Minutes v1.0

20th Meeting of the CEOS Land Surface Imaging Virtual Constellation (LSI-VC-20)

14-16 September 2026
Hosted by the United States Geological Survey (USGS)
12201 Sunrise Valley Dr, Reston, VA 20192, United States



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Day 1: Tuesday, September 15, 2026

Session L1: Opening Session

L1.1: Welcome

LSI-VC Co-Leads (Ake Rosenqvist, Takeo Tadono, Chris Barnes) welcomed everyone to USGS Headquarters for LSI-VC-20.

L1.2: USGS Welcome and Landsat Program Updates

Timothy Newman, Program Coordinator for USGS National Land Imaging welcomed everyone to USGS Headquarters. He recalled the early days of the LSI-VC, back before it was reconstituted in 2016 and mobilised in support of CEOS-ARD, which has been very impactful. He reiterated USGS support for CEOS and the LSI-VC.

Landsat Next is now known as Landsat 10, which will be a single platform. There will be a future transition of the Sustainable Land Imaging (SLI) program, with a commercial model and product-focused approach, providing continuity of critical products using Landsat and commercial data. Congress has yet to weigh in on this proposal, which will occur with the new budget next year. Foundational data from gold-standard platforms like Landsat as well as strong interoperability principles will be critical to ensuring the new commercial model will work.

The intent is to maintain the free-and-open data policy of Landsat, with the opportunity for commercial providers to profit from additional services and higher level products. The exact delineation is under discussion.

USGS is working on Landsat Collection 3, the design of which will be set in the next year. Collection 3 needs to be in place before Landsat 10 launches (around 2031-32).

L1.3: LSI-VC-19 Action Review

Matt Steventon (LSI-VC Secretariat) reviewed the actions from LSI-VC-19. 11 of the 19 actions are closed, and the remaining 8 are in progress. 12 of the 17 actions from the joint LSI-WGCV meeting are complete.

Action 13 asked for a shortlist of terms to support the UML diagram work. A shortlist of terms and definitions has been started, and needs review before incorporating into the UML diagram. Action 14 was closed.

Session L2: CEOS-ARD Fitness for Purpose

L2.1: CEOS-ARD Product Selection Framework Update

Matt Adams (GA, LSI-VC Co-Lead) shared the latest on the CEOS-ARD Product Selection Framework tool, which aims to help users in finding CEOS-ARD products which are suitable for their needs. GEOGLAM inputs to support the selection framework are pending, as are the NISAR and KCEO inputs actioned at LSI-VC-19.

Matt also shared the new EO Capabilities Explorer, which builds adjacent to the CEOS MIM Database to show a broader range of capabilities from the EO sector. Using the MIM Database as a baseline, the current pilot introduces missions from the private sector as well as a substantial increase in the level of detail about instruments and their sensing parameters, starting with SAR as an initial case.

It is anticipated that the Product Selection Framework would be deployed after the new CEOS-ARD Strategy is endorsed and preferably after a user engagement session(s) to ensure it meets the majority of needs.

The foundational data for the EO Capability Explorer is pulled from the MIM Database. Matt Adams will check whether the beta EO Capabilities Explorer can be shared with LSI-VC.

L2.2: Reinstating Partial Goal Compliance and Working Towards a Compliance Spectrum Based on Quality and Uncertainty

Alex Brooks (GA) reported on progress towards reinstating a partial Goal compliance model. A number of issues need to be addressed: understanding which criteria need to be addressed by a panel; how criteria should be weighted to produce a 'score'; and how partial Goal compliance can be communicated. The vast majority of Threshold requirements can be checked automatically, and around 50% of Goal requirements (e.g., checking DOI links are live). Alex presented a few options for displaying the difference between products, showing which areas they excel in and others where they don't.

A discussion followed to make decisions on the questions posed by Alex, with the conclusions captured in LSI-VC-20 Decision 01 below.

Discussion

Discussions on adoption of the NASA-ESA-USGS QAF by CEOS-ARD will occur after the new Strategy has been adopted. This will be a key topic for WGCV in 2027.

The forthcoming Assessment Tool will pull the criteria directly from GitHub. Flags on the YAML files will be able to indicate which criteria need to be reviewed by a panel. It won't be able to apply to historical versions of the PFS.

Might need a small group of people to review the existing PFS and identify the Goal level criteria which can be assessed by a single reviewer versus those which need a review panel.

The original motivation behind mobilising a peer review panel for Goal assessments was the need to have broad scientific expertise. From Alex's experience, most of the criteria are not challenging, apart from those around uncertainty and traceability.

Matt Steventon suggested that if the individual peer review team is capable and confident in reviewing and assessing a criteria, we should rely on that and not assemble a panel. If a panel is required this can be done on an *ad hoc* and as needed basis, including determination of the necessary panel constituency – which can be advised by the CEOS-ARD Oversight Group and PFS lead authors.

LSI-VC-20 Action 01	CEOS-ARD Secretariat to prepare and maintain a list of PFS Leads. Assignments should be communicated to the community and checked regularly. The assignments will serve as the basis for assignment of PFS oversight roles on GitHub. These people should be active members and participants in the CEOS-ARD Oversight Group and this mechanism needs to be added to the new CEOS-ARD Governance Framework.	**ASAP**

It was agreed that the partial Goal scoring should be kept as a simple percentage. Adding a weighting is too complicated, subjective, and varied across shared building blocks. The spiderweb chart is a nice way to show the partial Goal compliance. The overall percentage can be added to the ceos.org/ard datasets table, with a link to the spiderweb chart and the self-assessment.

There was strong support for returning to partial Goal compliance.

The assessment tool interface will be publicly accessible, for use in self-assessments.

It was noted that some of the Goal requirements say 'as Threshold'. These should not factor into the partial Goal score.

Alex will do an initial pass of all PFS to confirm which criteria are assessable by a sole reviewer, and which may potentially need the support of a peer review panel. Alex will share the results with the CEOS-ARD Oversight Group for information.

LSI-VC-20 Decision 01	Agreed to continue reinstating partial Goal compliance, with the following elements agreed: • Panels will not be required for partial Goal assessments, only for a full Goal assessment, as is currently the case. The peer reviewer will contact relevant experts within the CEOS-ARD Oversight Group or the broader CEOS community should there be any requirements which need additional expertise. • No weighting will be placed against individual requirements, the outcome will simply be a percentage showing the total number of Goal requirements met. • The spider-web / radar chart was agreed as the preferred approach to communicate partial goal compliance.

Session L3: CEOS-ARD & Standards

L3.1: Mapping CEOS-ARD Building Blocks to Existing Standards

Matt Adams (GA, LSI-VC Co-Lead) reviewed the work to map CEOS-ARD requirements to existing standards, on behalf of Ivana Ivánová . A structured standards-reference object is recommended. The standards reference describes the nature of the relationship without implying formal conformance or endorsement.

Fields would need to be added into the Building Block model for the mapping, and it was noted that the reference should point to the specific part of the standard that is relevant, which could have implications on building block sizes.

Further work is dependent on the UML model and PFS consistency effort. All of these pieces need to converge. There is also some potential to converge with OGC on the requirement / conformance class / building block terminology and structure; this work should be raised in the new Open Geospatial Consortium (OGC) ARD Domain Working Group (DWG).

A super structure will probably also be desirable, that is, we will probably want to group requirements into thematic guiding principles, and it needs to be decided at which level would you want to version (at the group, individual level, etc.)

If the same standard is used across different requirements, should specify the standard centrally, and use an identifier to map to requirements. Still need to consider the specifics of how to implement this mapping in the Building Blocks.

Peter suggested avoiding the terms ‘mappingStatus’ and ‘mappingNote’, due to potential confusion with *geospatial* mapping.

LSI-VC-20 Action 02	Matt Adams, Ivana Ivanova and Matthias Mohr to explore how the standards reference objects can be implemented in the Building Blocks.	**LSI-VC-21**

L3.2: Open Geospatial Consortium (OGC) ARD Domain Working Group (DWG)

Dave Borges (NASA, SEO) recalled the history of engagement with ISO and OGC and ARD. The past OGC ARD Standards Working Group has now been converted to a Domain Working Group. The motivation is to provide a forum for engagement with the broader geospatial community on ARD, provide a pathway to adoption of CEOS-ARD as an OGC Community Standard, and avoid the strict timelines imposed by a SWG regarding development of a standard.

Dave noted that there is intent in ISO/OGC to establish an "AI Ready Geospatial Data" ISO Preliminary Work Item. Siri Jodha will share the presentation about the AI ready data standard proposed in OGC.

The SEO is now the primary CEOS Liaison representative to ISO/TC 211, with secondary POCs being the WGISS and WGCV Chairs on a rotating basis.

Continuing to encourage CEOS agencies to engage with their National Standards Bodies. This is critical to ensure space agencies have a voice in ISO and TC211.

The OGC ARD DWG Charter has now been accepted and a call for co-chairs has gone out via the OGC Agora platform. Siri Jodha Khalsa (SEO), Andreia Siqueira (GA) and Chris Rampersad (EarthDaily) are nominated so far. The kick-off meeting is planned at the 136th OGC Technical Meeting on 12-15 October 2026. DWG Co-Chairs need to attend at least one OGC leadership meeting per year.

The DWG has no expected output, it is intended as a community forum. DWGs can publish reports, report to OGC leadership meetings, etc. It is envisioned that CEOS-ARD will be proposed as an OGC Community Standard, using the DWG to socialise this with the community and gather input.

Ake suggested an early task for the DWG could be to publish a white paper or some other OGC publication about CEOS-ARD, given the last published reference for our work is from many years ago and still refers to CARD4L; we need an updated referenceable source.

While the OGC ARD SWG has now been disbanded, it is important that CEOS continue to maintain links to national standards bodies for ISO representation. Dave is actively coordinating the US side, including making connections to USGS.

Matthias suggested that CEOS-ARD could begin the OGC Community Standard process sooner rather than later. It is probably mature enough to begin now, especially given that the Community Standard process will take some time (STAC took over a year). OGC needs to meet twice in the process, once to create the work item, then a second time to confirm the Community Standard. The primary requirement for a Community Standard is adoption, which CEOS-ARD could argue strongly. It was suggested that we should wait until we have completed the alignment of the Building Blocks.

LSI-VC-20 Action 03	In the frame of the OGC Domain Working Group, Siri Jodha to explore with Scott Simmons (OGC) the procedure for CEOS-ARD to become a community standard.	**First OGC ARD DWG meeting**

LSI-VC-20 Decision 02	Agreed to an internal (soft) deadline of the end of next year to get CEOS-ARD into the process to be accepted as an OGC Community Standard, pending discussion with Scott Simmons (see LSI-VC-20 Action 03).

L3.3: CEOS-ARD Unified Modeling Language (UML)

Siri Jodha Khalsa and Sumit Sen presented progress on the development of a UML structure for CEOS-ARD.

Noted ambiguity and misuse of the term 'resolution'. Many standards and metadata misuse the term. The first step is to define a set of core terms, which then need to be modelled to map against one another. There are efforts underway in OGC to update Geolexica, which is OGC's equivalent to the CEOS EO Glossary. We need to have alignment between both CEOS and OGC glossaries.

LSI-VC-20 Action 04	Peter Strobl to review the term definitions proposed by Sumit for the UML diagram. Boundary and Extent in particular need to be clarified and reflected in the CEOS Glossary. Definitions for resolution also need to be refined in the EO Glossary (i.e., specifying spatial, temporal, radiometric).	**December 2026**

The term 'boundary' is mostly used in the context of a bounding box. If a bounding box is just in lat/long limits, it cannot specify the extent of a scene at high latitudes. A geo-polygon is more versatile. But we also need something a bit simpler in some cases. A boundary could be a set of indices of a DGGS, for example.

The draft CEOS-ARD UML diagram can be found at: github.com/sumitsane/CEOS_ARD_Meta

Session L4: CEOS-ARD for Land

L4.1: Endorse New Version of the SAR PFS Built on the CEOS-ARD Building Blocks

Ake Rosenqvist (JAXA) recalled the SAR PFS has now been translated into the building blocks as version 1.3. Each of the individual products now have individual version numbers as well.

LSI-VC-20 Decision 03	Endorsed the new version of the combined SAR PFS built on the CEOS-ARD Building Blocks, as well as the corresponding versions of the individual SAR PFS.

L4.2: Version 6.0.0 of the Surface Temperature and Surface Brightness Temperature Product Family Specifications (PFS)

Siri Jodha Khalsa (IEEE) presented the v6.0.0 Surface Temperature (ST) PFS and the v1.0 Surface Brightness Temperature (SBT) PFS for endorsement. The PFS were developed in coordination with industry representatives from Ororatech, Constellr, Aistech, Earth Daily and SatVu.

The only difference between the ST and SBT specifications is that SBT does not include the requirement 'Adjustments for Emissivity and Anisotropy'. SBT is a new addition to the portfolio of CEOS-ARD specifications due to a request from the commercial sector participants. The specifications were not written in a 'merged' fashion in order to align with the new building block convention.

Other updates included a new requirement to specify which version of the PFS the product is compliant with, as well as an adjustment that means a provider is not required to provide full transparency of their processing algorithms provided that their dataset is complete with uncertainty information. This should be adopted across the PFS to facilitate commercial sector uptake of CEOS-ARD, given that many are reluctant to reveal commercially sensitive proprietary information.

LSI-VC-20 Decision 04	Endorsed v6.0.0 of the CEOS-ARD Surface Temperature PFS and v1.0.0 of the CEOS-ARD Surface Brightness Temperature PFS.

LSI-VC-20 Action 05	LSI-VC Secretariat to add new definitions/terminology from the ST/SBT PFS update to the CEOS Glossary.	**December 2026**

LSI-VC-20 Action 06	Matt Steventon to update the CEOS-ARD website with the new SAR, Surface Temperature and Surface Brightness Temperature PFS. Matthias to provide final versions of the PFS for upload after addressing editorial decisions from LSI-VC-20 (see Decision 06).	**ASAP**
LSI-VC-20 Action 07	LSI-VC Secretariat to review the proposals made by the Surface Temperature update team for wider adoption across other PFS, and incorporate into the PFS consistency work. Raise GitHub issues for awareness and tracking.	**December 2026**

L4.3: CEOS-ARD Self-assessment Progress Reports

NASA Harmonized Landsat and Sentinel-2 (HLS) Project

Margaret Wooten (NASA) presented progress of the self-assessment of the Harmonised Landsat and Sentinel-2 (HLS) product towards CEOS-ARD compliance. Most requirements are met, with just 3-4 requiring attention. HLS version 3 presents an opportunity to further align with the CEOS-ARD specifications and this is where, e.g., saturation flags, terrain shadow/occlusion masking, and uncertainty will be looked at. Margaret posed the following questions to the LSI-VC team, with conclusions below each question:

1. **Acceptable Limits of Level-1 Inheritance:** As a product derived from highly calibrated, reference-standard parent missions, HLS can reasonably satisfy some requirements by pointing to Level-1 inheritance. Is it acceptable to justify compliance for certain items through details accessible via the product DOI and/or via input L1 scene IDs (provided in the metadata) which can be used to trace back to the parent metrics/masks? Or must attributes be explicitly propagated into the HLS data/metadata?
    - In general, we would like to avoid pointing to another dataset for evidence of compliance. It would be preferable to import this information into the mask of HLS directly, in the spirit of providing a self-contained analysis-ready product.
    - Especially true for saturation as it is important to understand what the HLS processing chain has done with the data.
    - Regarding geometric accuracy, which is inherited from Landsat/Sentinel, because HLS is resampling we need to prove the geometric accuracy again.
2. **Implementation Timing (Forward Processing vs. Reprocessing):** If we make a mid-collection/version update that only affects forward processing (e.g., bundled with the upcoming low latency product release), is this acceptable for CEOS-ARD

compliance? Or are updates required to be tied to a full historical reprocessing (e.g., a future v3 release)?

- This is not something that has been thought through before, although we have in the past assessed tools that produce CEOS-ARD on the fly, which implies that whole archive reprocessing is not a requirement. As such, forward compliance seems to make sense.

3. **Clarification on Traceability and Per-Pixel Uncertainty:** Do the traceability and uncertainty requirements strictly mandate per-pixel uncertainty, or is robust product-level validation acceptable?
   - Per-pixel uncertainty is not a requirement for Threshold.
   - Implementing explicit per-pixel saturation flags and per-pixel uncertainty quantification, as well as terrain shadow/occlusion masking, is a priority for HLS v3.

The current optical PFS structure does not consider harmonised products, unlike the SAR specifications. It would be worthwhile considering what changes are needed on the optical side, following the lead of SAR. This might also be helpful in the context of harmonising the building blocks.

The HLS team will work through the remainder of the outstanding points and hope to submit for peer review in early 2027.

LSI-VC-20 Action 08	LSI-VC Leads and Secretariat to work with NASA HLS team to address PFS issues related to composite products and inheritance of features that are impacting the HLS self-assessment. This dataset has raised some new issues for consideration around composite products, inheritance of compliance information from lower level inputs, and whether an entire collection needs to be reprocessed for compliance or whether forward compliance is sufficient.	**LSI-VC-21**

NISAR L-band

Bruce Chapman (NASA/JPL) reported that a self-assessment for the NISAR L-band RTC product is underway, and it is mostly compliant. A small number of missing items are non-technical omissions and the team will address these shortly before submitting the product for peer-review. InSAR and GLSC products will follow for assessment after.

Bruce requested that item 1.7.9 in the SAR specification allow for self-describing formats, instead of requiring this detail in the metadata. This was resolved for the OPERA product. It was clarified that using the XML is only a Goal requirement, so the approach done for NISAR is acceptable.

Bruce also noted issues meeting item 4.5 (gridding convention), as NISAR products are being produced 'snapped to grid'. Ake and Bruce committed to developing a proposal to fix this, and present it to the SAR group for approval.

LSI-VC-20 Action 09	Ake Rosenqvist and Bruce Chapman to develop a proposal to resolve the issue with the gridding requirement for NISAR, and present it to the SAR PFS authors for discussion and approval.	**LSI-VC-21**

RADARSAT-1

Jon Dudly (NRCan) reviewed the approach to CEOS-ARD products for the Canada Centre for Mapping and Earth Observation (CCMEO).

Radarsat-2 CEOS-ARD is still pending MDA approval but it is hoped that an assessment for some compatible modes will be forthcoming.

On-demand CEOS-ARD products are available for Radarsat Constellation Mission (RCM), for 5 Stripmap modes and 1 ScanSAR mode in 6 polarisations.

RCM ScanSAR 30-metre MLC, CH/CV single mode, provides systematic coverage of Canada's landmass, every 12 (24) days and is CEOS-ARD compliant. Launched in early 2025, more than 22,000 CEOS-ARD products are available to the public.

There is a push to process the entire Radarsat-1 catalogue to CEOS-ARD and have that publicly available. The Raw Level 0 status of the archive has presented a challenge, and this needed processing to L1C before the CEOS-ARD process could start. Single polarisation HH, NRB only. The dataset was lacking some necessary metadata due to its age. The data that has been processed has been certified as CEOS-ARD compliant as of August 2026; the rest of the archive needs to be brought up to the same specification. This is in progress and it is envisioned that the data will be hosted on the AWS open data registry once completed.

The motivation for having an RCM CEOS-ARD product from launch was to increase the use of RCM data by lowering the barrier to entry for SAR products.

Discussion

Ake stressed the value of Radarsat's global, HH polarisation, C-band archive, which is not commonly available. It would be a very interesting complement to Sentinel-1 data, particularly over certain areas like the Amazon, etc. Advocating for the release of such data in support of the CEOS AFOLU Roadmap is the remit of the LSI-VC Forests and Biomass subgroup and it was suggested that an action be taken by the group to consider a statement or similar action.

LSI-VC-20 Action 10	LSI-VC Forests & Biomass Subgroup to coordinate with NRCan regarding potential CEOS actions that might encourage the release of additional RADARSAT archive data over the Amazon and other high priority forest areas, as well as processing of the entire Radarsat-1 catalogue to CEOS-ARD.	**LSI-VC-21**

NASA Plankton, Aerosol, Cloud, ocean Ecosystem (PACE)

Sean Bailey (NASA) reviewed the PACE team's progress assessing their product against the Aquatic Reflectance PFS. 35 of the 42 Threshold requirements are already met. Work continues and it will be submitted for peer review shortly.

One issue is that PACE OCI Level-2 data are in the satellite coordinate system and are not reprojected to a uniform grid, which results in several Threshold requirements not being met. The PACE team would like to propose an adjustment to the specification such that CEOS-ARD does not require gridding.

It was noted that this proposal aligns with the updated geospatial representation proposal discussed yesterday. It should not be an obstacle in the next version of the PFS.

OroraTech

Anastasia Sarelli (OroraTech) reviewed the OroraTech constellation and its Level-2 Surface Temperature product, which are compliant with 12 Threshold and 12 Goal requirements of the new SBT PFS. 8 items need further work.

There are also issues here regarding geometric correction. This may also be resolved with the new geospatial representation requirements.

SatVu

Jamie McMillan (SatVu) presented SatVu's compliance with the ST PFS. Upcoming product updates and documentation will bring compliance up to 27/31 requirements. The current sub-pixel requirement is not achievable, but the geometric representation proposal presented on day one of LSI-VC-20 could achieve Threshold with some further product updates.

The remaining items are not required for Threshold. Traceability could be demonstrated on future payloads through dedicated pre-launch calibration. Cloud shadow and terrain occlusion are both challenging and would require further development.

Constellr

Christoph Lerot (Constellr) recalled that the LSTprecision product has been assessed as compliant at the Threshold level, for the ST v5.0 PFS. The Constellr team will now work towards compliance of their VNIR products against the SR PFS, as well as compliance with the new SBT PFS, and work towards providing a per-pixel uncertainty layer.

It was noted that the Spectral Response Function (SRF) is currently provided at a basic level, but they could share a csv with the full SRF if required.

Aistech

Mathias Gergely (Aistech) noted that the focus is currently on in-space cal/val and product improvements. Aistech is aiming to align with the v6 ST PFS at Threshold level.

There are currently some hurdles around company IP policy in meeting some Goal requirements, but it is hoped that some relaxation of this documentation requirement (replaced with uncertainty) will resolve this issue.

Aistech is not planning to produce detailed quality masks as these are not required by clients. Would anticipate meeting the NASA-ESA-USGS Quality Assessment Framework at 'basic' or 'good' level. General uncertainty will be provided as per-pixel metadata.

For sensor calibration, Threshold only requires identification of calibrated / not calibrated, but it does not state the sensor calibration parameters required. It was clarified that specific results need not be provided, rather the most important aspect is that the assessment details that the data provider has calibrated to some accepted standard. Peter hopes that this can be clarified in the PFS alignment phase. All that is required is a general description of how the calibration is done.

GISTDA THEOS

Prayot Puangjaktha (GISTDA) noted GISTDA's growing fleet of satellites, and outlined the approach used to develop CEOS-ARD products for THEOS-1 and THEOS-2.

THEOS has no dedicated cloud bands, so GISTDA is still working on cloud assessment methods and engaging with the Cloud Masking Inter-comparison Exercise (CMIX). They are also participating in the Ground Control Point (GCP) Intercomparison eXercise with the aim of improving their products geolocation.

CEOS-ARD products are currently stored in the NSDC, a GISTDA server/HPC. Data will be shared with the community following full compliance assessment to SR PFS v5.0.2.

The THEOS-1 self-assessment is with Alex Brooks now. Sample data has been provided. *Note: THEOS-1 was subsequently approved as CEOS-ARD at Threshold level on 21 September 2026.*

THEOS data is acquired globally, on request, with systematic acquisition over Thailand only. THEOS is used for disaster management around the world, among other applications.

L4.4: Update on Peer Review Status and Process

Medhavy Thankappan (GA, WGCV Vice Chair) reviewed the peer review process and some issues that have emerged in recent self assessments. The heavily manual process is a hurdle, which is motivating the development of more streamlined processes and automated tools. Metadata variations between providers is also a factor in the difficulty of reviewing self-assessments.

L4.5: Surface Reflectance Quality and Consistency Project Outcomes

Medhavy Thankappan (GA, WGCV Vice Chair) recalled that this is an effort to support better harmonisation of CEOS-ARD surface reflectance products from multiple sources, noting that every provider arrives at a Surface Reflectance product using different approaches. WGCV is leading this effort to publish guidance for data providers to increase interoperability of surface reflectance products.

Independent of the algorithms used to generate products, there are several ways to define the measurand of Surface Reflectance itself. The producer needs to decide which physical phenomena to take into account and which to exclude. It is likely not possible to land on a single agreed definition of SR, so there needs to be some other way forward to bring datasets closer than they are now.

The team has done a comprehensive review of scientific literature to understand how each parameter is treated, to inform the guidance. The team is evaluating the impact at an individual correction/input level to understand how to improve the interoperability of SR products.

The team aims to have a draft of the discussion section and initial guidance completed by CEOS Plenary (November 2026). Final publication will only take place after socialisation in a number of expert fora.

Day 2: Wednesday, September 16, 2026

L4.3: CEOS-ARD Self-Assessments Reports (cont.):

Resourcesat-2/2A LISS-3

Radhika (ISRO) reviewed progress on Resourcesat-2/-2A LISS-3 SR CEOS-ARD products. Sample products and the self-assessment were recently submitted for peer review. Resourcesat-2 and -2A have been harmonised into one product, which are validated using RadCalNet. Geometric accuracy has also been refined. The team will now work on developing CEOS-ARD products for the AWiFS sensor.

Data is available on ISRO's Bhoonidi, but coverage is only for India.

General metadata is available in one file, even though this isn't required for the optical PFS. It was suggested that this should be encouraged, as it greatly accelerates peer reviews.

The ISRO team plans to further enhance the metadata, making it available as a GeoJSON file, as well as making a separate metadata file for the QA layer.

NISAR S-band

V.M. Ramanujam (ISRO) reported that ISRO will submit their NISAR S-band Level-2 GCOV (polarimetric), GSLC and GUNW (interferometric) products for CEOS-ARD compliance assessment soon. Level-3 large area mosaics will also follow. The GCOV products are expected to be submitted for peer review in mid-October. GLSC and Mosaic products will be submitted in November, and GUNW products will be submitted in March 2027.

NISAR S-band products are openly available through Bhoonidhi. Non-Indian coverage is available also through Bhoonidhi, and is available for anyone to download and use.

ISRO is also processing the L-band NISAR data, which will be submitted for CEOS-ARD assessment in due course.

Discussion

It is difficult to appropriately represent SAR products on the CEOS-ARD dataset list, as there are usually a significant number of products/modes for each mission. A better approach to displaying them is needed.

LSI-VC-20 Action 11	Ake Rosenqvist and Matt Steventon to review how CEOS-ARD SAR products are represented on the CEOS-ARD website, noting there is often a large number of different products, modes, etc. per mission.	**LSI-VC-21**

Session L5: Agriculture, Forestry, and Other Land Use (AFOLU)

L5.1: CEOS AFOLU Roadmap and Portal Update

Matt Steventon (LSI-VC Secretariat) presented the draft CEOS AFOLU Portal, which aims to provide a public-facing means to stocktake and present CEOS Agency contributions to the AFOLU Roadmap. The portal is broken down into strategic objectives and initiative areas. Each contribution is categorised into the type of contribution, such as dataset, platform, tool, capacity building program, etc.

Discussion

The GEOGLAM subgroup is also struggling to achieve a comprehensive picture of CEOS Agency contributions to the EAVs. Having a centralised repository is a good first step and agriculture inputs should also be included; the portal currently has a primary focus on forestry.

The NASA Earth Rise team is focused on local and state governments, to help connect end users with NASA resources. That framework and structure might be useful for AFOLU activities.

Peter suggested creating a taxonomy for the Portal to understand how datasets map to CEOS-ARD products and product families.

L5.2: Essential Agriculture Variables (EAVs)

Alyssa Whitcraft (NASA/UMD, GEOGLAM) reviewed progress to stocktake CEOS Agency contributions to the EAVs. CEOS Agencies are asked to support the stocktake process by communicating their products and tools that support EAVs. GEOGLAM is also coordinating with the WGCV Land Product Validation (LPV) subgroup regarding a workshop on Evapotranspiration protocols. The goal is to have the results of the stocktake included in the MIM Database.

The NASA SIT Chair team suggested Evapotranspiration as a good focus activity for the LSI-VC GEOGLAM Subgroup due to the ability to bring together, e.g., EC, ESA, USGS, NASA around a common goal. There is also the opportunity to bring together two communities (agriculture, water) thanks to the ongoing NASA SIT Chair Water Planet activity and the LSI-VC GEOGLAM subgroup. Potential activities on ET include: Comparison of different approaches to ET across CEOS agencies; Efforts to support harmonisation/interoperability across agencies' ET products; Collaborative efforts on validation/accuracy assessment – to

do what is discussed in the parallel WGCV LPV activity developing good practices for validation of ET products.

We saw with the Above Ground Biomass map harmonisation activity under CEOS that full harmonisation of products across agencies is likely not feasible, so perhaps something like a CEOS-ARD Product Family Specification is the way to provide a suitable common ground / point of reference. The NASA SIT Chair team is also leading the water annex of the new CEOS-ARD Strategy and has now included a task on developing a CEOS-ARD higher-level Product Family Specification for ET. LSI-VC has just endorsed new Surface Temperature and Surface Brightness Temperature CEOS-ARD specifications which should prove useful

All of the above would be a useful means for convening the reconstituted LSI-VC GEOGLAM Subgroup and provide a tangible focus activity.

Discussion

Chris Barnes (USGS) noted that USGS has an on demand ET product, but no immediate plans to make it operational. USGS also generates a global dynamic water extent product.

A CEOS-ARD specification for ET would be complicated and new ground, as there isn't a single measurand. We would need to decide what parameters should be considered in an ET product, and it should certainly be a derivative of an existing PFS.

The Copernicus Land Monitoring Service now provides an operational ET product.

A workshop is being organised with ESA, NASA, ISRO and CNES on future thermal missions (Sentinel LSTM, TRISHNA, EAGLE).

LSI-VC-20 Action 12	Peter Strobl, Chris Barnes and Ferran Gascon to provide the names of EC, USGS, and ESA Evapotranspiration (ET) experts to support the LSI-VC GEOGLAM Subgroup in creating an ET CEOS-ARD PFS. Other agencies are invited to nominate experts to support the effort. Names are to be provided to LSI-VC Secretariat.	**October 2026**
LSI-VC-20 Action 13	LSI-VC Secretariat to set up quarterly meetings for the GEOGLAM Subgroup and mobilise work around the new Evapotranspiration focus area.	**October 2026**

L5.3: INPE AFOLU Updates

Mariane Reis (INPE) presented INPE's work on mapping and monitoring forests in Brazil, through the Prodes and Deter programmes. Prodes has produced annual maps of Brazil's forests since 2001, to support the monitoring of deforestation. Deter provides daily

monitoring of suppression and degradation of native vegetation, to allow authorities to act in real time. Sentinel-1 data is used to mitigate issues with cloud cover.

INPE has developed land cover maps using TerraClass for the Amazon every two years from 2008-2024, and Cerrado for every two years from 2018 to 2024. TerraClass map is available until 2024, openly available for download. The spatial resolution is 30m for most years, with more recent years based on Sentinel-2.

LSI-VC-20 Action 14	Mariane Reis to follow up the status of the claimed INPE CBERS-4 'CEOS-ARD' product that feeds into the Brazilian Data Cube and, if applicable, initiate the process for a formal CEOS-ARD self-assessment.	**LSI-VC-21**

L5.4: ESA AFOLU Updates

The meeting was running late, so participants were referred to the slides online.

L5.6: CSA AFOLU Update

Laurent Giugni (CSA) reviewed the recently released RADARSAT-2 Tropical Forests dataset, which now includes 80,000 images over south-east Asia. Data formats have been a challenge, and inexperienced end users have trouble with the SAR data, highlighting the need for things like CEOS-ARD for SAR.

RCM has acquired more than 1000 images over GEO-TREES validation sites.

Agriculture and Agri Food Canada is closely involved in GEOGLAM, including the Essential Agricultural Variables (EAVs) effort. AAFC has also programmed RADARSAT acquisitions over select international GEOGLAM-JECAM sites (Joint Experiments for Crop Assessment and Monitoring).

CSA is contributing to the PolSAR activity under the SAR-VC (previously an LSI-VC activity). The project uses common test sites to advance polarimetric and multi-frequency SAR research and application development.

L5.7: 2027 NOSA CEOS Chair Theme Opportunities: True Green

Ola Nordbeck (NOSA) reviewed the 2027 CEOS Chair Theme, *Trusted Satellite Data for a Better Future*. One of the focus areas, '*True Green',* focuses on increased provision of open, trustworthy and harmonised satellite-based data products for tropical forests, leveraging the CEOS-ARD Framework, promoting WGCV resources, and advocating WGISS interoperability principles.

Norway's International Climate and Forest Initiative (NICFI) works to protect the world's tropical rainforests. NICFI is a central partner of the Global Forest Observations Initiative (GFOI) – a long-term CEOS priority and flagship of the Group on Earth Observations (GEO). NICFI supports critical country capacity development through the Food and Agriculture Organization (FAO) Forestry Programme, including FAO's System for Earth Observation Data Access, Processing and Analysis for Land Monitoring (SEPAL). Norway's True Green focus activity aims to build upon these well-established relationships.

The NOSA CEOS Chair team commits to supporting implementation of the anticipated 2026-2031 CEOS-ARD Strategy, and will focus on two key areas:

1. Increasing cloud-native conventions in the CEOS-ARD Framework, in direct response to feedback from users in the forestry community, with a view to increasing the discoverability, accessibility and usability of satellite EO data;
2. Improving data quality and facilitating discussion on broader adoption of a common quality assessment framework by CEOS-ARD, and potentially more broadly across CEOS.

Tangible outcomes for this priority could include an update to the PFS to include more specifics about cloud-native data formats (without prescribing a particular one), improvements to FAO SEPAL workflows using CEOS-ARD, improved STAC representation for CEOS-ARD, and advocacy for a CEOS Best Practice for Data Quality Assessment. Another possibility raised by Dave Borges is a closer relationship between CEOS and the Cloud Native Geospatial (CNG) Forum, with the possibility of a CNG-hosted event the week before/after CEOS Plenary in 2027.

LSI-VC-20 Action 15	Dave Borges to connect Jed Sundwall (Radiant Earth Foundation/Cloud Native Geospatial (CNG) Forum) to the NOSA CEOS Chair Team regarding a potential CNG event aligned with the 2027 CEOS Plenary.	**CEOS Plenary 2026**

Discussion

The 2027 CEOS Chair priorities could inform topics for the OGC ARD DWG discussions and this should be kept in mind for the early agendas. There might be useful connections to make to the broader community, particularly those with cloud-native expertise that might be lacking in the usual CEOS community.

The CEOS-ARD STAC work is on hold at the moment, due to competing development priorities. The current extension needs an update, and work to update the mapping will probably only start next year (in 9-12 months time), in parallel with the assessor tool.

Implementation guidelines for STAC in the context of CEOS-ARD would be helpful. Landsat is looking to lock in STAC specifications for Collection 3 in 6-12 months; alignment would be desirable.

LSI-VC-20 Action 16	Matthias Mohr to review and revise the development roadmap for CEOS-ARD GitHub, STAC, and assessment tools. It would be helpful if this included a general timeline and estimate of effort required for each milestone. Once updated, distribute to the CEOS-ARD Oversight Group for review and confirmation of development priorities.	**December 2026**
LSI-VC-20 Action 17	CEOS-ARD SAR group to review the CEOS-ARD SAR STAC extension and determine necessary next steps to update it.	**LSI-VC-21**
LSI-VC-20 Action 18	Chris Barnes to coordinate USGS support for CEOS-ARD STAC development, noting alignment with Collection 3 goals. Also, connect Megan Rush to Matthias Mohr and the STAC Project Steering Committee. *Note: Within 9-12 months, we should aim to have a more coordinated approach on CEOS-ARD and STAC. This would be timely for Collection 3 definition.*	**LSI-VC-21**

L5.8: FAO LCCS taxonomies for advancing the characterisation and description, monitoring and planning of land and water environments

Richard Lucas (Aberystwyth Univ.) reviewed the activity to map the FAO Land Cover Classification System (LCCS), with the goal to develop unified land cover classifications for regional, national and global land cover classes, with consistent labels and colours. IPCC has developed a transition matrix, to identify land cover change; FAO have developed an equivalent one. These map to 77 impact categories and 144 driving pressures using environmental descriptors. The FAO LCCS can also support the planning of future landscapes, by applying pressures to understand the impacts.

Without good quality, consistent data, it is not possible to understand the environmental descriptors. The algorithms are made available openly. The classification is automated, as is the change and impacts. The big gap is the mapping to pressures, which need to have reliable data to support the understanding of these pressures. AI might be able to help.

Discussion

Classes defined in the FAO system have temporal requirements. Need to build a cube which is scale dependent on the layout of the spatial and temporal pattern. It would be easier if we could do the first step into semantics at the individual observational level.

Have demonstrated ways to do a single image classification for certain classes. Need multiple observations for biomass. Embeddings have also worked really well.

L5.9: Improving CEOS-ARD Support for FAO's System for Earth Observation Data Access, Processing and Analysis for Land Monitoring (SEPAL)

Erik Lindquist (FAO) reviewed the Food and Agriculture Organization of the United Nations (FAO) System for Earth Observation Data Access, Processing and Analysis for Land Monitoring (SEPAL) platform, which helps countries monitor and report on forests and land use.

The main platform is built on Google Earth Engine (GEE) and primarily uses the space agency datasets from (GEE). It is also available as a standalone package that can be run on other cloud platforms. During 2027, under the NOSA CEOS Chair year, we would like to see how CEOS-ARD might be able to better support SEPAL workflows, e.g., through reduced and improved pre-processing, improved CEOS-ARD accessibility through improved STAC metadata and cloud-native approaches, access to new datasets, and platform agnostic approaches.

Discussion

GEE makes various changes to their datasets. Using CEOS-ARD directly might reduce pre-processing burden and increase data quality, but this needs to be the subject of a study.

FAO stated that without BRDF, data aren't really analysis-ready for their purposes. BRDF is critical for large area classification, due to the differential reflectance problem. FAO flagged that BRDF correction is complicated for Sentinel-2 on GEE. BRDF correction is difficult to apply to GEE Sentinel-2 after the data has been put into tiles and scan line information is lost. FAO asked for static layers to enable easy correction.

Ferran does not anticipate this is an issue for the ESA Sentinel-2 source data. Sun direction and viewing direction should be available in the metadata for Sentinel-2 to support BRDF correction. However, it is not per-pixel and needs to be interpolated. Per-pixel is not possible due to data volume constraints. This could be a good demonstration of the value of authoritative CEOS-ARD. It was noted that the GEE version of the data does not have the ESA quality layers. In the past, Sentinel-1 data on GEE was not RTC and metadata layers

were also missing. LSI-VC should seek to understand the data processing steps done on the GEE side. This highlights the need for authoritative data and traceability of processing.

USGS is not yet sure if BRDF will be included in the operational processing stream for Landsat Collection 3, but if not included a tool will be provided.

Adding other radar datasets to SEPAL, such as NISAR, would be beneficial and a nice demonstration. There is a potential connection to the SAR-VC here too. SEPAL is already using ALOS-2 ScanSAR data, which is CEOS-ARD compliant.

STAC is an important point for SEPAL. GEE's advantage is the ease of data access, so anything that can be done from the CEOS-ARD side to ease the discovery of data would be beneficial. The FAO team will provide a list of STAC metadata fields which are required by SEPAL, for input to the CEOS-ARD STAC definition, as well as to support Landsat Collection 3 development.

LSI-VC-20 Action 19	LSI-VC Secretariat to follow up with the FAO team regarding a list of STAC metadata fields which are required by SEPAL, for input to the CEOS-ARD STAC definition, as well as to support Landsat Collection 3 development.	**October 2026**

A demonstration of SEPAL running on the Copernicus Data Space Ecosystem (CDSE) could be a good output for the 2027 CEOS Chair year.

SIT-42, SIT Technical Workshop, and the 2027 CEOS Plenary should be used as opportunities for further engagement between the FAO SEPAL team and CEOS Agency leadership.

L5.10: UMD Global Land Analysis and Discovery (GLAD) Laboratory

Matt Hansen (UMD) reviewed GLAD's work to use multiple data sources to develop long time series, using the Landsat archive. Using the HLS data as well. Have identified issues with BRDF effects. Bringing in the MODIS helps reduce the cloud effects, and reduces the noise. Using nearest-neighbour resampling improved results compared with the convolution method. Robust composites have reduced data volumes and processing overhead. GLAD has its own 'ARD' to make data more user friendly.

Discussion

There was feedback on needing to improve Landsat resampling to retain finest spatial resolution spectral response. USGS can look at the resampling feedback. Maggie seconded the issues with the L0 resampling; the GLAD team has provided feedback to the NASA HLS team on the L10 product as well.

The BRDF issue is similar to the incident angle issue with SAR data, that is, how to do BRDF correction over non-homogenous areas. Every scene had its own linear model built, using a dummy variable and matching areas that are stable in each image are identified. Bias adjustment is done via a bulk movement of the whole image, which works well with HLS. Don't want to have artifacts that are clearly scene boundaries.

The discussion about explicitly handling composites in the optical CEOS-ARD PFS was raised again.

L5.11: World Resources Institute (WRI) Global Nature Watch and Land & Carbon Lab

Viviana Zalles (WRI) presented WRI's Global Nature Watch programme (formerly Global Forest Watch and Land & Carbon Lab). The cropland extent data feeds into the Global Pasture Watch service. The programme integrates GLAD Land Cover products to yield a more comprehensive understanding of land use changes. GLAD ARD products are also used to support sample-based area estimation and validation, to improve the accuracy of products. WRI has developed a preliminary AFOLU flux product for 2016-2024.

Discussion

The flux map product includes CO_2, CH_4 and N_2O. Ake noted a potential exclusion regarding mangrove emissions.

Viviana will investigate the new Global Mangrove Watch v4.1 product.

It was clarified that WRI is using GLAD ARD products, not CEOS-ARD. Understanding the differences would be of interest. The introduction of HLS to the GLAD system is expected to provide a step change in accuracy and detection capabilities.

The team is interested in providing an update on the GHG product

WRI uses a variety of global projections for visualisation. The original data has the same projection as GLAD ARD; all based on the same grid and on the same system.

WRI invests significant time doing validation for their land cover maps. Every map has its own validation parameters. WRI doesn't do per-pixel uncertainty, rather they provide a global or regional estimate.

L5.11: CEOS Support for Wetlands

Ake Rosenqvist (JAXA/soloEO) reported that Global Mangrove Watch 4.1 was released on July 26, 2026. The new product includes separate layers for gains and losses, with annual maps for 1985-2025.

A wetland inundation dynamics product will be released in October 2026, in response to a request from The Ramsar Convention Secretariat. These products can be used to support habitat mapping, hydrological modelling, etc. L-band SAR is naturally well suited for forest inundation, but not so good for herbaceous inundation. In L-band, herbaceous inundation is seen as open water. C-band would be better to map inundation extent under herbaceous vegetation.

Discussion

The SIT Chair Team is considering a surface water extent CEOS-ARD PFS as a higher level product, as part of the Water Annex of the new CEOS-ARD Strategy. The inundation product might be relevant as a demonstrator for this PFS. The surface water extent PFS would have to include both radar and optical data, such that all water can be included.

Ake noted the ongoing development of Essential Wetland Variables in GEO Wetlands, which are also referenced in the Water Annex of the new CEOS-ARD Strategy.

Session L6: Wildfires

L6.1: LSI-VC Wildfire Subgroup Work Plan

Mark de Jong (NRCan) reviewed the status of the LSI-VC Wildfire Subgroup, which now has 16 organisations engaged. The subgroup is working on its Work Plan in anticipation of the call for inputs to the 2027-2029 CEOS Work Plan, and will work with the LSI-VC secretariat to ensure these are reflected in the CEOS Deliverables Tracker.

Discussion

Validation of active fire products is difficult to validate due to the short lived nature of wildfires, and the unique conditions that make artificial validation unfeasible. One task will be to look at the geospatial accuracy of satellite-derived products compared to aircraft observations; again acquisition synchronisation is difficult. Burn scar assessment validation involves using higher resolution sensors that can be cross-referenced with coarser resolution ones. Field surveys are also used given the longer time window available for the validation.

The GEO GWIS program (Global Wildfire Information System) was noted as relevant to the work of the subgroup. GWIS aims to bring together existing information sources at regional and national levels in order to provide a comprehensive view and evaluation of fire regimes and fire effects at global level. GWIS provides tools to support operational wildfire management from national to global scales. Mark noted the Wildfire subgroup is interfacing formerly, via their contact at EC-JRC.

L6.2: CEOS-ARD Support for Wildfires

Mark de Jong (NRCan) further reported on opportunities for CEOS-ARD to support the Wildfire Subgroup's ambitions. A CEOS-ARD PFS for fire products is of interest. An active fire product could potentially be built off the Surface Temperature PFS, while a burnt area product could be built off the Surface Reflectance PFS.

Discussion

Active fire products are generally presented as a series of hotspots, simply a series of pixel centroid latitude/longitude coordinates, often with additional information relating to fire pixel characteristics. Data providers are looking towards onboard processing, with only the hotspots downlinked. The issue with this is you lose the context, e.g., sometimes the thermal bands are obscured by cloud or dense smoke, but users can only understand this is the case with the rest of the context from the full image.

The CEOS Atmospheric Composition Virtual Constellation (AC-VC) has mentioned aerosol products in the context of the Wildfire subgroup, however there is very little overlap in terms of sensors and products used when it comes to direct wildfire management applications.

There is limited agreement between different fire products, and some have quality issues. There is also a rapidly growing offering of products from an increasing number of non-space agency providers. The barrier to making products is now very low, but the quality assessment of those products needs to be addressed. There is a strong need for a fire product endorsement process and best practices for fire products. Having an external body doing some endorsement of fire products would be beneficial for both the fire management users, as well as the data providers themselves. The Canadian WildFireSat team would also like to have an independent evaluation of their product to ensure it is the best it can be.

CEOS-ARD might be able to play a role in such a framework given the push towards including more quality metrics and integration of the NASA-ESA-USGS Quality Assessment Framework (QAF), however the wildfire community is looking to impose minimum thresholds.

Many differences between fire products come down to overpass times. Numbers can diverge quite widely and cause significant confusion in reporting.

L6.2: Earth Fire Alliance (EFA) Update

Mike Falkowski (EFA) presented EFA's objectives and plan to build the FireSat Constellation for near-real time fire monitoring. The first three satellites of the constellation were launched in July 2026, allowing for twice daily revisit. Full global coverage will begin in 2027 when the next four satellites launch. The constellation is integrated with Starlink's Plug and Plaser, SpaceX's satellite-based laser communication terminal and avionics bridge to reduce latency.

FireSat is able to support burned area mapping. FireSat is enabling insights into smaller fires which have never been detected from space before.

Discussion

Validation of the constellation and its products was discussed. EFA plans a field campaign in Alaska over prescribed burns to undertake calibration and validation. TIRCalNet was mentioned as a resource that might be useful, however its hot targets are still very much the focus of research and development. Other options for hot targets include heat lamps or coal pits. Underflying aircraft aligned with satellite overpass is the best validation method at the moment, but this has its own challenges with active fires.

The pixel size of the FireSat Constellation is 50m at nadir, 80m on average.

EFA downloads and stores all data on the cloud, including orthomosaics and derived vector mosaics. To manage data volumes and costs, L0 and L1 data is moved to Glacier storage pretty readily. Data retention is a priority and EFA is speaking with NASA about long-term archiving solutions. At some point the data lose commercial value, but they are valuable multispectral general use data.

EFA's data policy allows the provision of data for free to fire fighting organisations, modelling organisations, and management organisations; with that said, a model that pays for that going forward is needed, beyond their period of philanthropic funding. EFA is looking at selling to insurance companies, etc. They also give data back to Muon Space to sell for defense purposes, which they sell for profit, with some of that returning to EFA.

Noted the International Workshop on High-Resolution Thermal EO taking place February 9-12, 2027 at ESA ESRIN.

EFA won't be doing anything with burn severity; this will be left to users. EFA will produce a burn perimeter, and with time series, will give fire progression information.

Fire Radiative Power is nearly impossible to validate as it is so dynamically variable.

The CEOS-ARD PFS for Nighttime Lights Surface Radiance was noted. EFA is struggling with geolocation for night products and might find this PFS a useful reference. The WGCV Terrain Mapping Subgroup is also discussing geolocation of nighttime products; thermal GCPs coupled with reflected GCPs is an option being discussed.

L6.4: OroraTech Fire Detection Updates

Jayendra Praveen Kumar Chorapalli (OroraTech) presented his work on fire detection products and pipelines at Ororatech. Products fit three labelled classes: fires, heat emitting industrial sites, and sun glint. OroraTech is using a two part QA/QC process (internal and external).

The Level 2 NRT Active Fire product is processed on the satellite, with only the hotspots downlinked. Edge processing reduces latency and downlink volumes. The on-orbit fire detection model has an average precision of 0.76. Model validation uses on-orbit emulation, running the full onboard L1 processing on the ground segment. The onboard model size is constrained.

Timeliness between acquisition and downlinked data available on the ground is around 45-55 minutes, depending on region.

Discussion

OroraTech is engaged in the LSI-VC Wildfire subgroup.

Session L7: Other Business and Closing

L7.1: Earth Observation Data Providers Collaboration Forum (EODCF) Outcomes

David Borges (NASA, SEO) reviewed the forum hosted by the SIT Chair at the 2026 SIT Technical Workshop. He noted the action taken by the SIT Chair Team to consider how CEOS might have a more organised approach for sustained connection to the private sector, perhaps similar to how CEOS Agencies have designated points of contact. Companies also highlighted that they are being approached by many individuals from CEOS, often to numerous people on their side, and this makes engagement unclear; it is not clear where they should focus their attention, what events to attend, etc.

Dave noted the suggestion raised during the SIT Technical Workshop regarding having the CEOS Chair send a communication to executives of companies that are newly compliant with CEOS-ARD, as a means of increasing visibility at the management level and acknowledging the effort of the staff who have developed these products. It is thought this might foster a top-down understanding of the importance.

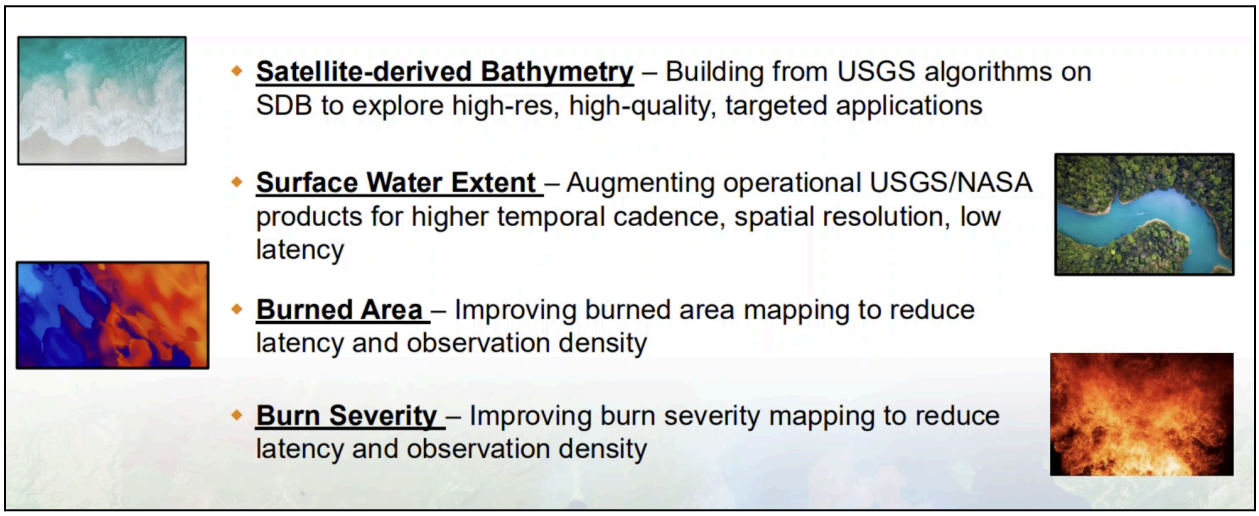
The SIT Chair team is following up the idea of a commercial collaboration mailing list with the CEOS Secretariat.

Discussion

It was suggested that CEOS think about implementing such forums as a standard part of the Technical Workshop going forward.

The Landsat Sustainable Land Imaging (SLI) Commercial Transition Initiative was referenced during the EODCF. CEOS-ARD would provide a useful baseline for interoperability, alongside other CEOS best practices and resources.

The SLI commercialisation strategy is product based. That is, while the baseline dataset is intended to be free and open, commercial providers would be able to make money from higher level products. Addressing higher level products in CEOS-ARD could be timely and could focus on some of the initial SLI priorities, shown below.



At the EODCF there was broad consensus across CEOS leadership that downstream users need to be able to seamlessly integrate civil and commercial data for their needs. CEOS should help enable this.

Defense anchors the commercial EO market. There is a lack of consistency between the defense community needs and those of the civil sector. NASA and ESA are the biggest purchasers of commercial data for civil applications. It is within the ability of CEOS to provide another collective representation for the needs of the civil EO sector, by adopting consistency in terms of data quality and having CEOS-ARD as a baseline requirement, among other things.

L7.2: Other LSI program updates

Megan Rush (USGS/KBR) reported an update on the Landsat STAC implementation, which will include updates to Collection metadata only.

Collection 3 will move to STAC v1.1, switch from the CARD4L extension to the CEOS-ARD extension, and add various fields. The Landsat Collection 3 STAC extension update will add fields for anomalies including flight, data, and sensor anomalies. It might be worth considering whether these are more broadly applicable beyond Landsat.

Discussion

Some discussion earlier about a CEOS-ARD STAC Extension update in near future such that it can be included in/be consistent with Collection 3.

The CEOS-ARD STAC Extension simply expresses which specification and version a product is compliant with, for the purpose of filtering, for example. It doesn't contain any other metadata.

It would be worth presenting a Landsat STAC update to the STAC Project Steering Committee.

LSI-VC-20 Action 20	Matthias Mohr to organise for USGS to present a Landsat STAC update to STAC Project Steering Committee.	**LSI-VC-21**

L7.3: Closing Session

Matthias Mohr (SEO) raised some questions about how to handle the changelog of the PFS. The conclusions are detailed in LSI-VC-20 Decision 05 below.

LSI-VC-20 Decision 05	Regarding the layout of the PFS, the following was agreed: • The changelog will be placed at the end, and only changes since the last major version will be listed. • A table of contents should be included. • The sentence that reads 'this version contains breaking changes!' should be more descriptive, noting it requires reassessment of products to have compliance. • Patch (editorial) changes will not be listed in the changelog.
LSI-VC-20 Decision 06	LSI-VC-21 will be hosted in the Washington D.C. area, USA (either NASA GSFC, USGS HQ, or UMD) from 14-16 April 2027.

LSI-VC-20 Action 21	LSI-VC Secretariat to lock in a venue for the LSI-VC-21 meeting, 14-16 April 2027 and circulate an announcement to the mailing lists.	**October 2026**

The LSI-VC Co-Leads thanked everyone for participating in LSI-VC-20 and contributing to the discussions.

Appendix A: List of Participants

Organisation	Name
Aberystwyth University	Richard Lucas*
Agriculture and Agri-Food Canada	Andrew Davidson*
AisTech	Mathias Gergely*
BIS India/IITB	Sumit Sen*
constellr	Christophe Lerot*
CSA	Curran MacDonald*
CSA	Laura-Alexe Marcoux*
CSA	Laurent Giugni*
Earth Fire Alliance	Michael Falkowski
Egyptian Space Agency	Hassan Abouseada*
ESA	Clement Albergel*
ESA	Fabrizio Niro*
ESA	Ferran Gascon
ESA / Spacebel	Yves Coene*
EC-JRC	Peter Strobl
FAO	Erik Lindqvist*
Geoscience Australia	Alex Brooks*
Geoscience Australia	Matthew Adams*
Geoscience Australia	Medhavy Thankappa*
GISTDA	Pawarin Kuha
GISTDA	Prayot Puangjaktha
IEEE	SiriJodha Khalsa*

Organisation	Name
JAXA/soloEO	Ake Rosenqvist
LSI-VC Secretariat	Matthew Steventon
LSI-VC Secretariat	Libby Rose
NASA	David Borges
NASA	Sean Bailey*
NASA	Maggie Wooten
NASA	Rodrigo Vieira Leite
NASA/JPL	Nicholas Parazoo*
NASA/JPL	Bruce Chapman*
NOSA	Johnathon Rizzi*
NOSA	Ola Nordbeck*
NRCan	Francios Charbonneau*
NRCan	Hugo Drouin*
NRCan	Jonathan Dudley*
NRSC/ISRO	Radhika T*
Ororatech	Anastasia Sarelli*
Ororatech	Jayendra Praveen Kumar Chorapalli*
SANSA	Cecilia Masemola *
SatVu	Jamie McMillan*
SEO	Matthias Mohr
U Twente	Michael Marshall*
UMD	Matt Hansen*

INPE	Mariane Reis*
ISRO	Jayasri PV*
ISRO	Manavala Ramanujam*
ISRO	Usha Ryali*
JAXA	Takeo Tadono*

USGS	Cody Anderson*
USGS	Evan Neuwirth
USGS/KBR	Christopher Barnes
USGS/KBR	Megan Rush*
WRI	Viviana Zalles*

* virtual participation

Appendix B: Decisions

ARD OG Decision	Collaborative editing capabilities for the CEOS-ARD PFS Building Block editor will be deprioritised, as the number of concurrent collaborators would be limited and very infrequent.
LSI-VC-20 Decision 01	Agreed to continue reinstating partial Goal compliance, with the following elements agreed: • Panels will not be required for partial Goal assessments, only for a full Goal assessment, as is currently the case. The peer reviewer will contact relevant experts within the CEOS-ARD Oversight Group or the broader CEOS community should there be any requirements which need additional expertise. • No weighting will be placed against individual requirements, the outcome will simply be a percentage showing the total number of Goal requirements met. • The spider-web / radar chart was agreed as the preferred approach to communicate partial goal compliance.
LSI-VC-20 Decision 02	Agreed to an internal (soft) deadline of the end of next year to get CEOS-ARD into the process to be accepted as an OGC Community Standard, pending discussion with Scott Simmons (see LSI-VC-20 Action 03).
LSI-VC-20 Decision 03	Endorsed the new version of the combined SAR PFS built on the CEOS-ARD Building Blocks, as well as the corresponding versions of the individual SAR PFS.
LSI-VC-20 Decision 04	Endorsed v6.0.0 of the CEOS-ARD Surface Temperature PFS and v1.0.0 of the CEOS-ARD Surface Brightness Temperature PFS.
LSI-VC-20 Decision 05	Regarding the layout of the PFS, the following was agreed: • The changelog will be placed at the end, and only changes since the last major version will be listed.

	• A table of contents should be included. • The sentence that reads 'this version contains breaking changes!' should be more descriptive, noting it requires reassessment of products to have compliance. • Patch (editorial) changes will not be listed in the changelog.
LSI-VC-20 Decision 06	LSI-VC-21 will be hosted in the Washington D.C. area, USA (either NASA GSFC, USGS HQ, or UMD) from 14-16 April 2027.

Appendix C: Actions

LSI-VC-20 Action 01	CEOS-ARD Secretariat to prepare and maintain a list of PFS Leads. Assignments should be communicated to the community and checked regularly. The assignments will serve as the basis for assignment of PFS oversight roles on GitHub. These people should be active members and participants in the CEOS-ARD Oversight Group and this mechanism needs to be added to the new CEOS-ARD Governance Framework.	**ASAP**
LSI-VC-20 Action 02	Matt Adams, Ivana Ivanova and Matthias Mohr to explore how the standards reference objects can be implemented in the Building Blocks.	**LSI-VC-21**
LSI-VC-20 Action 03	In the frame of the OGC Domain Working Group, Siri Jodha to explore with Scott Simmons (OGC) the procedure for CEOS-ARD to become a community standard.	**First OGC ARD DWG meeting**
LSI-VC-20 Action 04	Peter Strobl to review the term definitions proposed by Sumit for the UML diagram. Boundary and Extent in particular need to be clarified and reflected in the CEOS Glossary. Definitions for resolution also need to be refined in the EO Glossary (i.e., specifying spatial, temporal, radiometric).	**December 2026**
LSI-VC-20 Action 05	LSI-VC Secretariat to add new definitions/terminology from the ST/SBT PFS update to the CEOS Glossary.	**December 2026**
LSI-VC-20 Action 06	Matt Steventon to update the CEOS-ARD website with the new SAR, Surface Temperature and Surface Brightness Temperature PFS. Matthias to provide final versions of the PFS	**ASAP**

	for upload after addressing editorial decisions from LSI-VC-20 (see Decision 06).	
LSI-VC-20 Action 07	LSI-VC Secretariat to review the proposals made by the Surface Temperature update team for wider adoption across other PFS, and incorporate into the PFS consistency work. Raise GitHub issues for awareness and tracking.	**December 2026**
LSI-VC-20 Action 08	LSI-VC Leads and Secretariat to work with NASA HLS team to address PFS issues related to composite products and inheritance of features that are impacting the HLS self-assessment. This dataset has raised some new issues for consideration around composite products, inheritance of compliance information from lower level inputs, and whether an entire collection needs to be reprocessed for compliance or whether forward compliance is sufficient.	**LSI-VC-21**
LSI-VC-20 Action 09	Ake Rosenqvist and Bruce Chapman to develop a proposal to resolve the issue with the gridding requirement for NISAR, and present it to the SAR PFS authors for discussion and approval.	**LSI-VC-21**
LSI-VC-20 Action 10	LSI-VC Forests & Biomass Subgroup to coordinate with NRCan regarding potential CEOS actions that might encourage the release of additional RADARSAT archive data over the Amazon and other high priority forest areas, as well as processing of the entire Radarsat-1 catalogue to CEOS-ARD.	**LSI-VC-21**
LSI-VC-20 Action 11	Ake Rosenqvist and Matt Steventon to review how CEOS-ARD SAR products are represented on the CEOS-ARD website, noting there is often a large number of different products, modes, etc. per mission.	**LSI-VC-21**
LSI-VC-20 Action 12	Peter Strobl, Chris Barnes and Ferran Gascon to provide the names of EC, USGS, and ESA Evapotranspiration (ET) experts to support the LSI-VC GEOGLAM Subgroup in creating an ET CEOS-ARD PFS. Other agencies are invited to nominate experts to support the effort. Names are to be provided to LSI-VC Secretariat.	**October 2026**

LSI-VC-20 Action 13	LSI-VC Secretariat to set up quarterly meetings for the GEOGLAM Subgroup and mobilise work around the new Evapotranspiration focus area.	**October 2026**
LSI-VC-20 Action 14	Mariane Reis to follow up the status of the claimed INPE CBERS-4 'CEOS-ARD' product that feeds into the Brazilian Data Cube and, if applicable, initiate the process for a formal CEOS-ARD self-assessment.	**LSI-VC-21**
LSI-VC-20 Action 15	Dave Borges to connect Jed Sundwall (Radiant Earth Foundation/Cloud Native Geospatial (CNG) Forum) to the NOSA CEOS Chair Team regarding a potential CNG event aligned with the 2027 CEOS Plenary.	**CEOS Plenary 2026**
LSI-VC-20 Action 16	Matthias Mohr to review and revise the development roadmap for CEOS-ARD GitHub, STAC, and assessment tools. It would be helpful if this included a general timeline and estimate of effort required for each milestone. Once updated, distribute to the CEOS-ARD Oversight Group for review and confirmation of development priorities.	**December 2026**
LSI-VC-20 Action 17	CEOS-ARD SAR group to review the CEOS-ARD SAR STAC extension and determine necessary next steps to update it.	**LSI-VC-21**
LSI-VC-20 Action 18	Chris Barnes to coordinate USGS support for CEOS-ARD STAC development, noting alignment with Collection 3 goals. Also, connect Megan Rush to Matthias Mohr and the STAC Project Steering Committee. *Note: Within 9-12 months, we should aim to have a more coordinated approach on CEOS-ARD and STAC. This would be timely for Collection 3 definition.*	**LSI-VC-21**
LSI-VC-20 Action 19	LSI-VC Secretariat to follow up with the FAO team regarding a list of STAC metadata fields which are required by SEPAL, for input to the CEOS-ARD STAC definition, as well as to support Landsat Collection 3 development.	**October 2026**
LSI-VC-20 Action 20	Matthias Mohr to organise for USGS to present a Landsat STAC update to STAC Project Steering Committee.	**LSI-VC-21**

LSI-VC-20 Action 21	LSI-VC Secretariat to lock in a venue for the LSI-VC-21 meeting, 14-16 April 2027 and circulate an announcement to the mailing lists.	**October 2026**