# Minutes of the 56th Meeting of the CEOS Working Group on Calibration and Validation (WGCV)

Chaired by USGS

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# Day 1: Tuesday, April 21, 2026

## Session W1: Opening

### W1.1: Action Updates *[slides]*

- Harvey Jones (WGCV Secretariat) reviewed the open actions from the WGCV-55 and WGCV-54 meetings.

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| **WGCV-56-01** | Paolo to work with subgroup chairs to communicate activities to be shared on the Cal/Val Portal at https://calvalportal.ceos.org/wgcv, including an IVOS database on radiometric calibration capabilities and the new MSSG GNSS-R Task Team (once established). | **WGCV-57** |

## Session W2: Subgroup Reports

### W2.1: Microwave Sensors (MSSG) *[slides]*

Xiaolong Dong (CAS) reported on the progress of the CV-23-05 deliverable, aiming to retrieve and validate high wind data with combined active-passive microwave measurements, and to address gaps in current satellite-derived extreme winds. Data has been collected for 2020-2025, and a technical report will share methods, results, and discussion perspectives.

The CV-23-06 task aims to deliver all-weather ocean surface pressure (OSP) retrievals from FengYun-3D observations in 2023, filling the gap of OSP to support extreme weather forecasting. A technical report will accompany the data and retrieval algorithm.

A new Task Team was proposed within MSSG, dedicated to GNSS Reflectometry Cal/Val. There is strong demand for GNSS-R Cal/Val, with urgency to establish a benchmark for GNSS-R normalised backscatter radar over the ocean for the intercalibration of different missions. It would be helpful to build a GNSS-R virtual constellation of satellites. Xiaolong noted MSSG's interest to coordinate with the GSICS Microwave Subgroup to characterise the onboard calibration for small satellite microwave sounders.

Discussion

- Next steps for the GNSS-R Task Team were discussed; it seeks to gather contributors, first within WGCV and then within the CEOS SIT or Plenary. The group aims to leverage

existing coordination by EUMETSAT, CGMS and IROWG, and invite agencies operating GNSS-R sensors (e.g. CYGNSS and HydroGNSS).

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| **WGCV-56-02** | WGCV Members and Agencies interested in joining the proposed GNSS-R Cal/Val Task Team to contact the MSSG Chair, Xiaolong Dong. | **WGCV-57** |

**W2.2: Synthetic Aperture Radar (SAR) Subgroup *[slides]***

Dirk Geudtner (ESA) reported on the recent activities of the SAR Subgroup, including the 2025 SAR Cal/Val Workshop. Discussion topics included the cost-sustainability trade-offs in establishing corner reflectors, the standardised combination of SAR imagery and AIS data, RFI mitigation, and whether CEOS SAR Cal/Val should engage in curating validation procedures for L3 data.

The 2026 SAR Cal/Val Workshop will be held in Perth, Australia from 30 November-4 December.

ESA is unsure about the future of the Biomass mission's calibration transponder, requiring agency support as it is core to the community and long-term monitoring. This applies to other calibration sites. A letter of acknowledgement would help maintain these facilities.

Discussion

- Linkages between Level 3 SAR Products and the LPV Subgroup's Aboveground Biomass Focus Area were discussed. LPV has strong collaboration with GEO-TREES for the validation of AGB, alongside other variables of interest within the SAR domain.
- The potential to create a joint activity was discussed.

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| **WGCV-56-03** | Dirk and Fabrizio to explore connections between Level 3 SAR product validation and the LPV Subgroup Aboveground Biomass Focus Area. | **WGCV-57** |

**W2.3: Atmospheric Composition (ACSG) *[slides]***

Jean-Christopher Lambert (BIRA-IASB) reported updates on the TOAR-II community and assessment papers, the harmonisation of satellite tropospheric ozone data, and updates for the global atmospheric monitoring and geostationary air quality (GEO-AQ) constellations. ACSG is considering developing best practice guidance for the Cal/Val of GEO-AQ missions.

CEOS-FRM assessments are ongoing for atmospheric composition ground-based networks. Feedback from pilot projects included clarification on the class of instrument, highlighting the fitness for purpose of the FRM, and some subjectivity in self assessments requiring iteration with reviewers.

The WMO GAW Global Ozone Monitoring Strategy highlights concerns with the future of column ozone monitoring and long term validation standards.

AC-VC and ACSG have discussed the need for a general definition of a 'Cal/Val Supersite.'

Discussion

- Regarding the supersite definition, Fabrizio noted interest and past discussions on tiered approaches, ranging from well-characterised FRM-class sites to those testing on a statistics basis. LPV's terminology on supersites should be generalised for consistency across domains. A critical aspect to include in discussions are the user and cal/val needs.

### W2.4: Infrared Visible Optical Sensors (IVOS) *[slides]*

Nigel Fox (NPL) reported updates on the IVOS Subgroup, including outcomes from the IVOS-37 Meeting held in September 2026 in Tucson, Arizona, with special projects on RadCalNet, TIRCalNet, Surface Reflectance Quality and Consistency, CEOS-FRM, product validation, and lunar calibration.

IVOS is looking for a volunteer to lead the image quality / geometric focus group.

## Session W3: CEOS-FRM Assessment Framework

### 3.1: CEOS-FRM Assessment Framework Update *[slides]*

Paolo Castracane (ESA) reported results of the second CEOS-FRM Assessment Framework exercise. Following the conclusion of the second round of FRM pilots, WGCV will confirm the readiness for operationalisation of the network (WGCV-55-04). The objectives and endorsement maturity matrix assessment process were overviewed.

Discussion

- Fabrizio Niro (ESA) noted that as specified in the assessment requirements, if you want to increase the FRM grade, you need to fulfil the 'Climate' requirements. The assessment of *'Adequacy for Class of Instrument/Measurand'* for RadCalNet was 'good'.

- Nigel noted that it should be assessed against operational requirements, requiring modification to the text in the guidelines. The subjectivity of assessment requirements was discussed.
- Jean-Christopher noted the need to make the assessment tool more user friendly for different atmospheric species, as the assessment judges the FRM maturity of all products together. It would be better to have an assessment for each species.
- The potential to classify satellites as CEOS-FRM was discussed. The CEOS-FRM guidelines are currently focused on in-situ measurements. The definition of CEOS-FRM does include 'satellite based observations,' but the criteria needs refining.
- Nigel noted that while the guidelines are written with an in-situ focus, it is justifiable that they can be used for satellites too. CEOS-FRM assessments don't include the nuance of how satellite observations are used to calibrate and validate other sensors. Evidencing the calibration end of satellite measurements is a fundamental area to address. Landsat and Sentinel-2 are a very good reference, until we get SITSats.

**3.2: Discussion and feedback from FRM producers *[HYPERNETS], [USGS]***

Pieter De Vis (NPL) shared feedback on the LANDHYPERNETS self-assessment, gaining the Class C overall CEOS-FRM grade. There was some subjectivity between the wording of the available answers, as well as issues with differing maturity between sites across the network.

Garrison Gross (USGS) reported feedback following an assessment of Landsat-8 and -9, which was evaluated as Ideal or Excellent for all FRM categories. Landsat currently displays properties of a high-level FRM platform. Additional exercises to consider for FRM assessment are the L8/L9 sensors separately, or the Landsat Earth Explorer Archive as a whole.

Discussion

- Nigel noted some of the assessment questions are associated not with individual sites but with the network, and suggested that we introduce a qualification of e.g. 60 or 80 percent of the sites instead of all of them. As soon as you introduce a new site, the overall maturity goes down.
- CEOS-FRM, as we defined it, is for the Cal/Val of other satellites. We still encourage utilisation of the 'FRM' label for the non-calibration part of observations. He noted the importance of evidencing the criteria fulfilment, and iterating feedback with the assessor.

## Session W2: Subgroup Reports (continued)

### W2.5: Terrain Mapping (TMSG) *[slides]*

Peter Strobl (EC-JRC) reported updates on TMSG activities, including DEMIX, GCPIX, and GRGIX. The Digital Elevation Model Intercomparison Exercise (DEMIX) has produced eight peer-reviewed publications and now a final report. The Ground Control Point Intercomparison Exercise (GCPIX) began in 2025, and is currently developing a technical note of definitions and best practices. The Global Reference Grid Intercomparison Exercise (GRGIX) is currently debating grid terminology. A preliminary grid dichotomy and evaluation of global grids was presented.

### W2.6: Land Product Validation (LPV) *[slides]*

Fabrizio Niro (ESA) reported updates on the LPV Subgroup, which was established and driven by the GCOS Essential Climate Variables (ECVs) to develop a land product validation framework and protocols.

An updated list of LPV Supersites aims to evaluate the most suitable suites for land product validation, expanding the existing set of sites to include new variables and ranking them against CEOS-FRM principles. The list was endorsed by WGCV in March 2026.

The Leaf Area Index protocol is being updated to add FCover and FAPAR variables and more closely align with GCOS requirements and CEOS-FRM principles. Protocols are being developed for Burned Area, Fire Radiative Power, Phenology, Vegetation Index, and Evapotranspiration.

Results from the third Atmospheric Correction Intercomparison Exercise (ACIX) were published in 2025. The fourth activity will complement field campaign networks with RTM simulations to better characterise uncertainty sources.

HARMONIX is a new international initiative being developed to compare approaches for BRDF normalisation and data fusion, with an initial definition of a comparison protocol and associated quality metrics being explored.

Discussion

- Medhavy Thankappan (GA, WGCV Vice Chair) reported that LPV's Land Cover and Change Map Accuracy Assessment and Area Estimation Good Practices Protocol was endorsed at the recent CEOS SIT-41 Meeting.
- Cody Anderson (USGS, WGCV Chair) noted potential links to be made between the burned area and FRP LPV Focus Areas and the new Wildfire Subgroup of LSI-VC.

- Developing analysis ready data products for land cover classes is a high priority for the user community. User acceptance depends on providing clear, reliable data to ensure the products are truly analysis-ready.
- Links between HARMONIX and the Surface Reflectance Quality and Consistency project were discussed. Intercomparison exercises involve harmonising two products from distinct sensor families, touching on the core of the 'virtual constellation' concept. Links to NASA HLS were discussed.

## Session W4: WGCV Collaboration Updates

### W4.2: GSICS Coordination *[slides]*

Paolo Castracane (ESA) shared an overview of GSICS and the proceedings from the 2026 annual GSICS meeting. This included the transition of the NASA Spectral Band Adjustment Factor (SBAF) tool to GSICS, plans for joint ATBDs for VIS-NIR calibration, and a new GSICS dashboard being developed as a centralised tool for GSICS products from agencies.

Discussion

- GSICS plans to preserve the code for SBAF in an internal repository. Fabrizio noted that the tool was very valuable, and that LPV has some ideas to use it as a benchmarking tool. Mounir Lekourara (EUMETSAT) noted that SBAF will not be decommissioned, but cannot be maintained. GSICS reached out to NASA to take and maintain it, pending agreement.
- Mounir noted that ATBDs for VIS/NIR calibration could be of interest to the WGCV community. Nigel noted links to the IVOS PICSCAR group.

### W4.4: GSICS Lunar Calibration Workshop Announcement *[slides]*

Tom Stone (USGS) reported on the GSICS-WGCV Lunar Calibration Workshop, planned to take place from 16-20 November 2026 at EUMETSAT Headquarters in Darmstadt, Germany. Topics will include Measurements and Moon Observations, Lunar Calibration Systems and Model Development, Instrument Monitoring using Lunar Calibration and inter-calibration, Thermal infrared and Microwave, and Alternative Applications of Lunar Observations

### W4.1: WGCV Calibration Network Updates

Medhavy Thankappan (GA) reported on the ongoing framework being developed between the CEOS Chair, SIT Chair, and Executive Officer Teams to handle documents being presented to CEOS leadership for endorsement. Once the process is adopted in the CEOS

Governing Documents, WGCV could adopt a similar approach, citing past ambiguity on whether items should be endorsed by WGCV or its Subgroups.

Nigel Fox (NPL) reminded WGCV Members of the RadCalNet review process, which grants WGCV Members an opportunity to review submissions before their acceptance. He encouraged the SARCalNet leads to follow the same process for new sites.

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| **WGCV-56-06** | Medhavy to propose a mechanism for subgroups to table WGCV-level endorsements. | **WGCV-57** |
| **WGCV-56-07** | SARCalNet leads to formally propose the endorsement of new SARCalNet sites to WGCV Members. | **Next SARCalNet site approval** |
| **WGCV-56-08** | WGCV Members to review the Golmud RadCalNet submission. | **13 May 2026** |

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| **Decision 01** | Following a two week review opportunity from WGCV Members, the Golmud RadCalNet site was endorsed by WGCV Members. |

### W4.5: Outcomes from ESA's Gobabeb Science and Cal/Val Activities Workshop *[slides]*

Fabrizio Niro (ESA) shared an overview of the multi-purpose Cal/Val site in Gobabeb, Namibia, and the dedicated science workshop held in November 2025 at ESA ESRIN, Italy. One outcome of the workshop was to raise awareness at a strategic CEOS WGCV level by pursuing endorsement of Gobabeb as a "supersite," securing sustained national funding to maintain the site and address operational issues.

While domain-specific criteria should be identified for each area, a common set of generic criteria could be established to apply across domains, including: Permanent infrastructure with sustained funding; Measurements / data follow community protocols / standards; Multi-variables, multi-themes; and Very well characterised.

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| **WGCV-56-04** | WGCV Subgroup Chairs to convene a meeting to discuss a consistent definition for a 'Super site' within WGCV. | **WGCV-57** |
| **WGCV-56-05** | Valentina to propose a definition for a 'Cal/Val Park.' | **WGCV-57** |

# Day 2: Wednesday, April 22, 2026

## Session W5: GHG Cal/Val

### W5.1: GHG Cal/Val Updates *[slides]*

Hiroshi Suto (JAXA) reported updates on the Railroad Valley vicarious calibration campaign. Results from 2025 compared data from GOSAT, GOSAT-2, OCO-2, OCO-3, TROPOMI and TEMPO using the LIDORT radiative transfer code. The schedule for the 2026 RRV campaign was presented.

### W5.2: GHG Network Updates *[slides]*

Jean-Christopher Lambert (BIRA-IASB) reported updates from the NDACC FTIR, TCCON, COCCON GHG column Cal/Val networks, including new stations and campaigns. AC-VC is discussing co-benefits to develop a cross-theme GHG/AQ instrument network. Updates were shared on CEOS-FRM self-assessments from key GHG networks.

An activity is described in the GHG Roadmap to track Level 2 validation, capabilities, and evolving needs to explore and support a more operational GHG monitoring framework.

A Cal/Val planning and ground-based network design tool has been developed to support CO2M and will be extendable to other missions. Adding the tool to the CEOS-PVP was discussed, as well as encouraging the commercial sector to get involved.

### W5.3: OCO-2 Calibration: Successes & Surprises *[slides]*

Rob Rosenberg (JPL) reported updates on the OCO-2 mission, including its Level-1 and 2 products, bad pixels, contamination, and stray light issues. Ambitious science goals, a sensitive instrument, full-physics retrievals and precise validation measurements demand an aggressive calibration effort. With a changing carbon cycle, scientists need to be confident in their findings.

## Session W6: Agency Cal/Val Reports

### W6.1: GISTDA *[slides]*

Pawarin Kuha reported updates on the THEOS-1 and THEOS-2 missions, plans for upcoming MWIR, optical, and SAR THEOS missions, and GISTDA's Cal/Val activities.

GISTDA currently aligns with the CEOS Interoperability Handbook recommendations CALVAL #1, #7, and #8, is undergoing assessment for SARCalNet (GISTDA's corner

reflectors), EDAP+ (THEOS-1 L2A Standard Scene), and CEOS-ARD, in future, plans to align with QA4EO, GCPIX, CEOS-FRM, and SRIX4Veg.

GISTDA is willing to collaborate with the CEOS community on VHR satellite data approaches, GCPs, contribution to the CEOS Product Validation Platform, and apply CEOS guidelines to develop high quality products.

**W6.2: ASI *[slides]***

Giovanni Paolo Blasone, Giorgio Viavattene, and Patrizia Sacco reported Cal/Val updates from the COSMO-SkyMed and PRISMA satellites, and future SAR and hyperspectral missions. The 'PRISCAV' network of instrumented sites across Italy was introduced and contributions to the WGCV ACIX-III study were overviewed.

Discussion

- Medhavy supported ASI's use of the Queensland Corner Reflector Array, noting that cooperation between agencies is a good investment case for the site's continued operation.
- Following a suggestion to leverage SARCalNet, Giovanni noted that ASI would be willing to explore a contribution to the network.

**W6.3: JAXA *[slides]***

Kazuhisa Tanada reported updates on JAXA's EO constellation covering disaster and land monitoring, GHG, atmosphere, precipitation, water, and climate monitoring, including EarthCARE, PMM, GOSAT-GW, GCOM-C, ALOS-4.

**W6.4: USGS *[slides]***

Cody Anderson reported updates on the Landsat-8 and -9 missions, including the calibration of OLI and TIRS instruments, as well as plans for Landsat Next and Collection 3. The EROS 'Supersite' contains instruments supporting the PHENOCAM, SCAN, CRN, RCS, ANSS, AERONET, and RadCalNet (assessment in progress).

**W6.5: GA *[slides]***

Medhavy Thankappan reported updates on GA's Queensland and Yarragadee Corner Reflector Arrays, which are currently under review for addition to SARCalNet. The Pinnacles desert vicarious calibration site is being developed by CSIRO to join RadCalNet and TIRCalNet and to support Landsat Next. Drone capabilities for EO ARD SR validation.

**W6.6: ESA *[slides]***

Valentina Boccia reported updates on ESA's EO missions and Cal/Val activities, including recent a Biomass data release and new MAAP platform, Sentinel-1D commissioning, Sentinel-2 and -3 validation

**W6.7: ISRO *[slides]***

Raghavender Narayanadhasoju reported on the radiometric performance of the Resourcesat-2A , EOS-04 & -06, and NISAR missions over RadCalNet sites RVUS, GONA, BTCN, and ISRO's Shdnagar site.

EOS-04 ARD products are produced for Level-2B NRB and a mosaic product over India, available through ISRO's Bhoonidhi portal.

## Session W7: Uncertainty

**W7.1: SatVu Uncertainty Budget Overview *[slides]***

Jamie McMillan (SatVu) reported updates from SatVu, including the recent launch and commissioning of the HotSat-2 mission, and an uncertainty budget for SatVu's MWIR product. Components considered include residual non-uniformity, bad pixel correction, signal transfer function, dark current, thermal self-emission, and telescope transmission. SatVu would like guidance on a minimal set of uncertainty components to cover, and recommendations on data format for intermediary and output uncertainty files.

Discussion

- Out of the components presented, Cody suggested that they are listed by their order of impact. Telescope transmission is the biggest.

**W7.2: Outcomes from 2026 Uncertainty Workshop**

Esad Micijevic (USGS) reported on the annual 2026 Uncertainty Workshop, held in conjunction with JACIE at USGS Headquarters in Reston, USA. Topics included uncertainty for decision making, spectral characterisation, scene-dependent uncertainty in optical systems, cross-calibration, and an open discussion.

The discussion across commercial, government and academia included requests for guidance on SBAFs, lunar calibration, bridging the commercial gap on uncertainty and the importance of placing requirements up front.

Discussion

- There was discussion on achieving buy-in from the commercial sector to assess uncertainty pre- and post-launch of their missions. The sector is keen to provide this information, but is seeking tenable means and guidance to do so. Money is the bottom line for the commercial sector, so if there were specific conditions on uncertainty provision to sell their products, they would buy-in.
- Cody noted discussions amongst US agencies and commercial vendors, for which including this information would convince their stakeholders to invest more in Cal/Val. Peter Strobl (EC) noted the potential value in having an expert advise the commercial sector how much it would cost and how long it would take to provide uncertainty information. Jamie McMillan noted that the SatVu uncertainty budget presented took six months to develop.
- Tina Ochoa (Vantor) noted difficulties convincing stakeholders to provide continued support to Cal/Val efforts, and that anything government agencies can do to incentivise it would be appreciated. Kurt Thome (NASA) added that at JACIE, Tina showed that companies are starting to assess the level of absolute calibration required to make their customers happy. Our science community is not reacting quick enough. They know their platforms better than anyone else, but we need to support them. Michele Kuester (Vantor) noted that a template document for uncertainty might be helpful.

**W7.4: Discussion: Expressing Uncertainty Information *[slides]***

- Cody Anderson (USGS, WGCV Chair) shared the primary components of Landsat 8 OLI, ranked by impact for a typical scene: interpolation modelling uncertainty (highest), SI traceability, coupled geometric-radiometric uncertainty, noise interpolation propagation, and bad pixels/saturation/defects (lowest).
- Kurt noted that geometry for geolocation can take any approach. It may be possible to avoid geolocation and instead maintain the data in a pixel reference, however it could result in missing data points on certain days. The user community should help guide how they want us to give them datasets.
- Peter noted that orthorectification comes at the heavy price of doing an interpolation, and is not typically included in uncertainty budgets. The ARD paradigm that *"if it's not orthorectified, then it's not ARD"* is under dispute. The current processing level scheme at L2 does not allow only georectified data, and L2 has a prerequisite that data is orthorectified. We want ARD, but need to ensure they know what they're doing.
- Nigel noted that having worked examples of the scale of these effects is the most telling metric that will communicate to customers their importance. If you don't understand

your sensor to some level, you will struggle to make a constellation work self-consistently. Messages should work to operators as well as someone paying for it. It will help their own system.

- Medhavy Thankappan (GA, WGCV Vice Chair) suggested picking a few easily understandable case study examples, working backwards from the retrieval and adding uncertainty ranges, to see the difference in having X and Y in the process.
- Suggestions included the effect on resampling for land cover classification, harmonising higher resolution sensors to get better coverage, water clarity and extent, agriculture, biodiversity, satellite derived bathymetry, NDVI, and vegetation greenness.
- Jamie noted that for SatVu, uncertainty is important for their calibrated temperature products and time series monitoring examples. They could consider contributing a case study on utilising uncertainty evaluated for targets over time.

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| **WGCV-56-13** | WGCV leads to coordinate the collection of case studies from WGCV Member agencies highlighting the impact of providing uncertainty information with satellite data products. | **Initial poll by next WGCV Telecon** |

**W7.5: Discussion: Measurand Definition**

- A key objective is to agree at the CEOS level what we mean by Surface Reflectance, establishing a good starting point to drive quality and build steps to achieve harmonised SR data.
- The most important datasets people want to use together are Landsat and Sentinel. The retrieval of surface BRF at Level 2 was discussed, as a cornerstone for further retrievals.
- The only parameter suitable for use in an interoperable sense is bi-hemispherical, although it comes with an uncertainty price. Whether you transfer from different hemispherical directionals, you need a model for BRDF.
- With the amount of data that will be available in five years, no one will care about something that cannot be used with other data. Not having harmonisation will be inhibitive, not just to surface reflectance but other measurands too.
- Kurt noted the difficulty in getting L0 data now. Providers should at least produce a 'L1R' product that has only been radiometrically corrected and is reversible.

## Session W8: WGCV Initiatives Updates

### W8.1: SITSat Task Team update *[slides]*

Nigel Fox (NPL) reported updates on the WGCV SI-Traceable satellite task team, which was established following community requests for spaceborne reference missions. The team aims to establish a SITSat definition, develop a roadmap of what a SITSat-enabled observing system looks like, and develop a data sharing approach and communications strategy.

A new name was proposed for the SITSat: FRMsat (Fiducial Reference Measurement satellite). The first objective will be to establish clear definitions of what constitutes an FRMsat and minimal requirements needed to evidence this status.

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| **Decision 02** | Agreed to change the SITSat concept and WGCV task team to 'FRMsat.' |

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| **WGCV-56-09** | FRMsat Task Team to develop a baseline public website and a clear definition of what constitutes an FRMsat with minimal requirements needed to evidence their status. | **Q2 2026** |

Discussion

- Landsat was discussed as a potential FRMsat, however it would not meet the requirements as it needs to provide uncertainty commensurate with climate applications. Additionally, when used as a reference for other sensors, it should represent at least half of the uncertainty of similar satellites. Landsat and Sentinel-2 would not meet the criteria, although they can deliver FRM data. They meet criteria for FRM-quality data, but not at the uncertainty levels for climate. No single instrument that currently meets the requirements.
- Hopefully CLARREO-Pathfinder will meet the requirements.
- Jean-Christopher Lambert (BIRA-IASB) asked if an ozone measuring satellite measuring to SI be classed an FRMsat. Nigel noted that if it was measuring ozone at the level of uncertainty needed for climate, with an uncertainty half of other sensors, then conceptually it would meet the requirements. The FRMsat definition should be measurand agnostic.
- Yolanda noted that the term 'metrologically traceable to SI' may be difficult to prove for a retrieved quantity. We need to be careful with processing levels implied in the different definitions, and the primary measurand vs derived quantity. Emphasis should

not just be on the quality of the measurements themselves, but measurements plus retrievals.

**W8.2: Pre-flight Calibration Workshop Guidelines *[slides]***

Nigel Fox (NPL) shared an overview of the joint CEOS/GSICS Pre-flight Calibration and Characterisation Workshop, held in November 2024 at ESA ESTEC in Noordwijk, Netherlands. The workshop concluded with a series of conclusions and recommendations, which are planned to be developed into a good practices guidance document.

Norvik Voskanian (NASA) volunteered to support the guidance document's development.

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| **WGCV-56-10** | Nigel and Norvik to develop the executive summary from the Pre-flight Workshop guidelines, and reconvene a writing team to draft the pre-flight guidelines document. | **WGCV-57** |

**W8.3: Cal/Val Portal Update *[slides]***

Paolo Castracane (ESA) reported updates on the WGCV Cal/Val Portal, which aims to disseminate Cal/Val good practices and protocols to the wider EO community within CEOS and beyond.

Subgroup webpages are being drafted for the Atmospheric Composition and Terrain Mapping subgroups.

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| **WGCV-56-12** | Paolo to redirect the Cal/Val Portal Terms and Definitions Wiki to the CEOS EO Glossary. | **WGCV-57** |

**W7.6: CEOS-ARD Discussion**

- WGCV Members discussed potential initiatives to support the Quality, Authenticity & Provenance pillar of the 2026-2031 CEOS-ARD Strategy. These included:
  - CEOS-ARD should introduce intermediate levels of compliance.
  - CEOS-ARD should require some level of evidence of pre-flight characterisation of components.
  - Uncertainty should be a threshold requirement
  - CEOS-ARD providers should be required to cross-calibrate with reference missions on orbit.

- Sample data for CEOS-ARD self assessments should cover CEOS-PVP and RadCalNet photo-invariant calibration sites (PICS).

Discussion

- Cody Anderson (USGS, WGCV Chair) noted that the CEOS-ARD threshold level is relatively easy to achieve, and may not drive people to change their products much. In contrast, no one is achieving the goal level with less motivation to meet the requirements. This will allow distinction between Landsat/Sentinel-type datasets with those of everyone else at Threshold level. Since no one can reach Goal, there is currently no distinction between Threshold datasets, even if some are objectively outperforming others in some areas.
- Promoting the idea of partial goal compliance could be a short-term measure. The need for a full blown peer review panel at Goal level should be revisited. This is probably only needed for 3-4 parameters according to WGCV and likely could be covered by 1-2 experts (e.g., traceability and uncertainty requires significant knowledge to interpret the evidence provided; and these assessments will not be readily automated).
- Kurt and Fabrizio noted that the WGCV intercomparison exercises (CMIX, ACIX, DEMIX, GRGIX, and GCPIX) are all relevant to the strategy workflow.
- Melissa Martin (NASA CSDA) recognised the need to rethink what 'quality' means in the context of CEOS-ARD, including how to demonstrate Cal/Val for fitness for purpose applications.
- As it currently stands, when someone performs a self-assessment against the CEOS-ARD PFS, there is no check of the product quality or continuous integrity monitoring prior to the product's endorsement. We should mandate that providers follow the recommendations produced by WGCV.
- Nigel Fox (NPL) noted that CEOS Agencies signed up to QA4EO in 2010, which states that all products should have statements of uncertainty. With no uncertainty information, it is more complicated to give trust and confidence in the data. A rethink of the uncertainty requirement needs to be an initiative in the 2026 CEOS-ARD Strategy.

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| **WGCV-56-11** | WGCV Members to hold a follow-up discussion to consolidate initiatives to include under the Quality Pillar of the 2026-2031 CEOS-ARD Strategy | **Q2 2026** |

## Session 9: Closing

### W9.1: 2027-2028 WGCV Vice Chair Nominations *[slides]*

The Chair term of Cody Anderson (USGS) ends in November 2026, with Medhavy Thankappan (WGCV Vice Chair, GA) taking up the chair role for 2027-2028. WGCV is currently seeking a vice chair for 2027-2028 and subsequently Chair for 2029-2030.

Nigel Fox (NPL) indicated (pending approval from UKSA) interest to chair WGCV in 2029-2030. Nigel has been the IVOS Subgroup Chair since 2006, and has been active on various initiatives including EDAP, FRM, RadCalNet, and QA4EO. He proposed the TRUTHS mission in 2001, writing into the proposal that it was a CEOS mission focused on Cal/Val, driven by an IVOS meeting. A key motivation and priority to continue fueling WGCV is promoting the importance of fitness for purpose Cal/Val and QA.

### W9.2: Review of WGCV-56 Actions

Harvey Jones (WGCV Secretariat) reviewed the meeting's draft actions and decisions.

### W9.3: Plans for WGCV-57 Meeting *[slides]*

- Prayot Puangjaktha shared GISTDA's proposal to host the WGCV-57 Meeting in early 2027, following the agency's experience in hosting numerous CEOS Working Group meetings as well as the 2023 CEOS Plenary. WGCV-57 will be hosted in Thailand, with the venue to be determined.
- Cody Anderson (USGS, WGCV Chair) closed the meeting and thanked all participants, in-person and online, for their participation.

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| **Decision 03** | WGCV-57 will be hosted by GISTDA in Thailand, in January/February 2027 |

# Appendix A: List of Participants

| In person | | Virtual | |
|---|---|---|---|
| **Agency** | **Full Name** | **Agency** | **Full Name** |
| BIRA-IASB | Jean-Christopher Lambert | ASI | Giovanni Blasone |
| CEOS SEO | Brian Terry | ASI | Giorgio Viavattene |
| Constellr | Andreas Brunn | ASI | Patrizia Sacco |
| EC-JRC | Peter Strobl | CAS | Xiaolong Dong |
| ESA | Fabrizio Niro | CAS | Zijin Zhang |
| ESA | Paolo Castracane | CSA | Stéphane Côté |
| ESA | Valentina Boccia | EUMETSAT | Mounir Lekouara |
| GA | Medhavy Thankappan | ESA | Dirk Geudtner |
| JPL | Rob Rosenberg | GISTDA | Pawarin Kuha |
| Labsphere | Chris Durell | GISTDA | Prayot Puangjaktha |
| MYSA | Adhwa Amir Tan | ISRO | Keerthi |
| NASA | Kurt Thome | ISRO | P.V. Jayasri |
| NASA | Norvik Voskanian | ISRO | Raghavender Narayanadhasoju |
| NewSpace Intelligence | Masahiko Nagai | ISRO | Saritha P K |
| NPL | Nigel Fox | ISRO | Soma Sekhar Kopparthi |
| USGS | Cody Anderson | JAXA | Hiroshi Suto |
| USGS | Esad Micijevic | JAXA | Kazuhisa Tanada |
| USGS | Garrison Gross | NASA | Yolanda Shea |
| WGCV Secretariat | Harvey Jones | MYSA | Wayne Ng Su Wai |
| | | NPL | Pieter De Vis |
| | | SatVu | Jamie McMillan |
| | | USGS | Tom Stone |
| | | Vantor | Michele Kuester |
| | | Vantor | Tina Ochoa |

# Appendix B: Decisions

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|---|---|
| **Decision 01** | Following a two week review opportunity from WGCV Members, the Golmud RadCalNet site was endorsed by WGCV Members. |
| **Decision 02** | Agreed to change the SITSat concept and WGCV task team to 'FRMsat.' |
| **Decision 03** | WGCV-57 will be hosted by GISTDA in Thailand, in January/February 2027 |

# Appendix C: Actions

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| **WGCV-56-01** | Paolo to work with subgroup chairs to communicate activities to be shared on the Cal/Val Portal at https://calvalportal.ceos.org/wgcv, including an IVOS database on radiometric calibration capabilities and the new MSSG GNSS-R Task Team (once established). | **WGCV-57** |
| **WGCV-56-02** | WGCV Members and Agencies interested in joining the proposed GNSS-R Cal/Val Task Team to contact the MSSG Chair, Xiaolong Dong. | **WGCV-57** |
| **WGCV-56-03** | Dirk and Fabrizio to explore connections between Level 3 SAR product validation and the LPV Subgroup Aboveground Biomass Focus Area. | **WGCV-57** |
| **WGCV-56-04** | WGCV Subgroup Chairs to convene a meeting to discuss a consistent definition for 'Super site(s)' within WGCV. | **WGCV-57** |
| **WGCV-56-05** | Valentina to propose a definition for a 'Cal/Val Park.' | **WGCV-57** |
| **WGCV-56-06** | Medhavy to propose a mechanism for subgroups to table WGCV-level endorsements. | **WGCV-57** |
| **WGCV-56-07** | SARCalNet leads to formally propose the endorsement of new SARCalNet sites to WGCV Members. | **Next SARCalNet site approval** |
| **WGCV-56-08** | WGCV Members to review the Golmud RadCalNet submission. | **13 May 2026** |
| **WGCV-56-09** | FRMsat Task Team to develop a baseline public website and a clear definition of what constitutes an FRMsat with minimal requirements needed to evidence their status. | **Q2 2026** |
| **WGCV-56-10** | Nigel and Norvik to develop the executive summary from the Pre-flight Workshop guidelines, and reconvene a writing team to draft the pre-flight guidelines document. | **WGCV-57** |
| **WGCV-56-11** | WGCV Members to hold a follow-up discussion to consolidate initiatives to include under the Quality Pillar of the 2026-2031 CEOS-ARD Strategy | **Q2 2026** |
| **WGCV-56-12** | Paolo to redirect the Cal/Val Portal Terms and Definitions Wiki to the CEOS EO Glossary. | **WGCV-57** |
| **WGCV-56-13** | WGCV leads to coordinate the collection of case studies from WGCV Member agencies highlighting the impact of providing uncertainty information with satellite data products. | **Initial poll by next WGCV Telecon** |