qa** mailing list via the IRIS Data Services Message Center :

<http://ds.iris.edu/message-center/topic/mustang-qa/>