Questionnaire for information regarding the CEOS WGCV IVOS subgroup Cal/Val test sites for land imager radiometric gain

QA4EO-WGCV-IVO-CSP-001

Name of site: Ivanpah Playa

IVOS test site questionnaire: QA4EO-WGCV-IVO-CSP-001

This page is intentionally blank

IVOS test site questionnaire: QA4EO-WGCV-IVO-CSP-001

Questionnaire for information regarding the CEOS WGCV IVOS subgroup Cal/Val test sites for land imager radiometric gain

Author:	Gyanesh Chander
E-mail:	gchander@usgs.gov
Issued under Authority of:	CEOS

Issue no:	Version 1.1
Date of issue:	18 February 2009

Summary of Changes since last issue:

Issue 1.0: Initial version

Issue 1.1: Template section (17 February, 2009)

Table of Contents

1. Abstract

This document provides the template to collect and present information to describe the characteristics of a Land based test site suitable for calibrating and validating the radiometric gain of an inflight satellite/aircraft imaging optical sensor. The template is structured as a series of questions to describe the sites, accessibility as well as its physical characteristics and their derivation. Test sites with varying characteristics have been used for many years for a variety of applications, however this template has been specifically designed for sites which are regularly instrumented and are or seek to be endorsed by the Committee on Earth Observation Satellites (CEOS) Working Group on Calibration and Validation (WGCV) as "reference standards". At present there are eight such sites but more are required to ensure a robust system to reliably underpin the needs of the Earth Observation (EO) community in the longer term. The template contained in this document should be completed by anyone seeking to have a site endorsed by CEOS to join this group. The current eight **CEOS instrumented reference standard test sites** are:

- **Railroad Valley Playa**, NV, USA, North America
- **Ivanpah**, NV/CA, USA, North America
- **Lspec Frenchman Flat**, NV, USA, North America
- **La Crau**, France, Europe
- **Dunhuang**, Gobi Desert, Gansu Province, China, Asia
- **Negev**, Southern Israel, Asia
- **Tuz Golu**, Central Anatolia, Turkey, Asia
- **Dome C**, Antarctica

2. Scope

The scope of the template is to fully describe the characteristics of a test site so that those referring to its use or those seeking to use it can assess its suitability for their application. Once the template is complete it should be sent to the Infrared and Visible Optical Sensors (IVOS) subgroup chair who will arrange its review against CEOS defined criteria, before it is allocated a formal reference number and published on the Cal/Val portal as an endorsed site. At the time of issue of this template the most critical of these criteria is that it is regularly instrumented. However, these criteria are in the process of review and refinement and are likely to include other characteristics in the future. The template is structured (see table 1) to collate information

under a number of headings and whilst it is desirable to have all questions completed it is recognised that there may be some gaps in knowledge at the time of first submission.

It is also anticipated that as time progresses, data (particularly surface characterisation information) will increase and evolve, and may come from sources other than the nominal Point of Contact (POC). Provision is being made for this new information to be stored and linked to the template to improve the knowledge base. However, the POC should be made aware of such information as part of the submission process.

Table 1: Information content of questionnaires

Questionnaire Content Description
Site location
Logistic information
Site climatology
Site instrumentation
Measurement accuracy
Site usage
Contact information
Data availability
References

3. Process

The attached template (appendix 1) should be completed by an individual willing to serve as POC for a CEOS test site. In this role they are agreeing to ensure that the site is maintained to a level consistent with the data contained in the template or to change the data as appropriate. This confirmation will take place on an annual basis through an email exchange with CEOS WGCV IVOS chair and Quality Assurance Framework for Earth Observation (QA4EO) secretariat. Readers are directed to the view existing completed examples of the template for further guidance.

When the template is completed it should be returned to the CEOS IVOS chair (or other designated individual) to submit for review and to arrange for publication on the Cal/Val portal.

If approved, the template will then be assigned a reference number and placed on the Cal/Val portal (http://calvalportal.ceos.org/CalValPortal/welcome.do) and the information also

incorporated into the test site catalogue currently under development for CEOS WGCV by USGS (http://calval.cr.usgs.gov/sites_catalog_map.php).

Similar templates exist for non-land sites and also for non-instrumented land sites.

Appendix 1: Template for CEOS reference standard test site

CEOS Reference standard test site for Land radiometric gain

CEOS Reference: QA4EO-WGCV-IVO-CSP-xxx[1]

Name of site: Ivanpah Playa

Point of contact:

Address:

Range of applications[1]:

[1] to be completed by QA4EO secretariat

1. Site location

1.1. Identification and characterisation

1.1.1. Site Name

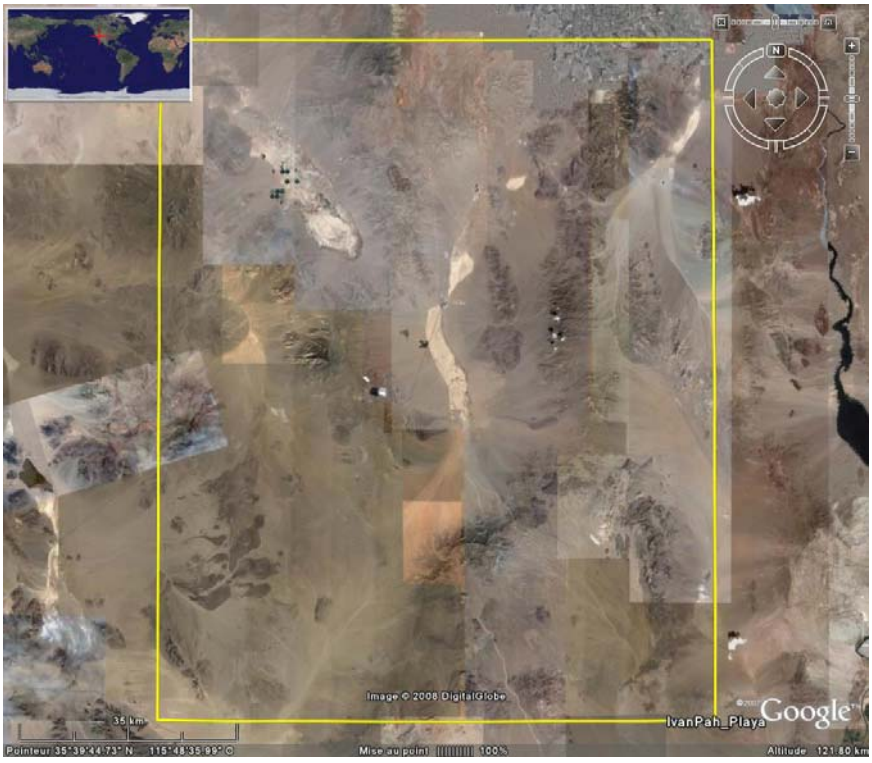
Ivanpah Playa

1.1.2. Location

Latitude 35.5692 North

Longitude -115.3976 West

1.1.3. Google Earth Image (1x1 degree around the site center)



1.1.4. Altitude

813 m

1.1.5. Description of the landscape

The site is a dry-lake playa, located right on the border of California and Nevada along I-15. It is smaller than Railroad Valley, and at lower elevation, but is by far more convenient to use and is more spatially uniform as well.

The site area is 1 x 1 km^2

Limitations: Seasonal variability

1.1.6. Environment

1.1.7. Topography

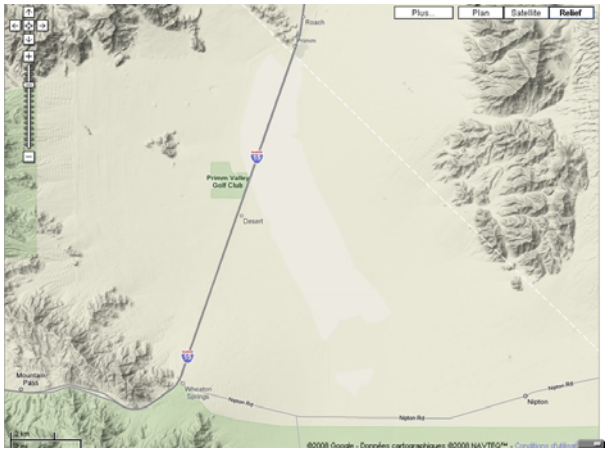


Figure 1: Topography of the site

1.2.Site view

2. Logistic information

2.1.Site proximity from road

I-15

2.2.Access

Primm Valley, Nevada/California, USA, North America

2.3.Nearest town

Primm

2.4. Distance from nearest town/port

2.5. Logistics (Hotel, Restaurant, etc.)

Ivanpah Playa gets some off-road vehicle use, but is close to the highway, and has hotel facilities close by.

2.6. Access to Communications

2.7. Owner

Bureau of Land Management (BLM)

Dr. Kurtis J. Thome (Email Researcher)

3. Site Climatology

3.1. General atmospheric conditions: Meteorological conditions

3.1.1. Annual pluviometry

3.1.2. Wind

3.1.3. Clear sky conditions

3.2. Atmosphere characterisation

3.2.1. Aerosol characteristics

3.2.1.1. Seasonal variation of the aerosol

3.2.1.2. AOT_550: Historical data

3.2.1.3. Data from AERONET CIMEL network

3.2.1.4. Nominal values of AOT at 450, 550, 650, 850 nm

3.2.1.5. Absolute error of AOT at 450, 550, 650, 850 nm

3.2.1.6. Model of aerosol used

3.2.1.6.1. Granulometry

3.2.1.6.2. Refraction index used

3.2.1.7. Alpha

3.2.2. Water vapour content characteristics

3.2.2.1. Water vapour content origin

3.2.2.2. Seasonal variation of the water vapour content

3.2.2.3. Mean and accuracy

3.3. Surface characterisation

3.3.1. Surface albedo characteristics

3.3.2. Surface reflectance characteristics

3.3.2.1. Instrumentation used for characterisation

3.3.2.2. Route of traceability

3.3.2.3. Mean reflectance at Nadir (full spectrum)

3.3.2.4. Uncertainty of reflectance (please give breakdown of uncertainty contributions)

3.3.2.5. Mean reflectance at Nadir at 450, 550, 650, 850 nm

3.3.2.6. $\Delta\rho$ at 450 nm, 550, 650, 850 nm

3.3.3. BRDF (or specific angles)

3.3.3.1. Instrument used

3.3.3.2. Relative error on BRDF correction at θs=45 degrees, θv=30 degrees

3.3.4. Surface reflectance – variability across site (uniformity) (%)

100 * 100 m =

500 * 500 m =

1000 * 1000 m =

4. Site instrumentation (Nominal)

4.1. Meteorological instrumentation (list)

4.1.1. Meteo station (Temperature, pressure, humidity)

4.1.2. Pluviometer

4.1.3. Anemometer

4.2. Atmospheric instrumentation

4.2.1. Instrument used for aerosol characterisation

4.2.1.1. Instrument used

4.2.1.2. Route of traceability

4.2.1.3. Measurement protocol

4.2.1.3.1. Scanning mode

4.2.1.3.2. Spectral characteristics

4.2.1.3.3. Frequency of measurements

4.2.2. Instrument used for surface irradiance characterisation

4.2.2.1. Instrument used

4.2.2.2. Route of traceability

4.2.2.3. Measurement protocol

4.2.3. Instrument used for water vapour content characterisation

4.2.3.1. Instrument used

4.2.3.2. Route of traceability

4.2.3.3. Measurement protocol

4.3. Surface instrumentation

4.3.1. Instrument used for reflectance/radiance characterisation

4.3.1.1. Instrument used

4.3.1.2. Route of traceability

4.3.1.3. Measurement protocol

4.3.1.3.1. Scanning mode

4.3.1.3.2. Spectral characteristics

4.3.1.3.3. Frequency of measurements

4.3.2. Instrument used for BRDF characterisation

4.3.2.1. Instrument used

4.3.2.2. Route of traceability

4.3.2.3. Measurement protocol

4.3.2.3.1. Scanning mode

4.3.2.3.2. Spectral characteristics

4.3.2.3.3. Frequency of measurements

5. Current status of the site

5.1. Instrumented

5.2. Maintained (source and commitment of funding)

5.3. Regularly visited (state frequency)

- Human □
- Satellite □
- Aircraft □
- Automated □

6. Site usage

6.1. Historical record of comparisons (ground, aircraft and satellite)

6.2. Date / sensor / location of results

2007-09-16: Field trip to Alkili Lake, Railroad Valley, and Ivanpah for TM, ETM+, ASTER, Terra MODIS and downloading of Ground-viewing radiometers. Collaboration with the Japanese science team for the ASTER collections.
2007-09-11: Field trip to Ivanpah for ASTER and ETM+. Collaboration with the Japanese science team for the ASTER collections.
2007-08-17: Field Trip to Ivanpah and Railroad Valley for TM, ETM+, ASTER, MASTER and downloading of Ground-viewing radiometers. Collaboration with the Japanese science team for the ASTER collections.
2007-07-24: Field Trip to Ivanpah and Railroad Valley for TM, ETM+, ASTER and downloading of Ground-viewing radiometers.
2007-06-23 : Field Trip to Ivanpah and Railroad Valley for ETM+, ASTER, Aqua MODIS and NOAA-17.

6.3. Regularity of satellite data (if known)

6.4. Satellite and sensor ID

7. Contact information

7.1. Point of Contact (Name and address)

Kurt Thome

Remote Sensing Group

Optical Sciences Center

University of Arizona

Tucson AZ 85721-0094

Phone: +1 520.621.4535

Fax: +1 520.621.8292

Email: kurt.thome@opt-sci.arizona.edu

kurtis.thome@nasa.gov

7.2. Instrumentation maintenance

8. Dataset availability and owner

8.1. Dataset

8.2. Owner

8.3. Availability

9. References

9.1. Bibliography

9.1.1. Characterization of the site

9.1.2. Description of the methodology

9.1.3. Description of the instrumentation

9.1.4. Description of applications for vicarious calibration

9.2.Site Web