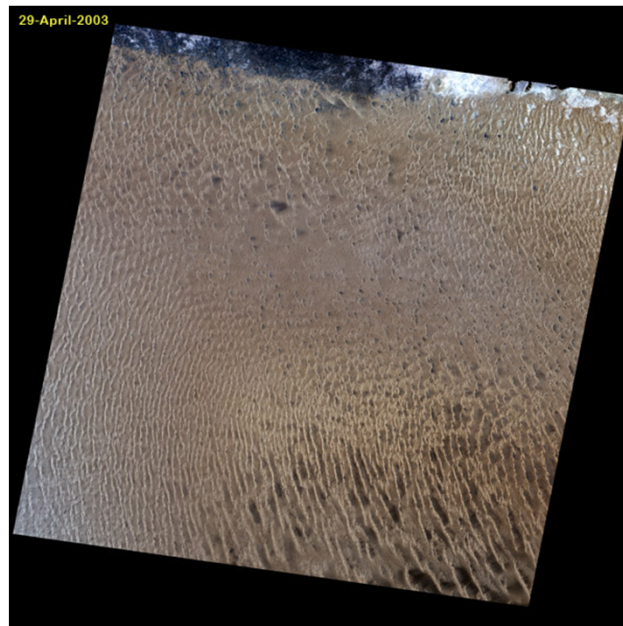# CEOS WGCV IVOS)

# MEREMSII review

# Nigel Fox
# CEOS IVOS chair

# IVOS: Vision

*To facilitate the provision of 'fit for purpose' information through enabling data interoperability and performance assessment through an 'operational' CEOS coordinated & internationally harmonised Cal/Val infrastructure consistent with QA4EO principles.*

*To Include:*

- *Pre-flight characterisation & calibration*
- *Test – sites*
- *Comparisons*
- *Agreed methodologies*
- *Interchangeable/readable formats*
- *Results/metadata - databases*

**Need Key Infrastructure to be established and maintained independent of sensor specific projects and/or agencies**

# Post launch vicarious Cal/Val:

**Critical for all EO optical missions to facilitate:**

- Interoperability

- Bias assessment/removal

- Sensor drift monitoring/correction

- End to end performance check

**CEOS strategy: evaluate, consolidate & establish 'best practise'**

Test sites / 'methods' with documented procedure & uncertainty

- Different approaches optimum for different purposes
- Need to establish 'degree of equivalence'' between similar & different methods & consistent traceability

# Test sites

- **Aim for relatively few to encourage multi-satellite data collection**
  - **~5 -10 autonomous instrumented/ground characterised**
  - **6 psuedo-invariant deserts (only observed from sats)**

- **Need Site characteristics**

- **atmospheric variability**

- **multiple acquisitions**

**Have wide CEOS agency support & recognised as core focus and achievement for Cal/Val**

# Conceptual operational network
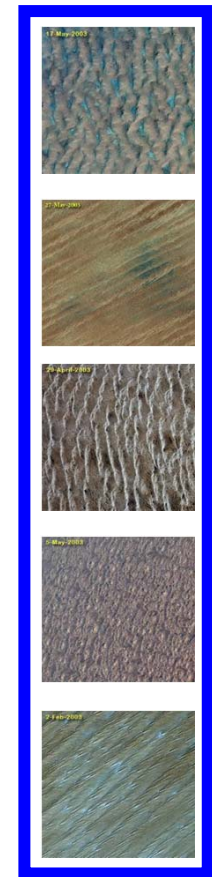


**Absolute sensor**

SNO

Moon
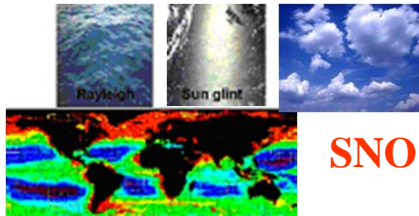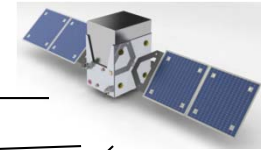
**Linked by Satellite
(Reference sensor
/ensemble)**

**Database / results
- SADE
- Dimitri
- CEOS**

**Pseudo-Invariant Sites
Long term trends
Stability Monitoring**

**Instrumented Sites (LANDNET)
Radiometric Gain**

CEOS

IVOS

NPL

# What might an Operational Cal/Val service look like?

- Probably Not real time calibration coefficients
  - More a continuously updated set of Sensor to sensor Relative coefficients using standardised conditions: cloud, angles etc
    - Trend to a single site, group of sites, range of methods
    - Difference between a pair of sensors
    - Difference to a 'Reference sensor''
    - Difference to an agreed baseline
    - Difference to a "community Mean"
- User friendly fully open interface to access results fully archived, with appropriate metadata and re-analysable
- Automatic collection and deposition (accessible) data over CEOS sites
  - Formats/translators
  - CWIC tool
  - Meteorology/Aeronet
- Probably 'intelligent' operator managed
- Allow full access to tools for user analysis
- Results based on a combination of tools following analysis of performance
- Could Kick start process with a few methods e.g. WG4 output

**IVOS 2010 (JRC) Workshop led to establishment of WGs to consider 'best practise' / relative consistency/applicability of different methodologies CEOS and WMO-GSICS**

## WGs on methodology and data format

– **WG1: Use of Deep Convective Cloud**

    **Lead:** D Doelling (NASA)

    **Participant:**

– **WG2: Rayleigh Scattering**

    **Lead:** P Henry (CNES)

    **Participant:** M Bouvet (ESA)* , L Bourg (ACRI)

– **WG3: Sun Glint**

    **Lead:**

    **Participant:** S Lavender (ARGANS)

– **WG4: Use of fixed ground sites e.g. SADE, DIMITRI, Landnet, invariant desert sites (but not requiring ground measured data)**

    **Lead:** X Briottet

    **Participant:** D Smith (RAL), P Henry (CNES),
                 M Bouvet (ESA)*, L Bourg (ACRI)
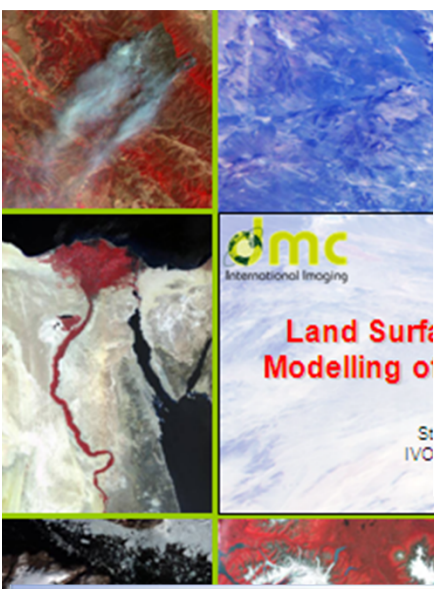
– **WG5: Simultaneous Nadir Observation**

    **Lead:**

    **Participant:** S Kumar (ISRO), S Saunier (Mag)

**Call for participants & leads still open......**

**WORKING GROUPS NEED INPUT FROM OTHER AGENCIES TO ENSURE HARMONISATION AND BEST PRACTISE/EXPERTISE**

# Sensor to se



## Monitoring Stability of VIIRS Radiometric Response

Slawomir Blonski, Changyong Cao, Sirish Uprety, and Xi Shao

NOAA / NESDIS / STAR

*Presented at the CEOS IVOS-24 Meeting, Sioux Falls, South Dakota, May 8-10, 2012*

Terra ASTER
r the CEOS calibration sites

n Sioux Falls

O (GSJ),
A (ITRI),
(GSJ)

l and Science Technology

**Toulouse, France**
**April 13 – 15, 2011**

Gyanesh Chander (SGT/USGS EROS)
Email: gchander@usgs.gov

## Absolute Calibration of Optic
## Using Pseudo Invariant Calib
## (PICS)
## Initial concepts

Dennis Helder
Nischal Mishra
Sandip Shrestha
Image Processing Laboratory
SDSU

South Dakota State University
Image Processing Lab

**IVOS**

### cnes
CENTRE NATIONAL D'ÉTUDES SPATIALES

## ETM+ vs Terra/MODIS
## Cross Calibration over Desertic Sites
## &
## Accuracy Assessment using Hyperion Data

Patrice Henry, Bertrand Fougnie, Sophie Lacherade,
Philippe Gamet, Denis Blumstein - CNES
Thomas Colin – CS
Gyanesh Chander - USGS

CEOS/IVOS Meeting – 13, 14, 15 April 2011 – Patrice HENRY / CNES

**NPL**
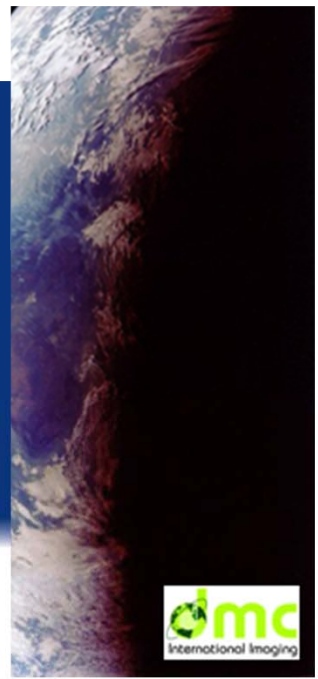
# CEOS IVOS workshop on: Libya 4 (Oct 4-5 2012   CNES Paris

**CEOS 'non-instrumented' Test sites for Stability and sensor to sensor cross-comparison**



OPTIMIZED SAHARAN PICS

Algeria 3
Libya 4
Egypt 1
Mauritania 1
Mauritania 2
Libya 1
Egypt 2

Blue regions are the optimal regions of interest (ROI)

Helder SDSU
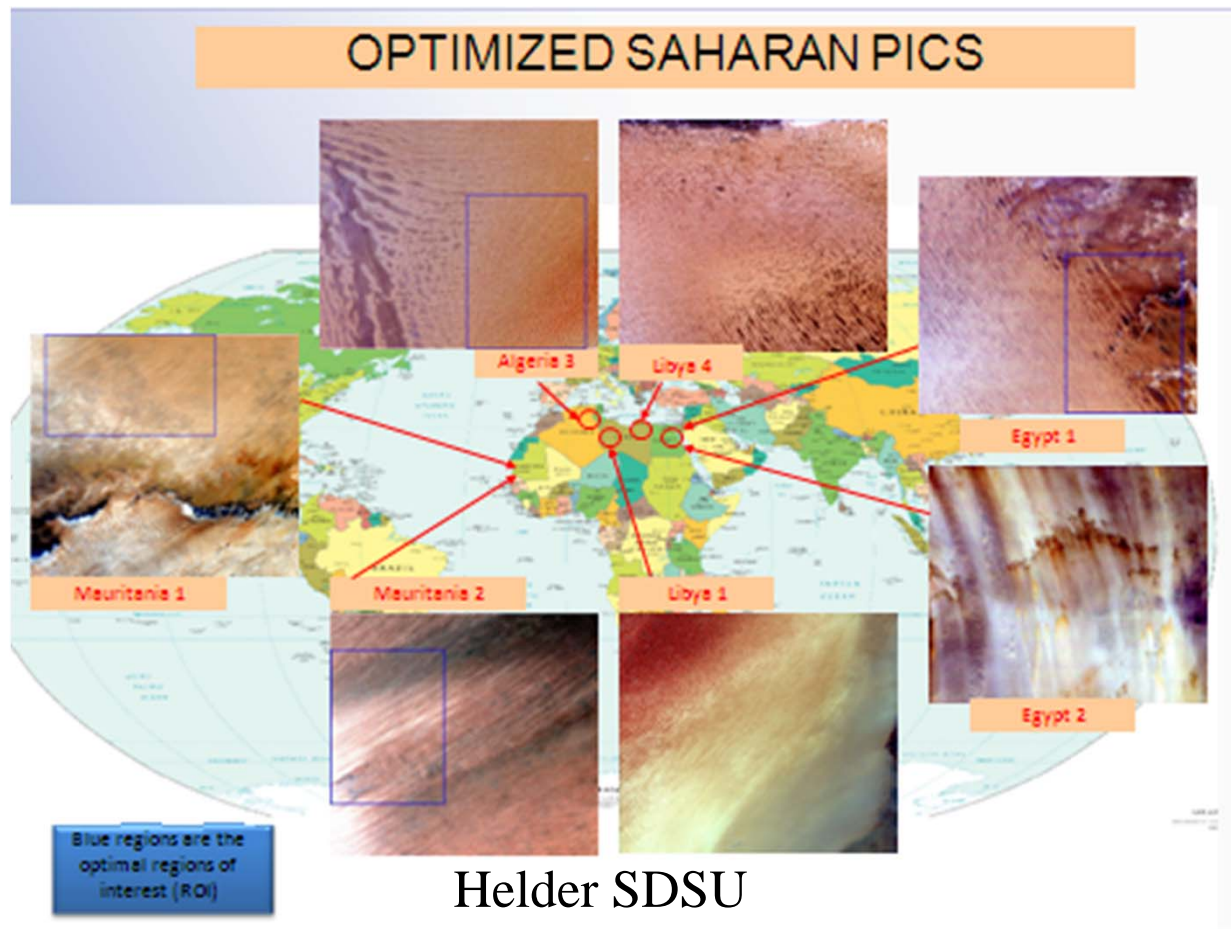
- **~25 attendees**
- Working meeting
- Focus on one site
- Share ideas
- Different sensors
- Cal/comparison methods
- Site characteristics – observed/modelled
- High and medium res
- **What can & might be achievable?**

# Conclusions: Next steps

- Compare results from different BRDF models
  - Develop/agree a CEOS BRDF (site specific)
  - Look at Sensor derived Pleiades, MISR, CHRIS, POLDER

- Compare (and assess uncertainty) of methods of spectral response convolutions with standardised site reflectance

- Extend comparisons to include higher resolution sensors

- Assess variances in atmospheric corrections (part of K Thome task group

- Evaluate hyperspectral measurements of test sites (Schiamachy, hyperion etc)

# Other Tools
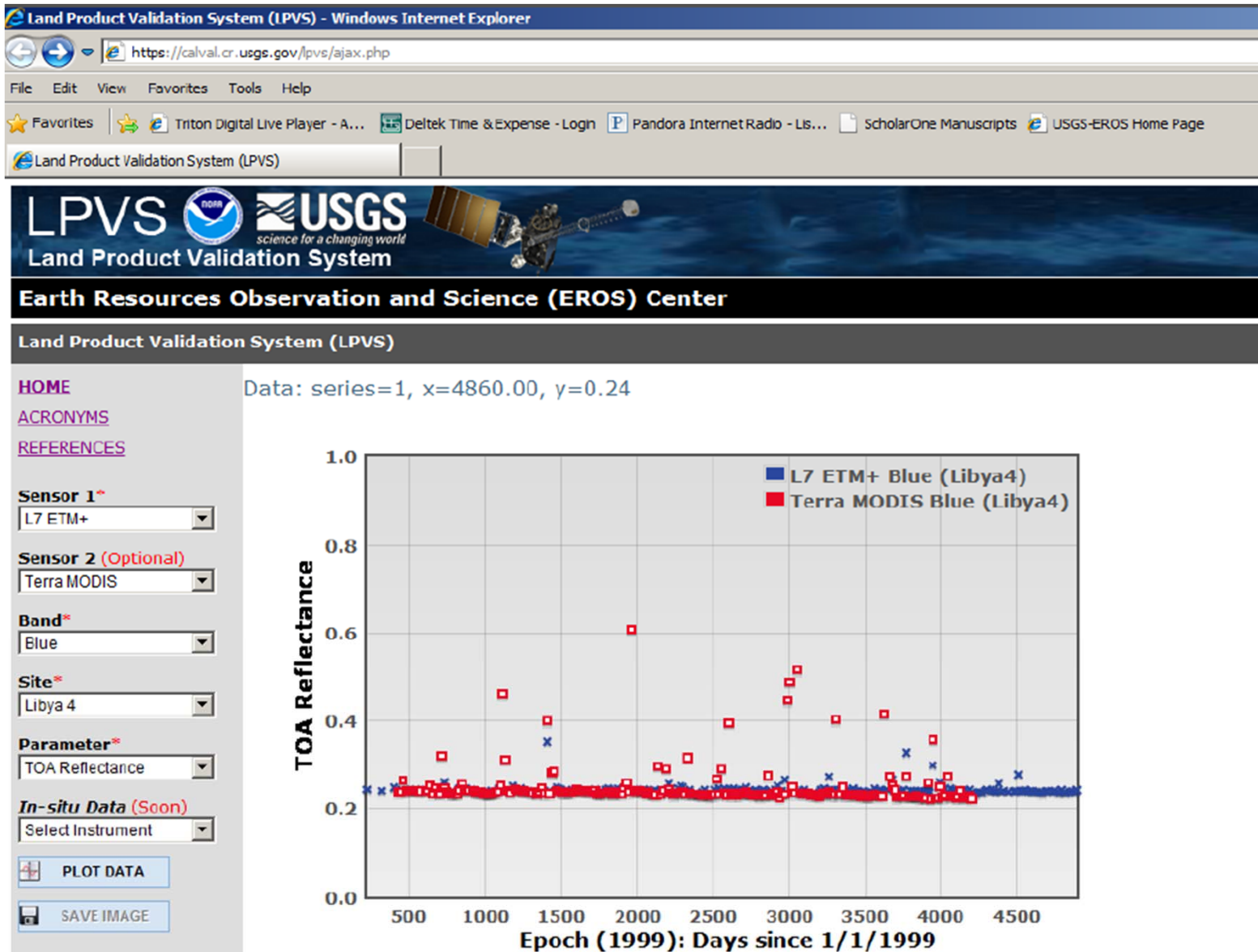
# Future tools/infrastructure

- **CEOS / GSICS access to SADE database of CNES - long time base multi-sensor acquisition data over key test sites**

- **DIMITRI data-base and comparison tool - open access via Cal/Val portal**

- **'Test data set and protocol' - open access via Cal/Val portal**

- **CEOS COVE - Acquisition/comparison planning and past opportunities tool**

  **CEOS WGCV plenary 35 ISRO Sep 23-28 2012**

- **USGS Sensor cross-comparison tool and acquisitions data base**

- **WGISS CWIC tool – IDN linked search/find and order tool for multi-sensor data granules – temporally & spatially defined**
  - **User interface for CEOS test sites now under development**

# CNES: SADE & Muscle

# CEOS WGISS Integrated Catalogue (CWIC)
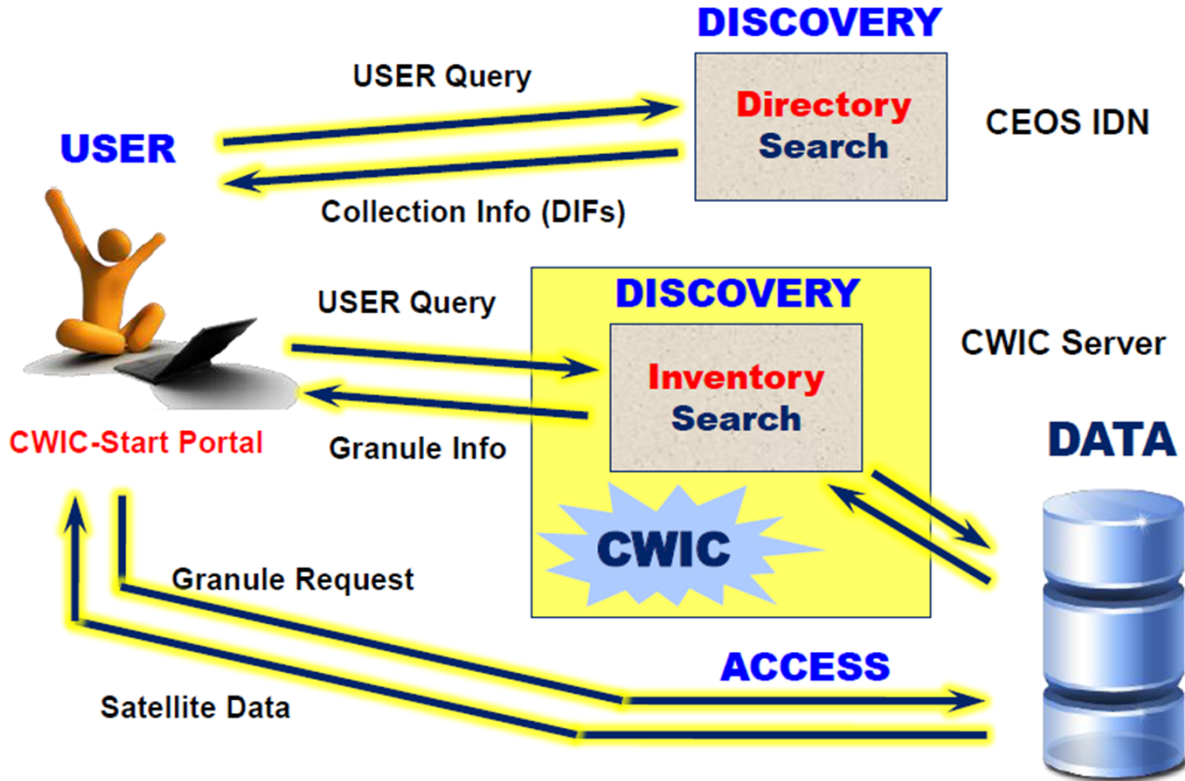
# GUI focussed on applications



- Finds data sets,
- Links to catalogues to allow ordering
- Also provides meta-data
- Currently extending to provide one for CEOS test sites
- Potential linkage with COVE
- JAXA has version for Oceans (but also includes Aeronet sites and data)