15th Meeting of the CEOS Virtual Constellation for Land Surface Imaging (LSI-VC)

3-5 April 2024

Hosted by RESTEC / JAXA

Second Floor, Tokyu REIT Toranomon Bldg., 3-17-1 Toranomon, Minato-ku, Tokyo 105-0001

Meeting Objectives

Community Engagement

1. Hold a dedicated workshop with representatives from the Japanese commercial EO sector, including 'New Space' companies – both data providers and distributors (e.g., cloud platform operators). Act on the recommendations from the CEOS New Space Task Teams white paper, spread the word of CEOS-ARD, establish relationships and encourage CEOS-ARD self-assessments and other collaborations with LSI-VC. Explore opportunities to improve the discovery, access and utilisation of data, particularly CEOS-ARD, by Japanese users and cloud platforms.

Observation Requirements

2. Continue the discussion on a response to the ESA PolInSAR workshop recommendations. The recommendations cover requirements for multi-mission, multi-frequency SAR datasets over supersites, overall increased synergy of SAR satellite systems, and the need for new SAR research sites. Reflect on the information collated following LSI-VC-14 regarding the current state of CEOS Agency quad-pol/compact-pol data acquisitions and formulate a suggestion for consideration of CEOS Principals. Invite JAXA and Japanese SAR experts to attend and explore further responses to the recommendations.
3. Establish an understanding of the support needed from CEOS Agencies on the GEOGLAM Essential Agriculture Variables (EAVs) and refine the related input for the CEOS SIT-39 meeting (April 9-11). Discuss the specific role of LSI-VC in this process and agree a forward roadmap. Reflect on the results of the pilot efforts of USGS to assess unmet observation needs to create EAVs, and discuss the potential application of this process more broadly in the context of land surface imaging requirements.
4. Noting recent requests for support on EAVs, EBVs, and ECVs, it is time that LSI-VC re-examine its loose boundary of 'Level 2' products. If CEOS Principals agree that there is a role for CEOS in supporting higher level products such as these, LSI-VC will need to be the group to respond for land aspects. We need to have clarity on our own scope, what it is we can feasibly do, what agency representation we need, and how our efforts fit into a broad, coherent hierarchy – to avoid overlaps, duplication, and to promote interoperability and complementarity of products.
5. Advance an LSI-VC response to the Land Surface Temperature (LST) Climate Data Record (CDR) concerns highlighted by the CEOS-CGMS Working Group on Climate (WGClimate), as input to the Essential Climate Variable (ECV) Inventory gap analysis and WGClimate response to the GCOS Implementation Plan. This will include an update on the latest definitions of CDRs, and how the Surface Temperature PFS can be updated to reflect the needs of the climate community of surface temperature products.

6. LSI-VC Forests & Biomass Subgroup will lead a review of the CEOS AFOLU Roadmap and the development of the Actions Supplement. Gather additional input from LSI-VC to help shape the Action Supplement.
7. Hold strategic discussions on LSI-VC team membership and representation of thematic experts necessary to be able to respond to requests such as those from WGClimate, GEOGLAM, CEOS AFOLU Roadmap, etc. Shortlist of names of people we would like to see in LSI-VC.

Interoperability

8. Identify LSI-VC-related gaps in the CEOS Interoperability Framework Roadmap and brainstorm how these might be addressed and included in the next version of the CEOS Work Plan.
9. Review progress and clarify the next steps for the Surface Reflectance Quality, Equivalency and Consistency Project.

CEOS-ARD and Product Family Specification (PFS) Development

10. Review the updated CEOS-ARD Strategy 2024 (and industry engagement as a component of that) and refine the tasks and descriptions.
11. Discuss the proposal for a combined optical PFS, with matching metadata specification (as done for the Combined SAR PFS). Establish a clear understanding of the level of commonality between the different optical PFS and the opportunities for combination/harmonisation. Consider the common elements between the optical and SAR PFS, with a view to further harmonisation.
12. Review the latest on the CEOS-ARD STAC Extensions and address the specific questions and suggested PFS changes resulting from the development.
13. Agree a solution to the issues related to high resolution EO datasets and the 0.5 pixel rRMSE sub-pixel accuracy requirement of the Surface Reflectance PFS, and make a formal decision at LSI-VC-15 on the way forward. Discussions should consider the impact of this requirement on the applicability of CEOS-ARD to 'New Space' and industry generally; the core motivations for CEOS-ARD (stackable data, time series analyses); the stop-gap downsampling approach used by KARI and whether this is something that would be officially recommended to other VHR satellite operators; and the balance of scientific rigour versus inclusivity.
14. In the process of data providers undertaking CEOS-ARD self-assessments, various other feedback is received on the PFS parameters and requirements. We will use the meeting to take stock of the latest feedback / issues and discuss whether any additional adjustments are needed to the PFS.

CEOS-ARD Assessments

15. Review agencies' ongoing CEOS Analysis Ready Data (CEOS-ARD) self-assessments. Obtain progress reports from agencies, work through any issues, and aim to accelerate any pending CEOS-ARD self-assessments towards peer review.

CEOS-ARD Applications & Pilots

16. Discuss and agree actions for CEOS-ARD / LSI support to the CEOS Ecosystem Extent Task Team Demonstrators. Invite presentations from the leads of these Demonstrators. This has the potential to be a mutually beneficial relationship. The Demonstrators present a great opportunity to demonstrate the utility of CEOS-ARD, guide the development of new Specifications, and serve as an incentive for

agencies to undertake self-assessments for their data (i.e., real world use case and user feedback opportunity). For the EETT Demonstrators, CEOS-ARD will provide additional data in a form that is easier to use, facilitates interoperability, and can be used as a good starting point for the derivation of higher-level products.

17. Review the work taking place under the CEOS Analytics Lab, including trial commercial SAR CEOS-ARD assessments, plans for a 'New Space' ARD interoperability project, etc.

Other Topics

18. Exchange CEOS Agency updates related to land surface imaging. All agencies will be given an opportunity to present the latest activities in their agencies and raise any issues that would benefit from discussion and coordination.
19. Hear a brief update from JAXA on the Ramsar STRP (Ramsar Convention Science and Technology Review Panel, STRP) where JAXA is an observer organisation, with a focus on some discussions on data requirements that would be relevant to CEOS/LSI-VC.

Agenda

Wednesday April 3

Session 1: Welcome and Introductions *Session Lead / Moderator: Steve Labahn* *Objectives:* ● *Review and aim to close past open actions*		
10:00	**1.1**: Welcome [Slides] ● Opening remarks ● Review of meeting objectives, agenda ● Meeting protocols	LSI-VC Leads
10:15	**1.2**: LSI-VC-14 Action Review [Doc]	Matt Steventon
Session 2: CEOS Analysis Ready Data *Session Lead / Moderator: Matt Steventon* *Objectives:* ● *Review the updated CEOS-ARD Strategy 2024 and refine the tasks and descriptions.* ● *Review agencies' ongoing CEOS Analysis Ready Data (CEOS-ARD) self-assessments. Accelerate pending CEOS-ARD self-assessments towards peer review.* ● *Discuss the proposal for a combined optical PFS. Consider the common elements between the optical and SAR PFS, with a view to further harmonisation.* ● *Agree a solution to the issues related to high resolution EO datasets and the 0.5 pixel rRMSE sub-pixel accuracy requirement of the Surface Reflectance PFS, and make a formal decision at LSI-VC-15 on the way forward.* ● *Take stock of the latest PFS feedback / issues and discuss whether any additional adjustments are needed to the PFS.* ● *Exchange CEOS Agency updates related to land surface imaging.*		
10:30	**2.1**: CEOS-ARD updates and self-assessment reports ● CONAE (SAOCOM) ● CONAE Agency update ● JPL (OPERA) ● NRCan (RCM) ● ISRO (EOS-04)	D. Dadamia (virtual) L. Frulla (virtual) B. Chapman (virtual) F. Charbonneau (vrt) Hari Priya S. (virtual)
11:15 – Break (15 mins)		
11:30	**2.2:** CEOS-ARD Strategy 2024 and Scene Setting [Slides] ● Discussion: Refine tasks, descriptions, agree next steps	Matt Steventon

12:00	**2.3:** Product Family Specification Feedback and Updates – Discussion and Decisions [Slides] • SR PFS comments from the CHIME team (Ferran) • Review of GitHub issue tracker • 2.13 in SR / NLSR – Requirement "to be determined" • 'No Data' Definition • Spectral Bands & FWHM • Map projection (1.6) in ST PFS	Matt Steventon
13:00	**2.4:** Discussion: 0.5 pixel rRMSE accuracy [Slides]	Matt Steventon
13:30 – Lunch (60 mins)		
14:30	**2.5:** Combined Optical PFS Discussion [Slides] • GitHub thread • Decision: Proceed with a combined optical PFS?	Matt Steventon, Ake Rosenqvist
15:30	**2.6:** Agency Updates • USGS (Labahn) • CSIRO/ARD update (Z-S Zhou) • JAXA CEOS-ARD (Tadono) • ESA (Gascon)	
16:30 – Break (15 mins)		
Session 3: Data Discovery, Access, Utilisation, Interoperability *Session Lead / Moderator: Steve Labahn* *Objectives:* • *Identify LSI-VC-related gaps in the CEOS Interoperability Framework Roadmap and brainstorm how these might be addressed and included in the next version of the CEOS Work Plan* • *Review progress and clarify the next steps for the Surface Reflectance Quality, Equivalency and Consistency Project.* • *Review the latest on the CEOS-ARD STAC Extensions.* • *Consider a statement of recommendations / desires for CEOS to address regarding the search, discovery, access, use and exploitation of cloud-based CEOS-ARD.*		
16:45	**3.1:** CEOS-ARD Surface Reflectance Products: Quality, Consistency and Equivalence [Slides]	Medhavy Thankappan
17:15	**3.2:** CEOS-ARD STAC Extension Update [Slides]	Matthias Mohr
17:30	**3.3:** CEOS Interoperability Framework [Slides] • LSI-VC gaps in the CEOS Interoperability Framework	Nitant Dube

	• Contributions for the Interoperability Handbook	
18:00 – Adjourn		

Thursday April 4

Session 4: Land Surface Imaging Requirements [Slides] *Session Lead / Moderator: Steve Labahn* *Objectives:* • *Advance an LSI-VC response to the Land Surface Temperature (LST) Climate Data Record (CDR) concerns highlighted by the CEOS-CGMS Working Group on Climate (WGClimate), as input to the Essential Climate Variable (ECV) Inventory gap analysis and WGClimate response to the GCOS Implementation Plan.* • *Understanding the different types of CDRs and what is the most appropriate definition for adopting for CEOS-ARD.* • *Take stock of the existing Surface Temperature PFS and how this could be amended to reflect the concepts of LST CDRs.* • *Discuss and agree actions for CEOS-ARD / LSI support to the CEOS Ecosystem Extent Task Team Demonstrators.*		
10:00	**4.1:** Essential Climate Variables [Slides] • Land variables • Additional background and context for Session 5	Wenying Su
10:20	**4.2**: Land Surface Temperature Climate Data Records & GCOS Implementation Plan Response [Slides] • Understanding the different types of CDRs and what is the most appropriate definition for adopting for CEOS-ARD. • Take stock of the existing Surface Temperature PFS and how this could be amended to reflect the concepts of LST CDRs.	Darren Ghent
11:20	**4.3:** Ecosystem Extent Task Team Demonstrators Background docs: [Canada] [Australia] [Costa Rica] • CEOS-ARD support and feedback opportunity • Application of the Interoperability Framework as a test for multi-sensor, multi-modal measurements	Jason Duffe, Shaun Levick, Adriana Parra (TBC)
12:00 – Break (15 mins)		

12:15	**4.5:** Wetlands: JAXA update from the Ramsar Convention Scientific and Technical Review Panel (STRP)	Ake Rosenqvist
13:00 – Lunch (60 mins)		
Session 5: Beyond 'Level 2' [Slides] *Session Lead / Moderator: Matt Steventon & Steve Labahn* *Objectives:* ● *Noting recent requests for support on EAVs, EBVs, and ECVs, it is time that LSI-VC re-examine its loose boundary of 'Level 2' products. If CEOS Principals agree that there is a role for CEOS in supporting higher level products such as these, LSI-VC will need to be the group to respond for land aspects. We need to have clarity on our own scope, what it is we can feasibly do, what agency representation we need, and how our efforts fit into a broad, coherent hierarchy – to avoid overlaps, duplication, and to promote interoperability and complementarity of products.* ● *Discussion on LSI-VC team membership and representation of thematic experts necessary to be able to respond to requests such as those from WGClimate, GEOGLAM, CEOS AFOLU Roadmap, etc. Shortlist of names of people we would like to see in LSI-VC.* ● *Establish an understanding of the support needed from CEOS Agencies on the GEOGLAM Essential Agriculture Variables (EAVs) and refine the related input for the CEOS SIT-39 meeting (April 9-11).*		
14:00	**5.1:** Biodiversity Community Need for Derived (L3 & L4) Products [Slides] ● Ecosystem Extent Task Team Recommendation: CEOS agencies should support research and development of value-added biodiversity products and release the corresponding open source software. ● While agencies routinely produce Level 2 products such as surface reflectance, biodiversity users generally need higher level products--none of the EBVs or GBF indicators are Level 2 products, for example.	Gary Geller
14:15	**5.2:** GEOGLAM Essential Agricultural Variables [Slides] [Paper] ● Ambitions regarding CEOS Agency support ● Preview of pitch to SIT-39 ● Overview of relevant activities in Copernicus, WorldCereal, NASA Acres, NASA Harvest, etc.	Alyssa Whitcraft, Sven Gilliams
14:45	**5.3:** Product Hierarchies ● Strategies for efficiently addressing the EBVs, EAVs, ECVs ● Justification for why LSI-VC should act as a coordinator for these discussion	Peter Strobl

	• Avoiding duplication across agencies, ensuring interoperability and complementarity of products/tools • OGC Geospatial Reporting Indicators update?	
15:15	**5.4:** Discussion • On the scope/mandate of LSI-VC • Should LSI-VC seek to formally address higher level land product requirements that are being raised by partners • What role could LSI-VC feasibly play beyond Level 2 and what opportunities / risks exist?	All
15:45 – Break (15 mins)		
16:00	**5.4:** Discussion (cont.) • Does it make sense to position LSI-VC as a forum where agencies that have active LSI application R&D programs come together to coordinate their activities related to EAVs, EBVs, ECVs, etc.? • If we agree this is a role for LSI-VC, what do we need from CEOS Principals to do it? • What is the role of partnerships with the likes of GEOGLAM, SilvaCarbon, FAO, SEO – those that operate closer to the users. • What LSI-VC team membership, including representation of thematic experts, is necessary to be able to tackle these types of things?	All
17:00	**5.5:** Refining GEOGLAM input to SIT-39. Discussion: • Pilot for up to three of the most critical EAVs (Crop Type, Yield, Production) • Who is the customer and what is the end point for outputs • Confirming LSI-VC role, refining requests for CEOS Principals	Alyssa Whitcraft, Sven Gilliams
Session 6: ESA PolInSAR Follow-up *Session Lead / Moderator: Ake Rosenqvist* *Objectives:* • *Continue the discussion on a response to the ESA PolInSAR workshop recommendations. The recommendations cover requirements for multi-mission, multi-frequency SAR datasets over*		

supersites, overall increased synergy of SAR satellite systems, and the need for new SAR research sites. Reflect on the information collated following LSI-VC-14 regarding the current state of CEOS Agency quad-pol/compact-pol data acquisitions and formulate a suggestion for consideration of CEOS Principals. Invite JAXA and Japanese SAR experts to attend and explore further responses to the recommendations.		
17:20	**6.1**: ESA PolInSAR Workshop Recommendations Follow-up [Slides]	Ake Rosenqvist, Magdalena Fitrzyk, Francesco Sarti
18:00 – Adjourn		

Friday April 5

Session 7: Commercial Engagement Workshop		
See standalone agenda here.		
13:00 – Lunch (90 mins)		
Session 8: LSI Forests and Biomass Subgroup *Session Lead / Moderator: TBA* *Objectives:* ● *LSI-VC Forests & Biomass Subgroup will lead a review of the CEOS AFOLU Roadmap and the development of the Actions Supplement. Gather additional input from LSI-VC to help shape the Action Supplement.*		
14:30	**8.1:** CEOS AFOLU Roadmap and Actions Supplement	Stephen Ward
16:15 – Break (15 mins)		
Session 9: Closing *Session Lead / Moderator: TBA* *Objectives:* ● *TBA*		
16:30	**9.1:** Wrap up ● Action review ● SIT-39 plans and prep	

	• Upcoming meetings: SatSummit, IGARSS, IOCCG, SIT-39 • Discussion: ARD24 CEOS representation • LSI-VC-16 • Adjournment	
17:00 – Adjourn		