**Minutes v1.0**

**LSI-VC-9 Teleconference #4: GEOGLAM, Forests & Biomass, CEOS ARD Strategy, Loose Ends, Wrap-up**

Wednesday 13 May 2020

**Participants**

**ESA:** Ferran Gascon

**EC/JRC:** Zoltan Szantoi

**Forests & Biomass Subgroup:** Stephen Ward, George Dyke

**GA:** Adam Lewis, Andreia Siqueira, Medhavy Thankappan

**GEOGLAM Subgroup:** Ian Jarvis

**Labsphere:** Chris Durell, Brandon Russell

**JAXA:** Takeo Tadono, Ake Rosenqvist

**KARI:** Daehoon Yoo

**LAPAN:** Kustiyo, Danang

**LSI-VC Sec:** Matt Steventon (Chair)

**NOAA:** Kevin Gallo

**SEO:** Brian Killough

**UK Catapult for UKSA:** Electra Panagoulia

**USGS:** Steve Labahn, Jenn Lacey

**WGISS:** Robert Woodcock

*The presentation slides compiled for this meeting are attached in Appendix A.*

**Introduction**

* Matt Steventon (LSI-VC Secretariat, Chair) welcomed everyone to the meeting and summarised the key topics to be covered (slide 2).

**GEOGLAM Subgroup**

* Ian Jarvis (GEOGLAM Secretariat) presented on GEOGLAM (slides 3-9). He noted that the Essential Agriculture Variables (EAVs) are a key way forward for GEOGLAM support to multiple policy drivers. GEOGLAM sees itself as a link between space agencies and decision makers, with EAVs as the connection. EAVs are fundamental driving data needs and therefore have implications on ARD and CARD4L. EAVs can be a step towards understanding integrated requirements across many policy drivers.
* Adam Lewis (GA, LSI-VC Co-Lead) asked how LSI-VC can connect with the infrastructure group of GEOGLAM. Ian noted they are meeting for the first time shortly. He would be happy to make the connection if desired.

**Forests & Biomass Subgroup**

* Stephen Ward (Forests & Biomass Subgroup Secretariat) presented on the Forests & Biomass Subgroup’s activities: the Biomass Workshop, CEOS Biomass Protocol, AFOLU Roadmap, and the team’s Work Plan (slides 10-15).
* Ian Jarvis (GEOGLAM Secretariat) commented on the AFOLU Roadmap and the potential for GEOGLAM to contribute to the Agriculture part. He noted that there are existing crop masks of varying quality. In the near future the World Cover and World Cereal products (ESA funded activities) are expected to be released. The EAVs will also include a “State Change of Agricultural Land Use” parameter, which would be useful. Looking at change over time is a clear overlap between the AFOLU Roadmap and the EAVs.
* Adam Lewis (GA, LSI-VC Co-Lead) asked about the links between GFOI and SEPAL. SEPAL has been developed by FAO over the years as a part of OpenForis, funded by Norway and running in Google Earth Engine. It is intended to simplify uptake of EO data for countries that FAO works with on forestry applications. It is promoted in the GFOI Tools Registry and is endorsed to be compliant with the GFOI Methods and Guidance Documentation (MGD).

**CEOS ARD Strategy Stocktake**

* Matt Steventon (LSI-VC Secretariat) reviewed progress against each of the main tasks in the CEOS ARD Strategy (slides 16-25).
* There may be a question for future discussion around potential CEOS engagement with Big Data providers on hosting and uptake of CEOS ARD products.
* Adam Lewis (GA, LSI-VC Co-Lead) shared a link to the most recent draft of the [CEOS Analysis Ready Data – Involving the Private Sector](https://docs.google.com/document/d/1oFlC9FgfKpojAKpuAg76EEnKFShlWfzkb1hg-88u6ro/edit) paper.
* Adam suggested it would be useful to trace the links from ARD to the Essential Agricultural Variables.
* Steve Labahn (USGS, LSI-VC Co-Lead) noted that the ARD provided to VNSC’s Mekong Data Cube was from Collection 1 (a pre-CARD4L-compliant form) and so an update may be needed.
* Brian Killough (NASA, SEO) has been speaking with Google about setting up an ODC instance on Google Cloud, leveraging the datasets they hold there.
* Steve suggested identifying a clear primary owner of each of the CEOS ARD Strategy items.

**CEOS Interoperability Terminology**

* Steve Labahn (USGS, LSI-VC Co-Lead) and Robert Woodcock (CSIRO, WGISS Chair) presented on the CEOS Interoperability Terminology Report (slides 26-29). In late 2019, a multi-disciplined team led by WGISS and including LSI-VC and WGCV IVOS was formed to address the broader interoperability related terminology challenge, building on past work completed in LSI-VC.
* WGISS plans to begin circulating the latest draft report through its team along with the most interested/engaged parties (LSI-VC, WGCV, IVOS, SIT Chair Team)
* Another recommendation is to pursue a few follow-on pilot activities (CEOS-COAST, Landsat/Sentinel-2 HLS/Sen2Like, DEAfrica, others?) to test each of the types/items in the report.
* Robert noted a related development from the WGISS-49 meeting – a proposal from himself and Brian Killough (NASA, SEO) regarding the establishment of a CEOS Earth Analytics Interoperability Lab. WGISS was approached by a number of CEOS entities about a variety of types of interoperability discussed in the report (from CARD4L through interoperability and analysis) and have proposed the Lab as a means to address the challenges related to executing these activities (i.e., eliminating the need to rely on *ad hoc* solutions from a collection of different agency resources). The SEO will host the Lab as an extension of the CEOS Open Data Cube Facility. It will provide a sandbox for these different projects and prototyping.
* Matt Steventon (LSI-VC Secretariat) forwarded the proposal to the LSI-VC mailing list for information following the call.

**CARD4L Supply, User Access, User Experiences and DEAfrica**

* Adam Lewis (GA, LSI-VC Co-Lead) presented on CARD4L supply and access, and user experiences (slides 30-32) and on some potential CARD4L pilot ideas (slide 33). Pilots could be explored through UNCCD / GEO LDN, WGDisasters (GEO-LEO-SAR Flood Pilot), and CEOS-COAST.
* There is little structured feedback on CARD4L because we have not yet asked in a structured way. The Copernicus Sentinel Data Access Annual Report is one exception. In 2018 the report noted that: *“Due to the ramp up of (Sentinel-2) L2A production over the year, there has been an even larger increase in the Archive Exploitation Ratio”*. This indicates a user-preference toward analysis-ready data rather than lower levels of processing. The widespread interest in analysis-ready data from across communities indicates that this is an important concept.
* Informal discussions with users working with forests (FAO SEPAL) have highlighted a desire for BRDF corrections in ARD.
* Adam again highlighted the case of Digital Earth Africa, noting that reliable, systematic supplies of CEOS ARD are vital if Earth Observation is to have impact. Digital Earth Africa will use various CEOS ARD datasets. Continental scale is key.
* Chris Durell (Labsphere) noted that the PACE team is creating a Center of Excellence for coastal observations at Wallops Island. Susanne Craig at NASA GSFC is the POC. Steve Labahn (USGS, LSI-VC Co-Lead) will check whether this is already connected to CEOS-COAST. CEOS-COAST presents a really good prospect for a CEOS ARD pilot across multiple domains (land, coastal).

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| **LSI-VC-9-14** | Andreia to follow up UNCCD contacts (including Neil Sims, CSIRO / SDG-AHT) regarding their possible engagement with CEOS ARD (pilot or otherwise). | **ASAP** |
| **LSI-VC-9-15** | Steve Labahn to check whether the PACE Center of Excellence is connected to CEOS-COAST. | **ASAP** |

**WGCapD Collaboration**

* Zoltan Szantoi (EC/JRC, LSI-VC Co-Lead) presented on the CEOS Working Group on Capacity Building and Data Democracy (WGCapD) and potential collaborations for the purpose of CARD4L outreach and education (slides 39-43).
* Robert Woodcock (CSIRO, WGISS Chair) noted that WGISS has spoken to WGCapD about developing Jupyter Notebook training materials on using CEOS ARD and FDA infrastructure to access and analyse data. These could be developed and used as part of the CEOS Interoperability Lab and also assist CEOS project teams in various aspects of the technologies involved.
* Zolti asked whether WGCapD could support pilots of CEOS ARD. Feedback based on WGCapD experience would be welcomed. Also, as we are looking for future target products, feedback from the groups that WGCapD works with regarding user needs/demand would be helpful.
* Brian Killough (NASA, SEO) noted that WGCapD will not produce materials for us. They can help with advertisement of capacity building opportunities through their networks and provide lessons learned regarding how to run capacity building activities, etc. LSI-VC would need to take the initial steps, develop webinars, etc.
* It was suggested that WGCapD could simply advertise / direct users towards CARD4L in their existing activities. This promotion doesn’t necessarily need any large investment or new materials.
* We would need to check whether WGCapD could support our industry outreach goals.
* Steve Labahn (USGS, LSI-VC Co-Lead) suggested that LSI-VC needs to finalise its own outreach activities before extending to the WGCapD network. It was agreed that we should re-use the introductory parts of the CEOS-Industry ARD Webinar (explanation of the CARD4L Framework, how things work, stocktake, assessment pipeline, etc.). Once we have this material we can enlist the help of WGCapD for its use and promotion. This can also be used as a general webinar ahead of the CEOS-Industry ARD Webinar, if there is time.

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| **LSI-VC-9-16** | Matt to spin off from the CEOS-Industry ARD Webinar materials a more general set of slides to serve as a general introduction to ARD, which can be used for a general webinar ahead of the CEOS-Industry ARD Webinar (if there is time) as well as for engagement with the WGCapD network. | **ASAP** |

**Wrap-up**

Review of Actions and Decisions

* Matt Steventon (LSI-VC Secretariat, Chair) presented a recap of the actions and decisions recorded so far (slides 45-53). Only changes and extra actions are recorded below.

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| **LSI-VC-9-17** | LSI-VC Leads to engage Planet on ARD20. Steve Labahn to do the same for JACIE. The objective is to have CEOS ARD well represented in any upcoming meetings – preferably through specific sessions and having LSI-VC representatives chairing discussions. | **ASAP** |

* It would be helpful if the SIT Chair Team coordinated a joint teleconference in response to **LSI-VC-9-02**.
* Robert Woodcock (CSIRO, WGISS Chair) shared some slides from WGISS-49 on cloud optimized data formats [here](http://ceos.org/document_management/Working_Groups/WGISS/Meetings/WGISS-49/2.%20Wednesday%20April%2022/20200422T1330_Cloud%20Optimized%20Data%20Formats_.pdf).
* **LSI-VC-9-12** was agreed to be complete. **LSI-VC-9-17** (below) was recorded in response.

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| **LSI-VC-9-18** | Steve Labahn to share lessons learned and user feedback from the Landsat Collection 2 implementation on AWS. | **July LSI-VC Team Call** |

Revisiting Some Decisions and Discussions

*Standardisation*

* The following decision was agreed regarding the standardisation of CARD4L:

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| **DECISION 03** | A best practices (or similar) document through OGC could be a good middle ground. The possibility of this will be explored via our existing involvement in OGC Testbed-16.  The standards process is a big investment, and it isn’t clear it will definitely help us achieve our goal with CARD4L (uptake and impact).  Standards don't necessarily keep pace with current innovation rates.  “Pseudo-standards” which fill a gap are just as valued and used (e.g., the WGCV Protocols). |

* Ake Rosenqvist (JAXA) confirmed that the SAR PFS team has no desire to pursue a formal standardisation process either. They do however wish to ensure consistent terminology wherever possible.

*Expanding the CARD4L Framework*

* Matt Steventon (LSI-VC Secretariat, Chair) raised again the question of whether we need to consider adding ‘Advisory Notes’ as a fourth component of the CARD4L Framework to address data policy, data formats, interoperability, etc.
* Adam Lewis (GA, LSI-VC Co-Lead) presented some background on the origin of this question (feedback received in response to the *CEOS ARD – Involving the Private Sector* paper that questioned whether the omission of these topics in the PFS undermines the goal of CARD4L) and reviewed the current CARD4L Framework (slides 58-63).
* Adam noted that the ocean and atmosphere communities perhaps have more focus on some of these other aspects.
* The IT innovators are evolving standards for data formats and catalogues (COG, STAC, etc.).
* Adam noted that the SAR PFS team has already introduced metadata format specifications to suggest how data could be formatted.
* Steve Labahn (USGS, LSI-VC Co-Lead) noted that he has heard similar feedback through WGCV IVOS and WGISS. He believes these aspects need to be included in the CARD4L Framework somehow.
* Robert Woodcock (CSIRO, WGISS Chair) noted that some of these types of guidance materials are expected to come out of a 2019-2021 CEOS Work Plan Task assigned to WGISS (FDA-8). This action is being rewritten for the next CEOS Work Plan to make it more manageable. Adam noted the need for the SIT Chair to work out how to tie this work to CEOS ARD under the CEOS ARD Strategy and CARD4L Framework.

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| **DECISION 04** | LSI-VC will seek to add ‘Advisory Notes’ as a fourth component of the CARD4L Framework to address issues like data policy, data formats, interoperability, etc. | |
| **LSI-VC-9-19** | Adam Lewis and the LSI-VC Leads to work with Rob Woodcock and the SIT Chair Team to consider how to tie the work of WGISS on guidance materials related to data policy, data formats, interoperability, etc. to CEOS ARD under the CEOS ARD Strategy and CARD4L Framework.  **Context:** These documents are seen as a possible existing way to address the feedback that we need to consider adding ‘Advisory Notes’ as a fourth component of the CARD4L Framework to address data policy, data formats, interoperability, etc. Other new documents could also be used if these WGISS documents are found to be unsuitable. | **ASAP** |

* Ake Rosenqvist (JAXA) suggested that some of these aspects could be integrated easily enough, noting the example of metadata formats incorporated in the SAR CARD4L PFS. He cautioned against being too prescriptive on things like data format, as this risks limiting the appeal of the specifications. Adam agreed, highlighting that these are expected to be advisory notes only, not prescriptive requirements.
* Steve suggested that the use of these best practices / guides / advisory notes would move products along the interoperability spectrum.

*Accommodating Lower and Higher Resolution Datasets under the Existing PFS*

* Matt Steventon (LSI-VC Secretariat, Chair) noted that there is a need to revisit the specifications in regard to accommodating lower and higher resolution datasets. The LSI-VC Leads don’t see this being a major departure from what has been established, rather a small tweak to what we already have. The PFS have, to date, been resolution agnostic and we wouldn’t wish to move away from that approach.

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| **DECISION 05** | LSI-VC will review the suitability of the PFS for lower and higher resolution datasets ahead of the 2021 PFS revision cycle and work to make any adjustments needed to accommodate these types of data. | |
| **LSI-VC-9-20** | Andreia to lead the review and revision of the PFS in the 2021 revision cycle to accommodate lower and higher resolution datasets. | **2021 PFS Revision Cycle** |

* This would be a good topic for our industry engagement activities, given they generally operate higher resolution missions.

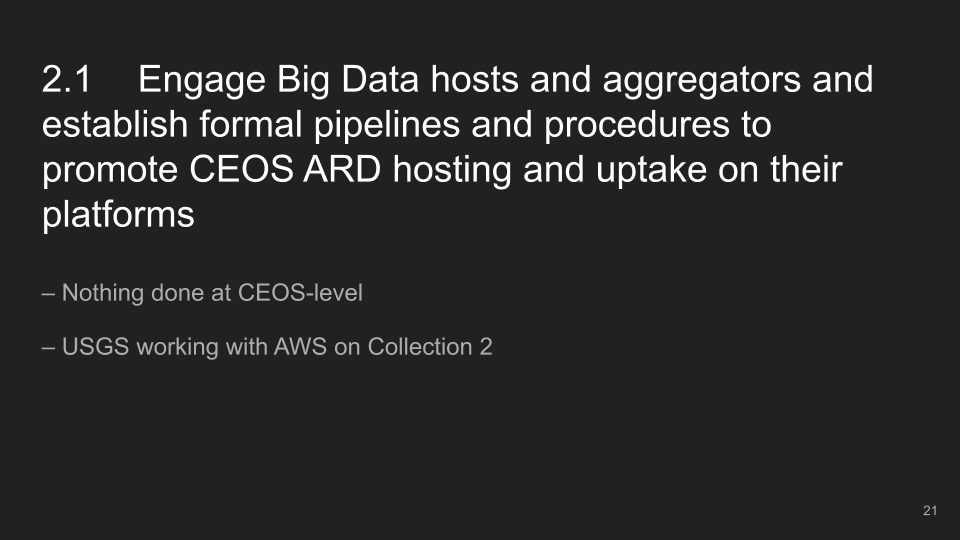
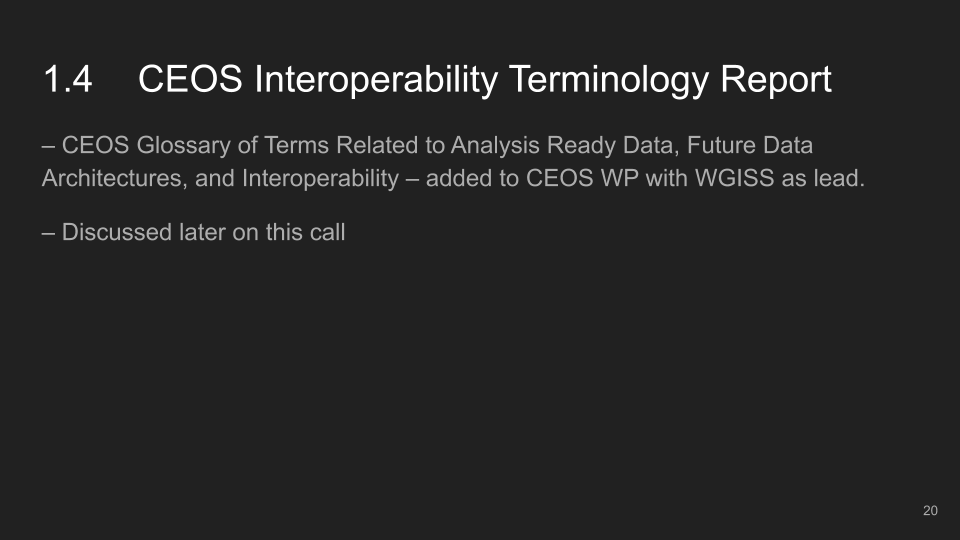
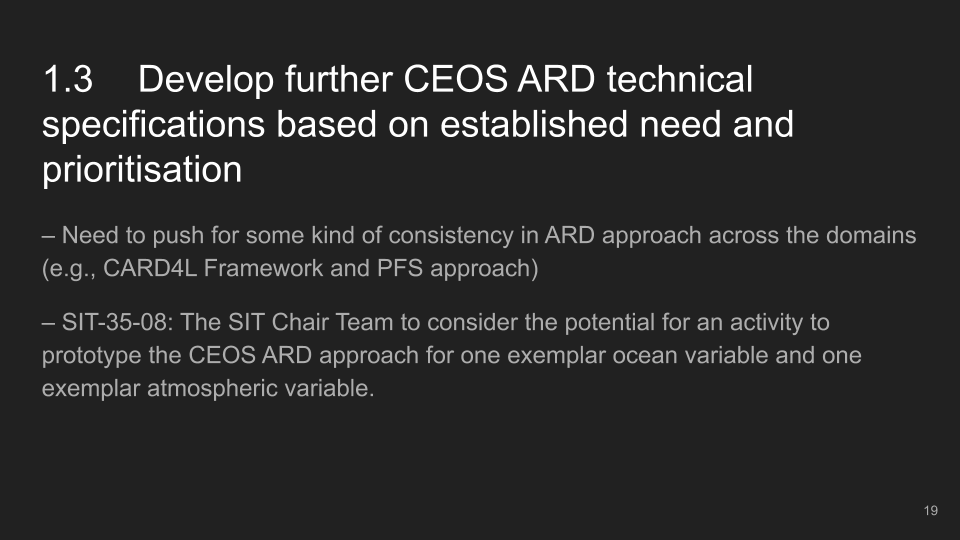
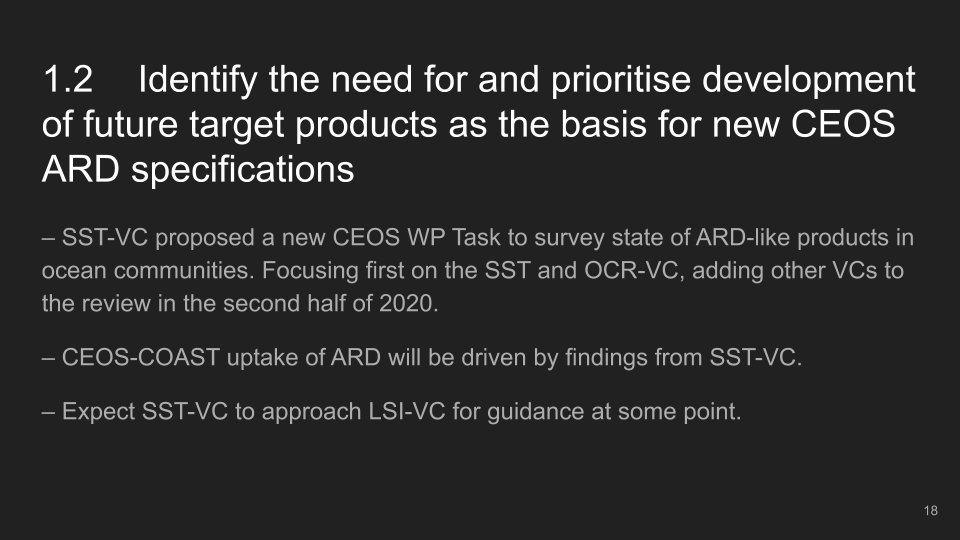
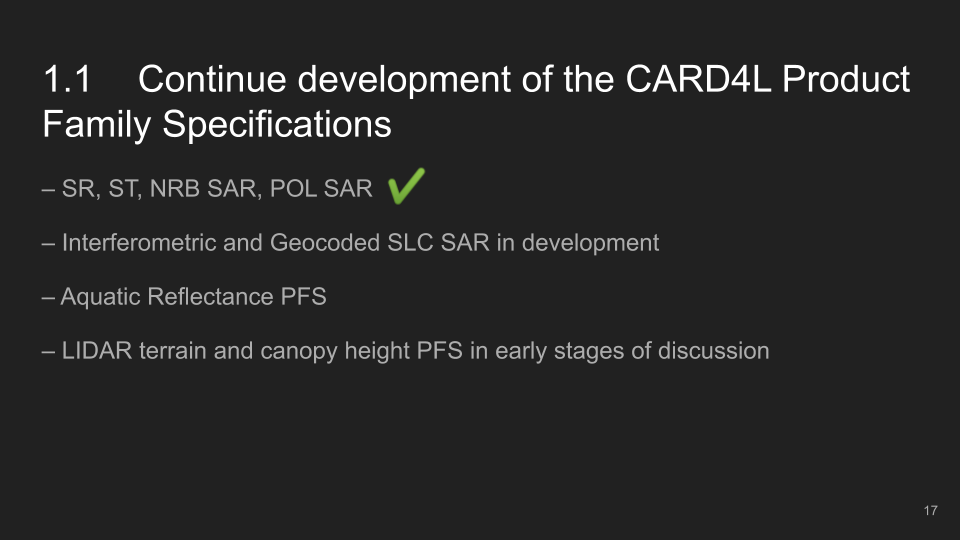
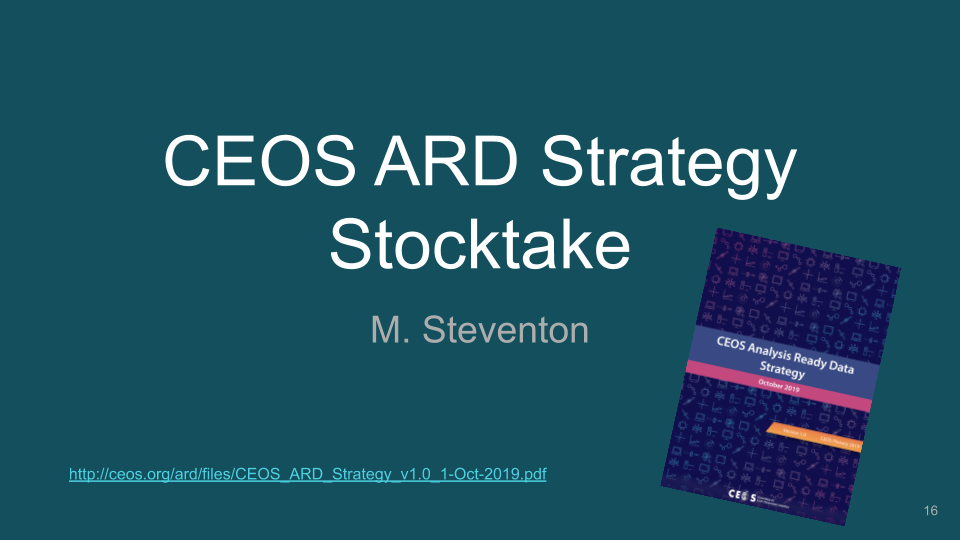
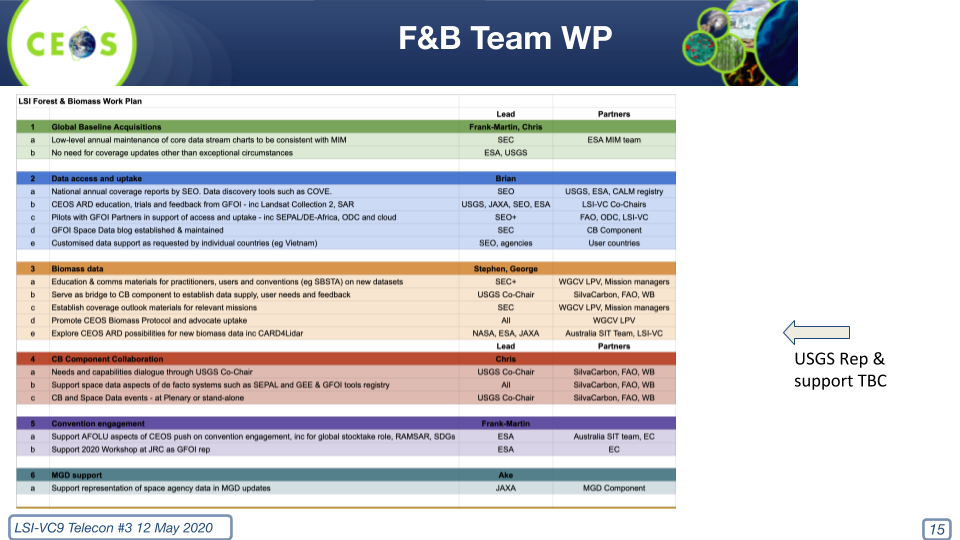
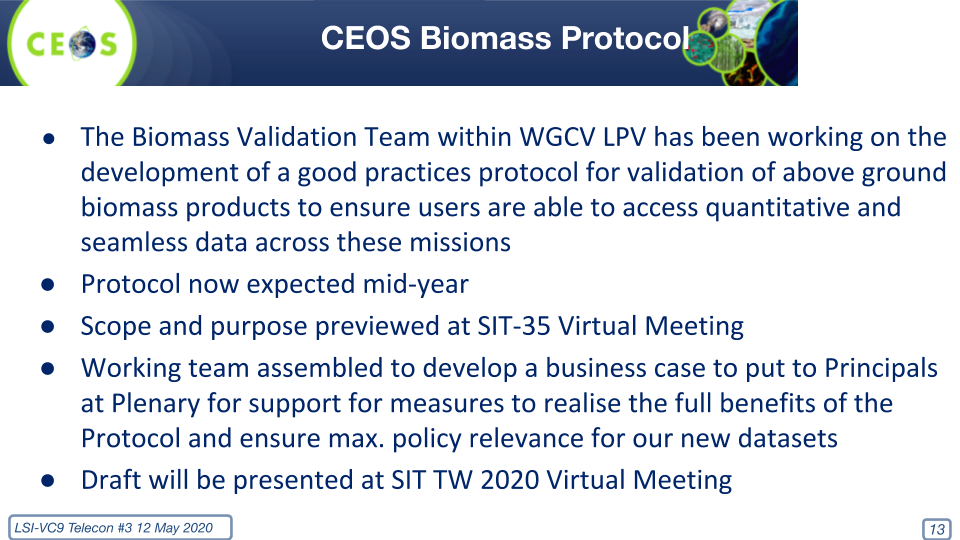
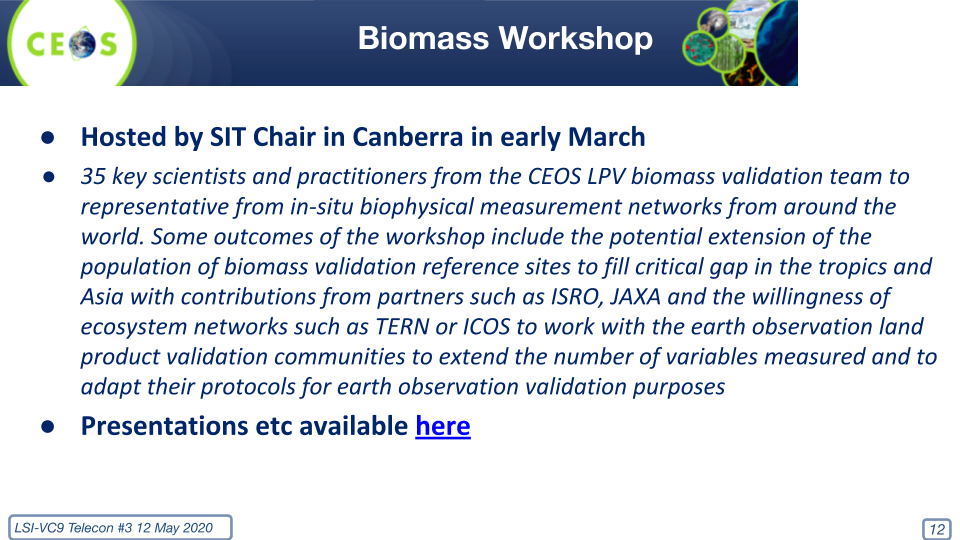
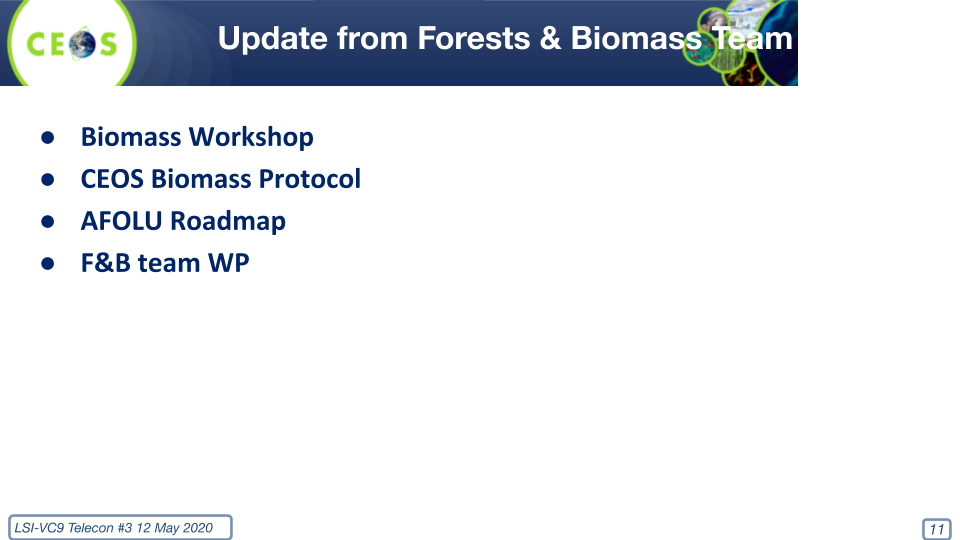
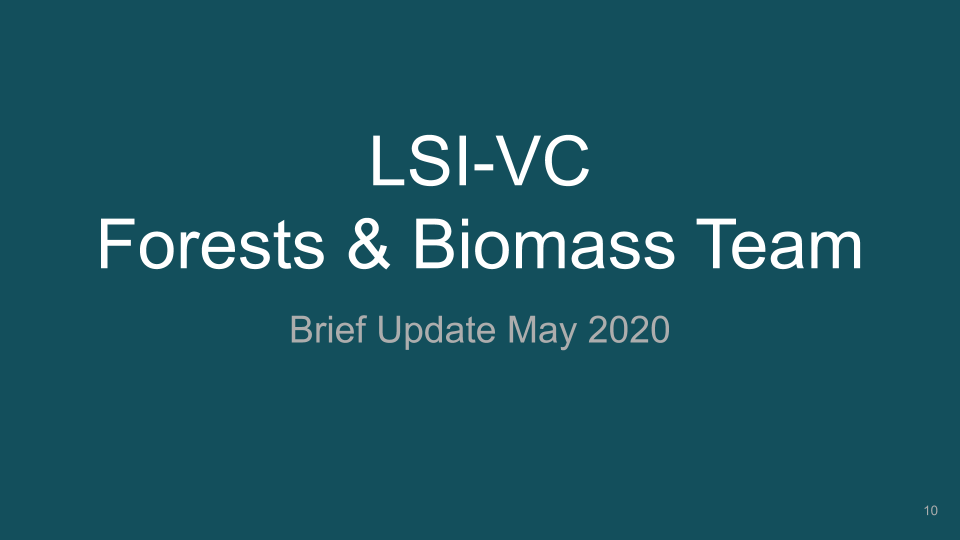
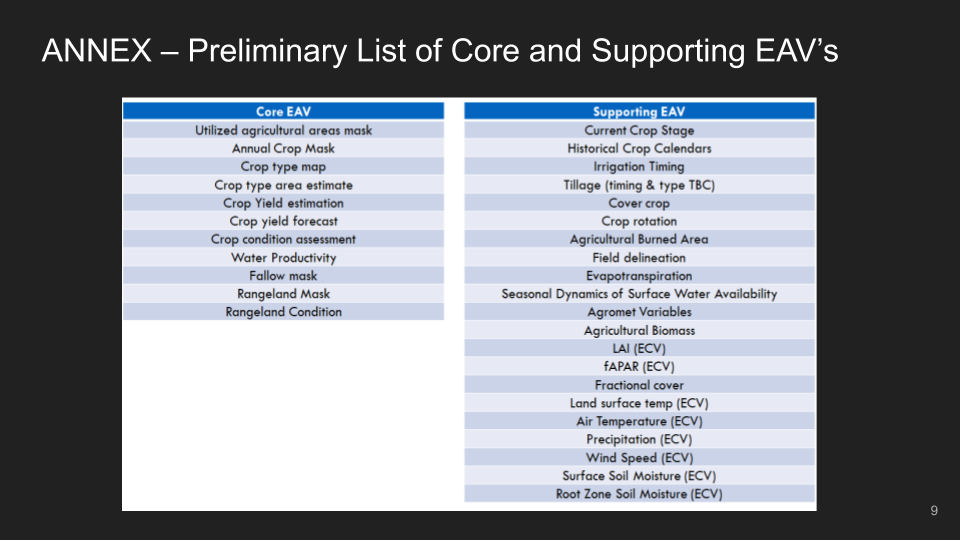
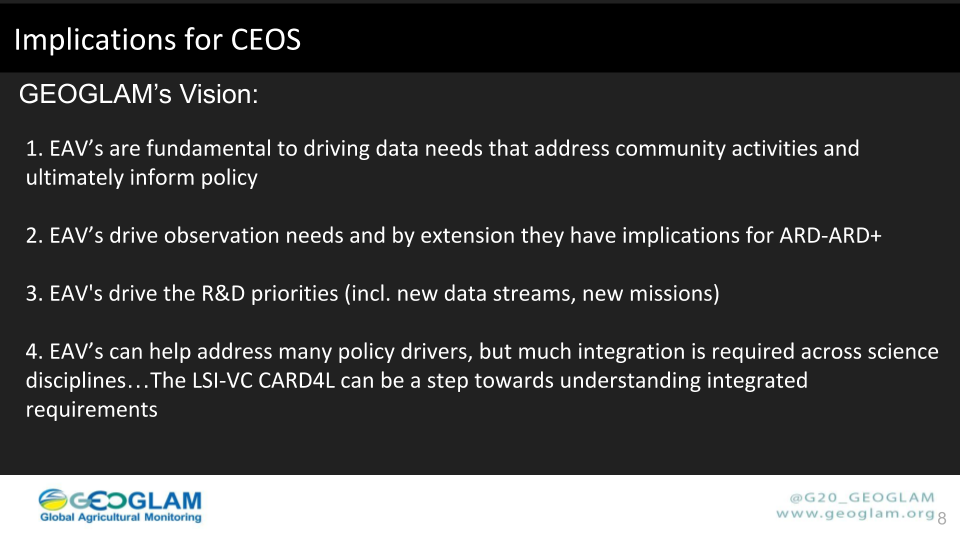
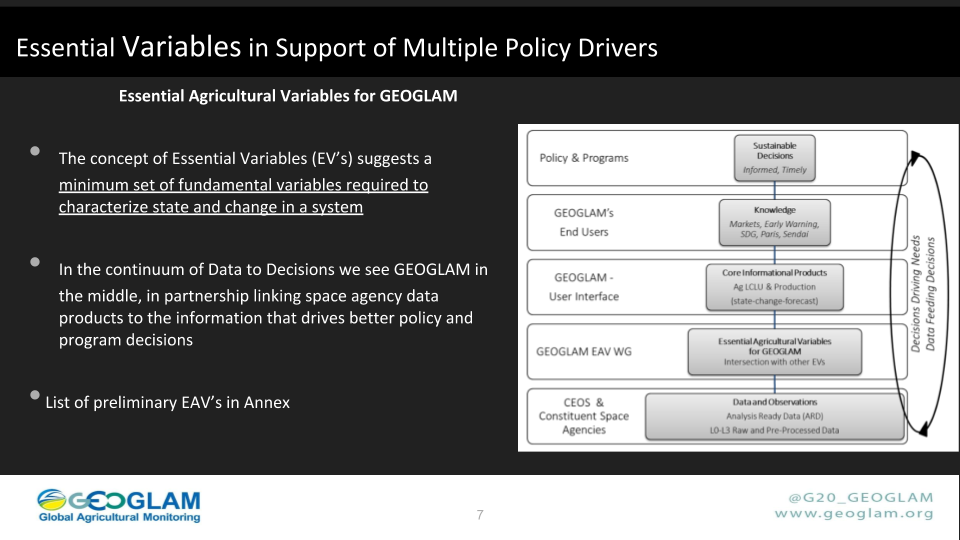
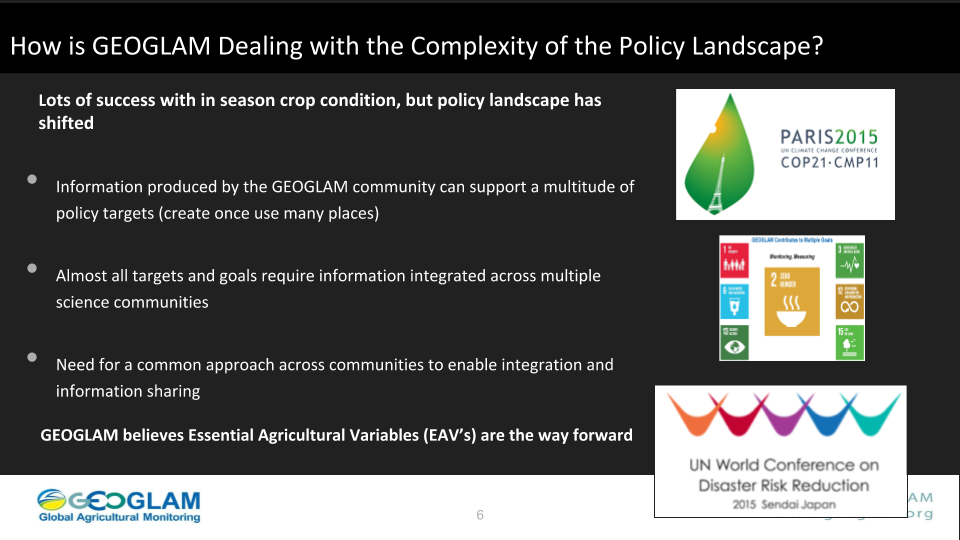
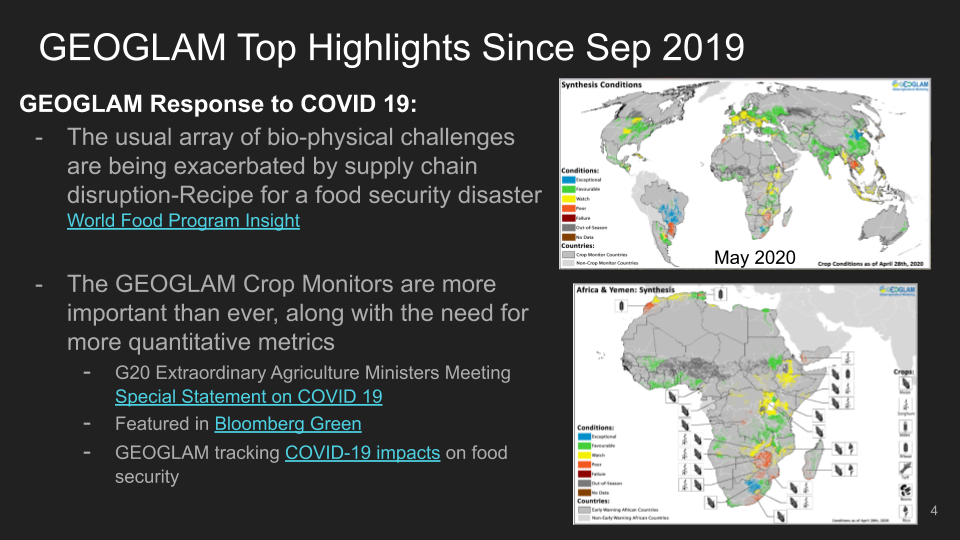
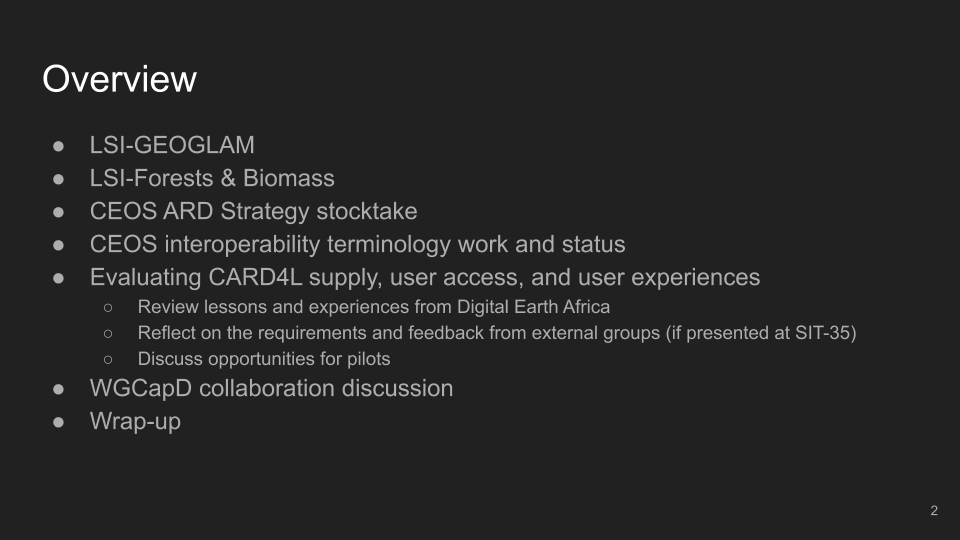
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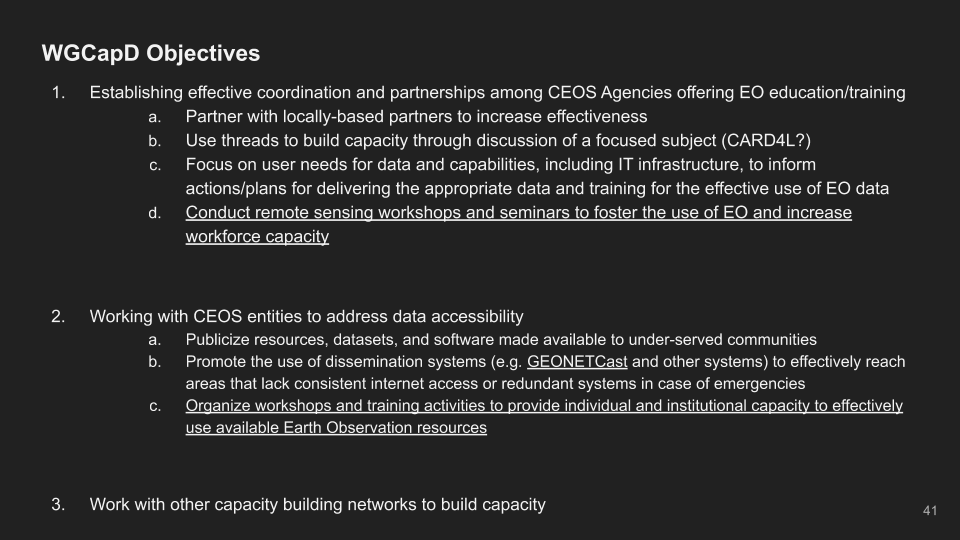
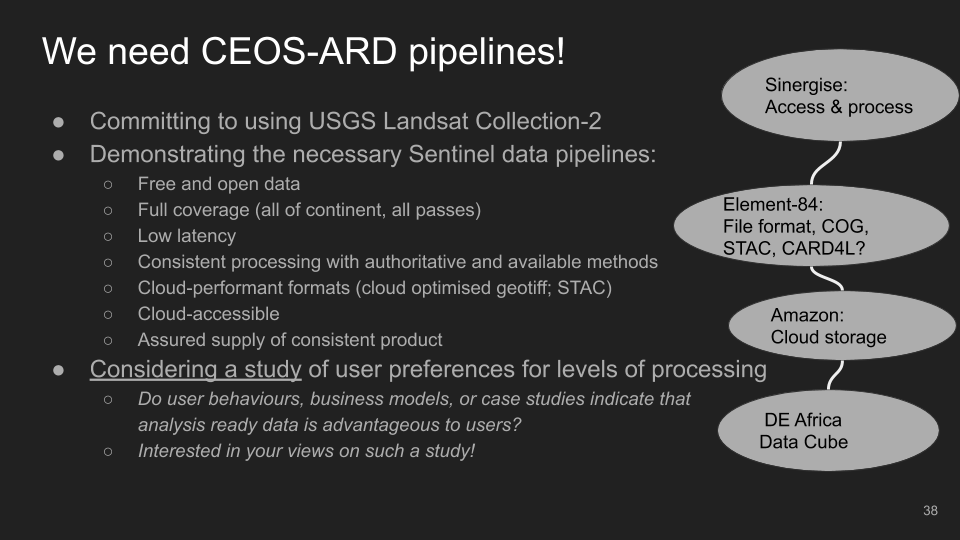
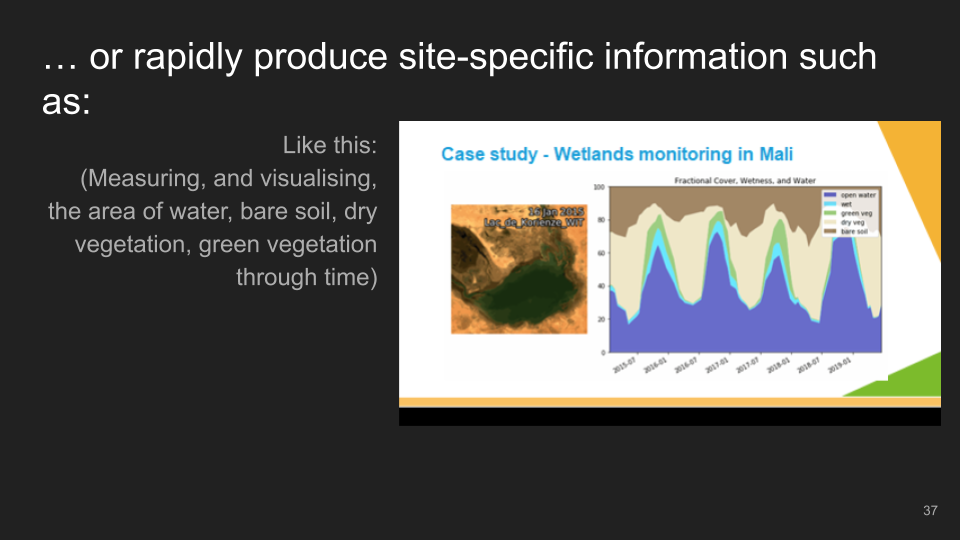
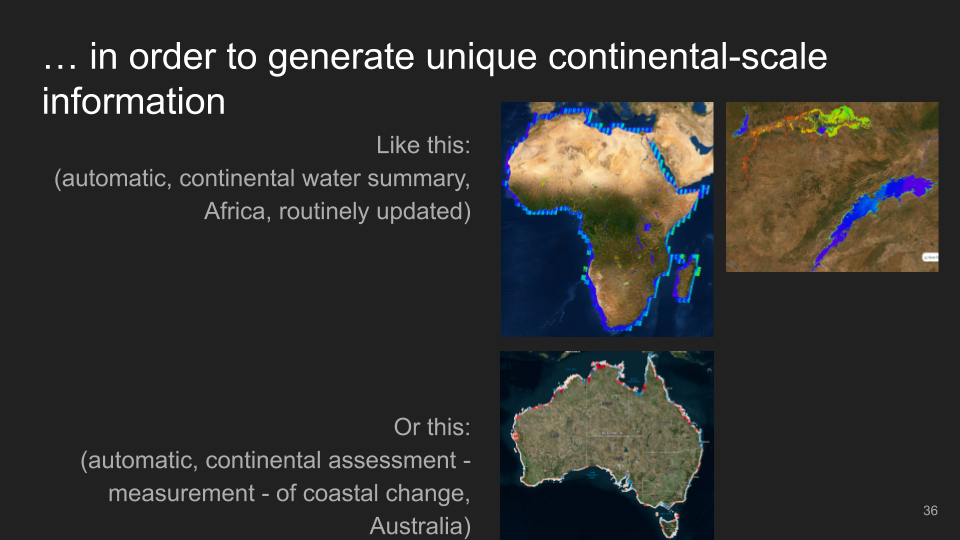
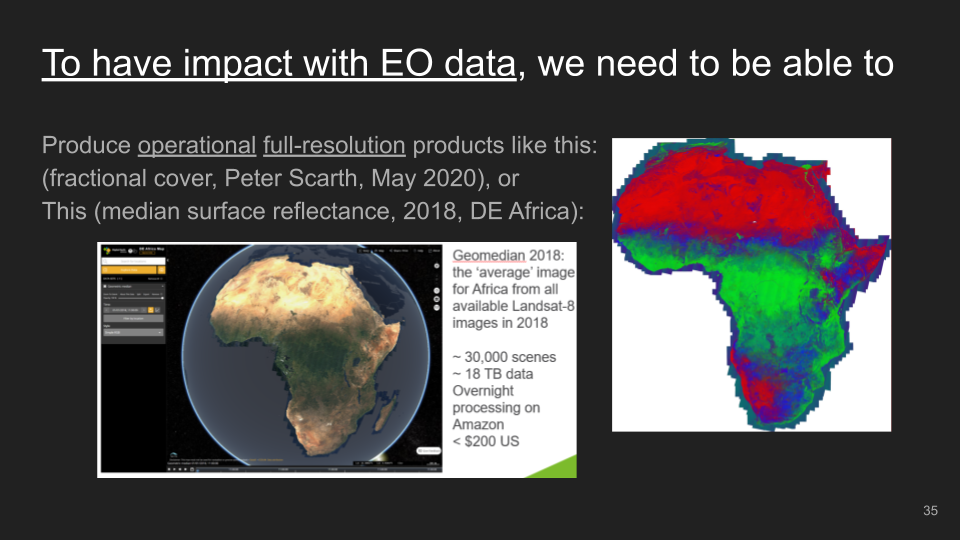
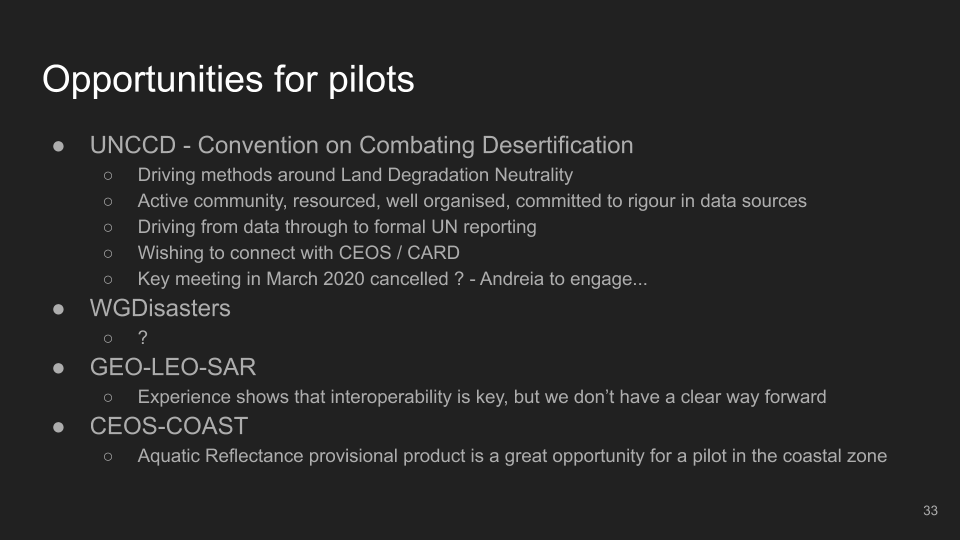
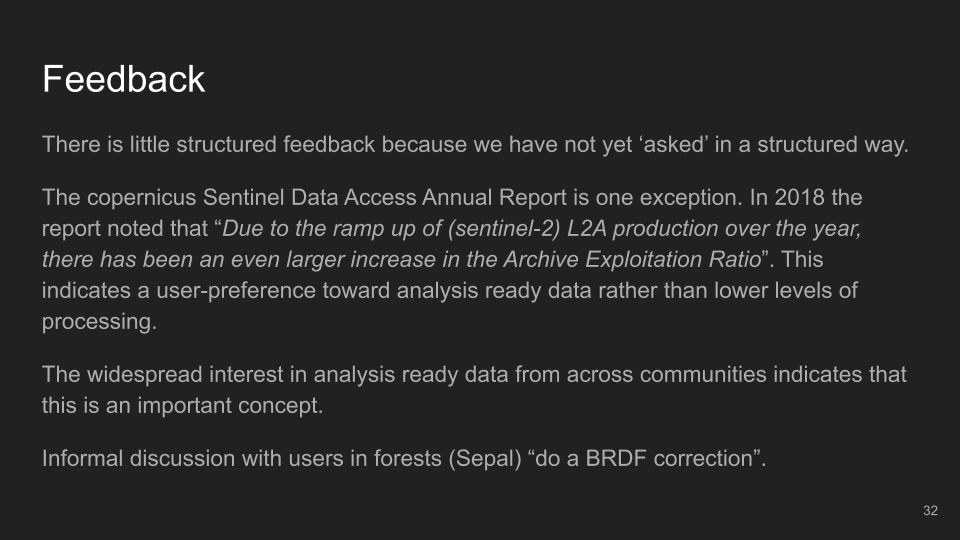
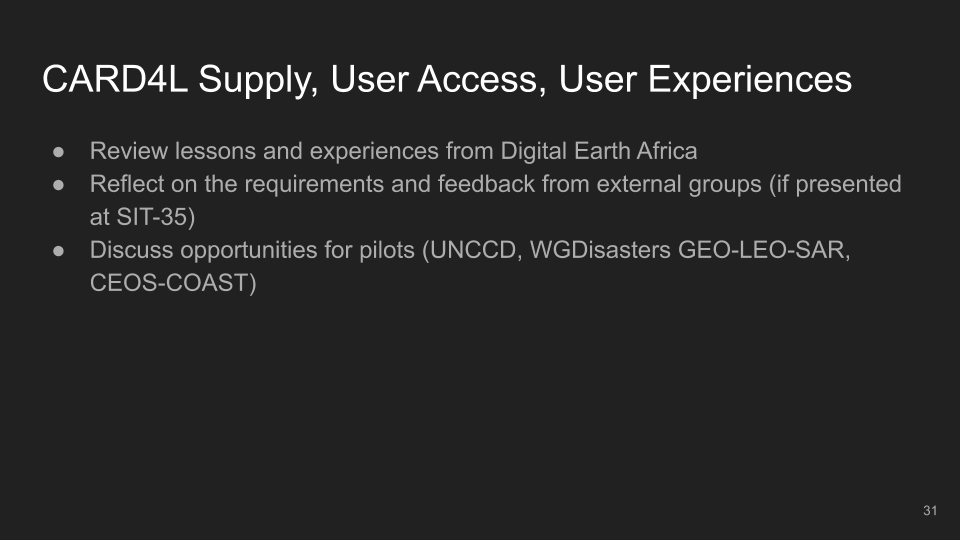
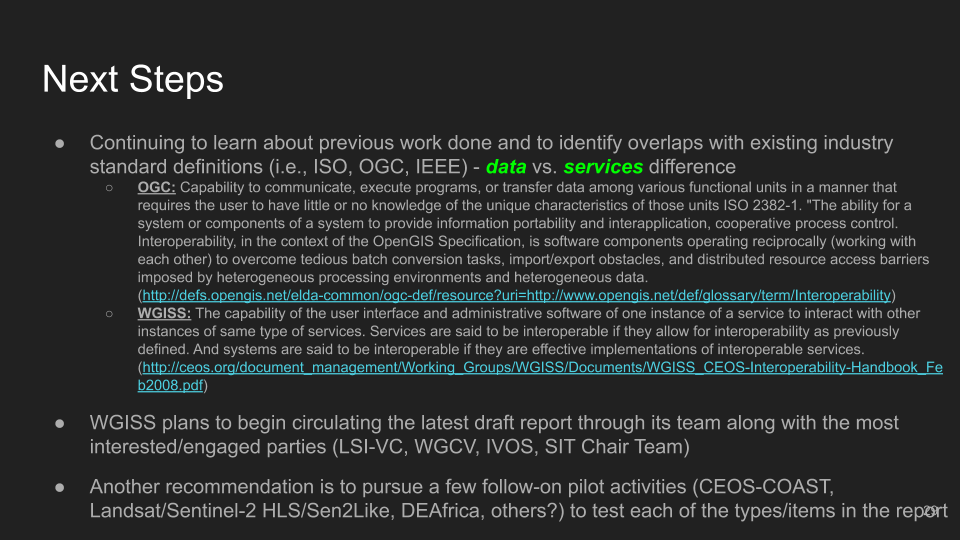
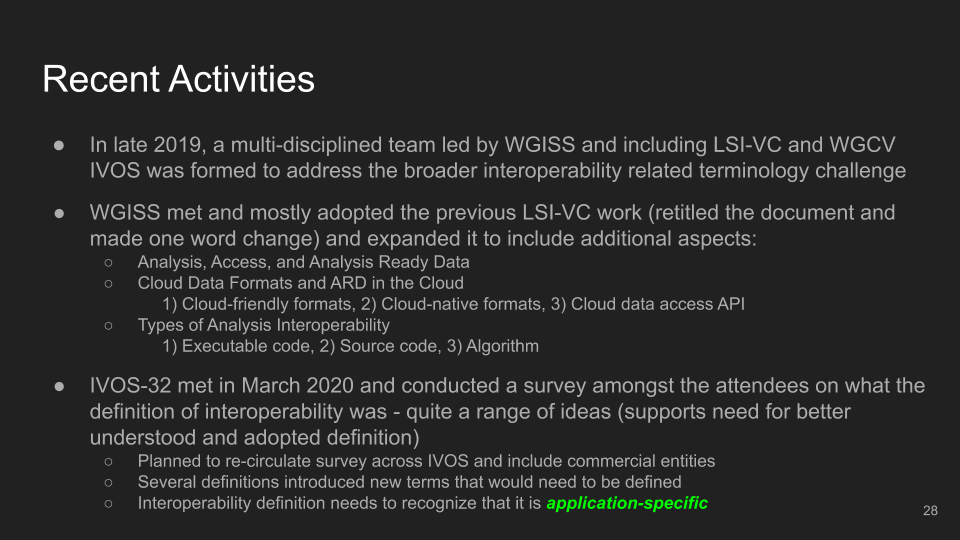
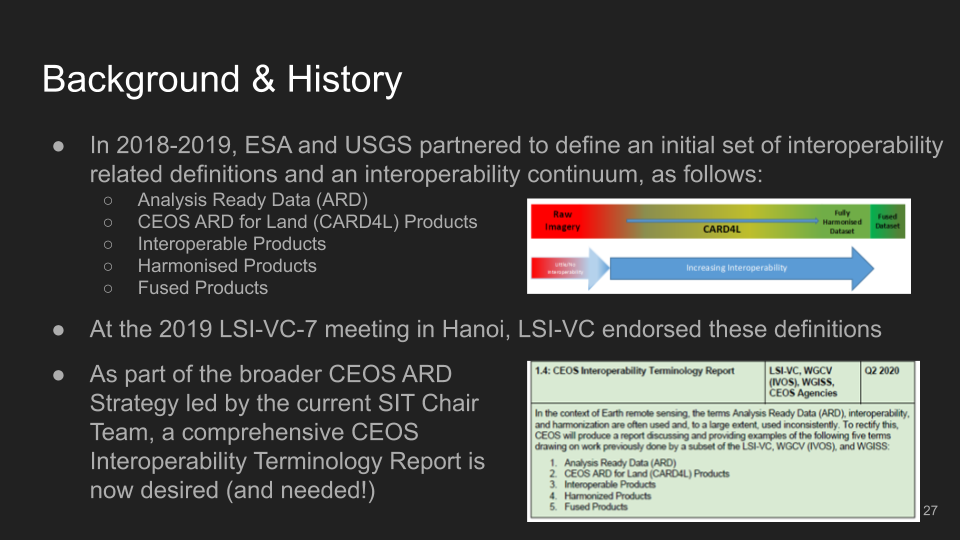
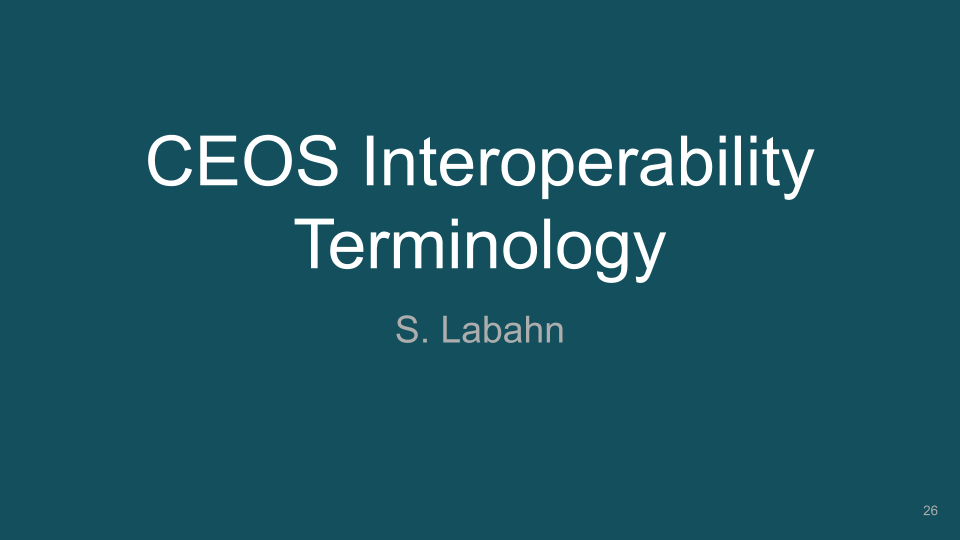
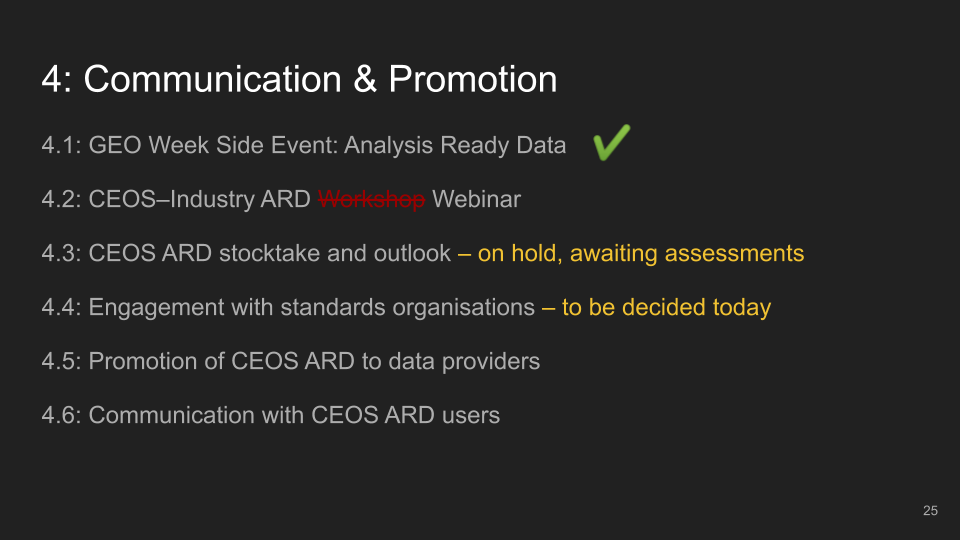
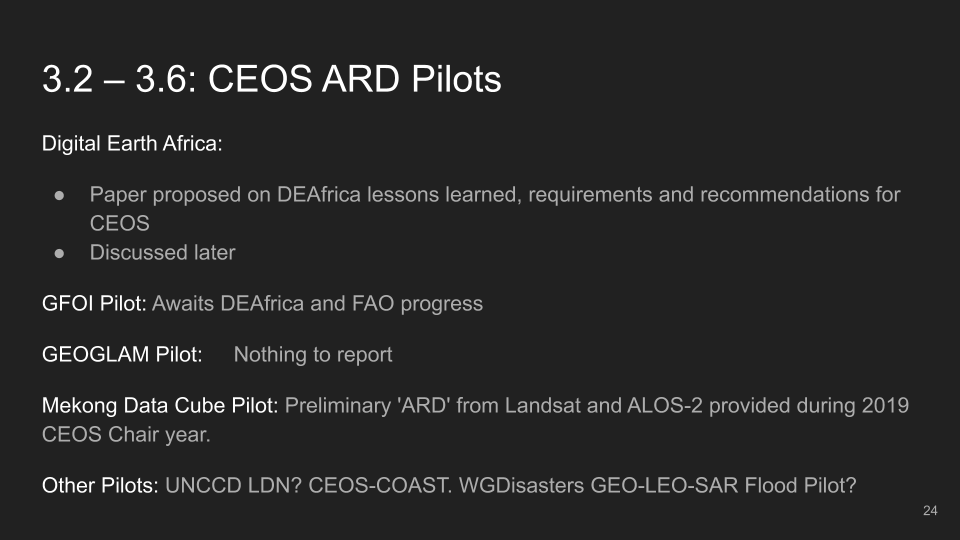
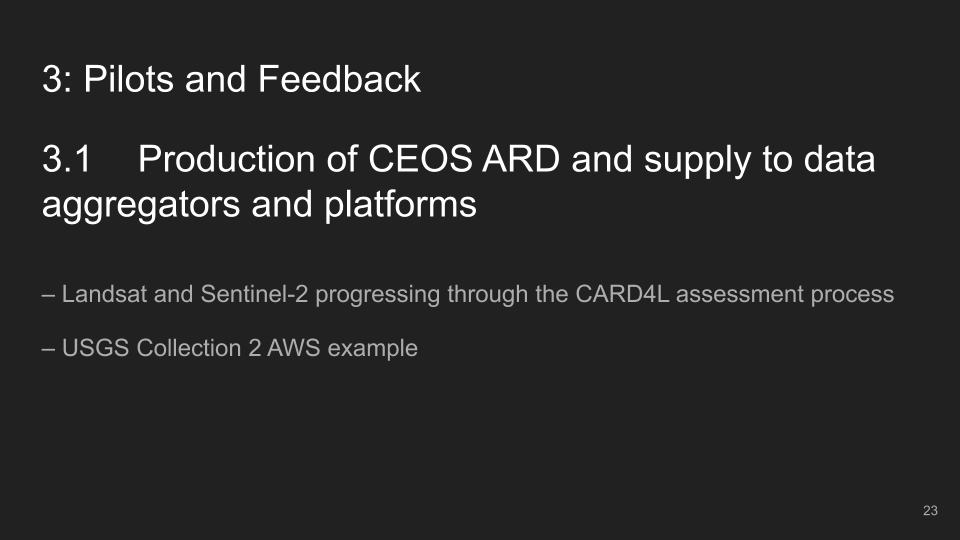
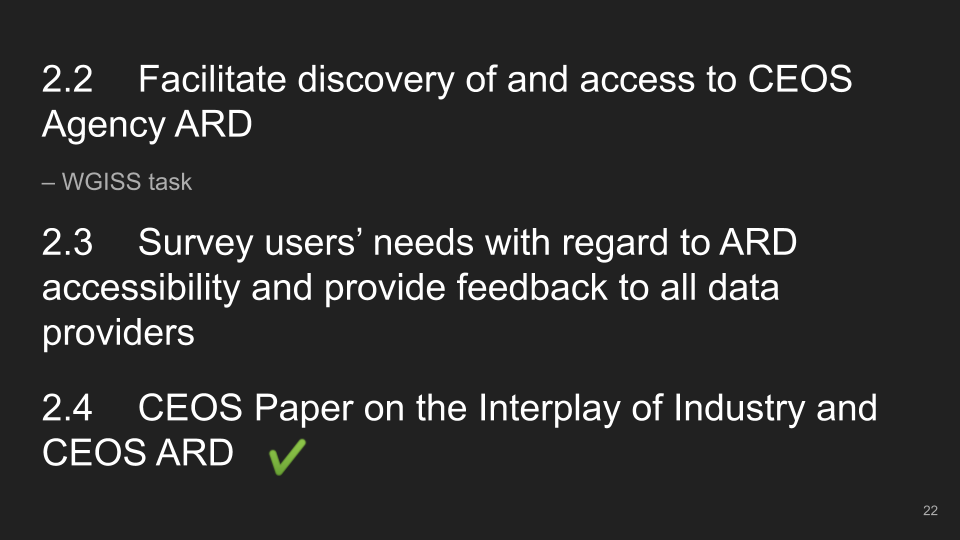
* Ake Rosenqvist (JAXA) asked about the possibility of changing the cut-off date for updates to the PFS to March instead of December, perhaps two weeks before the first LSI-VC meeting of the year.

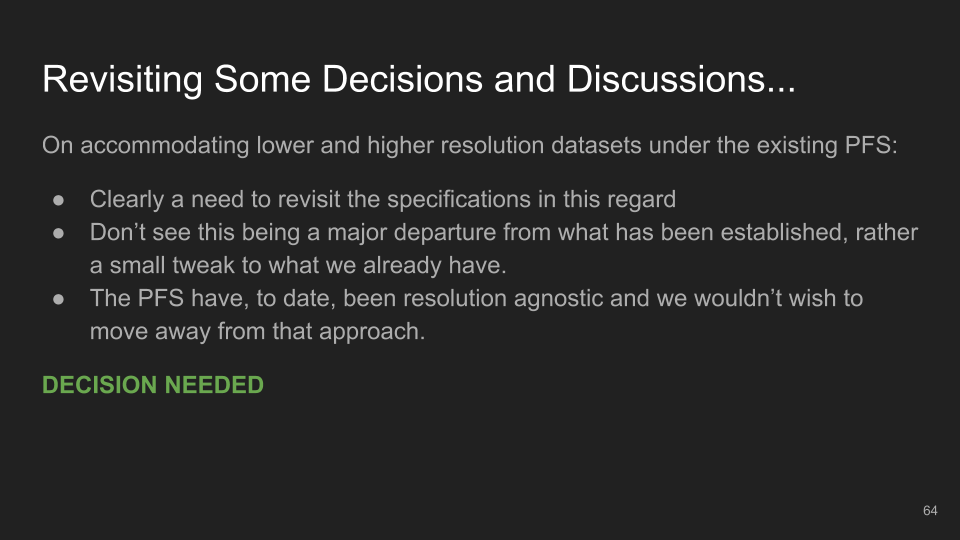
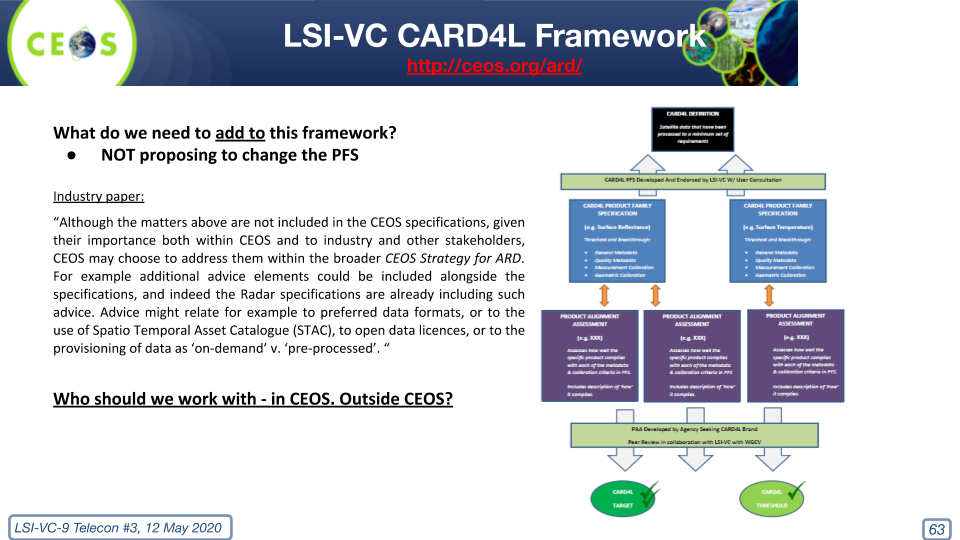
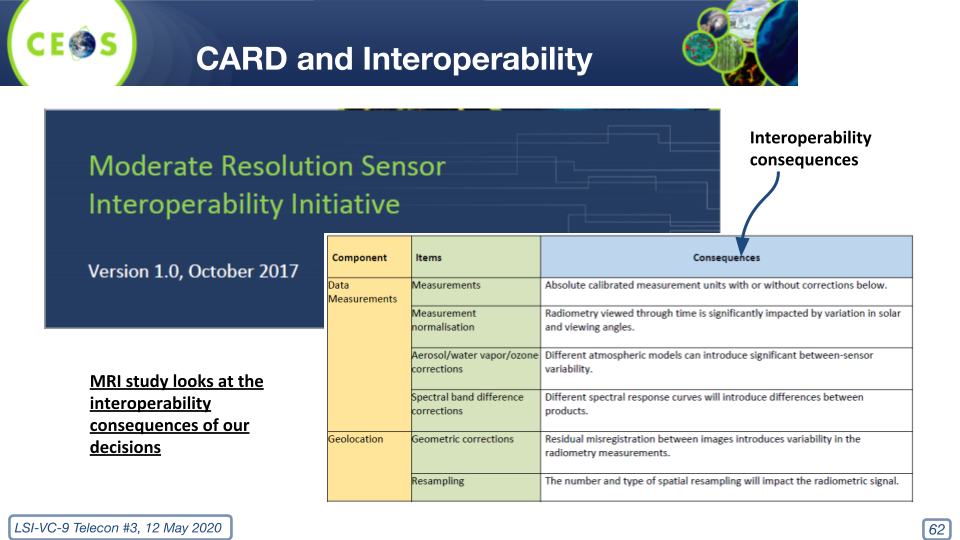
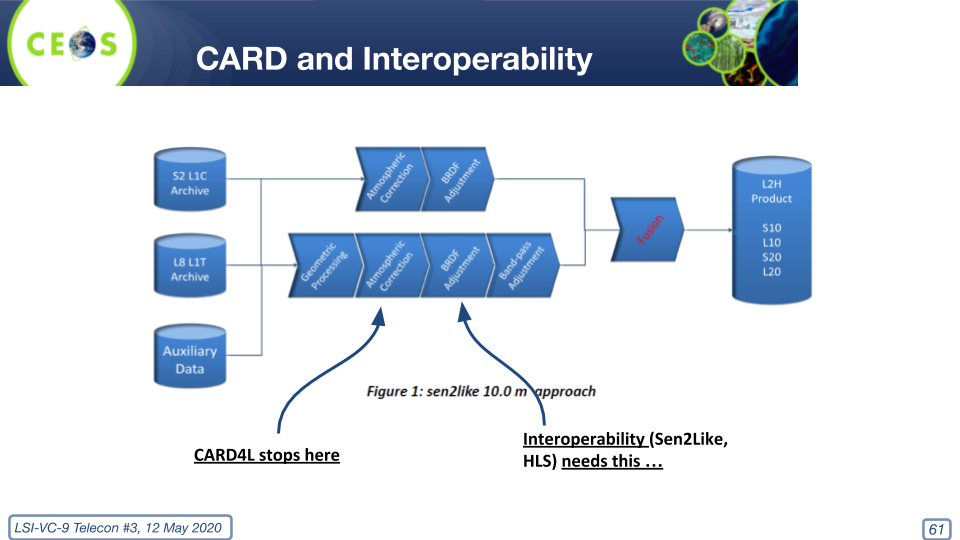
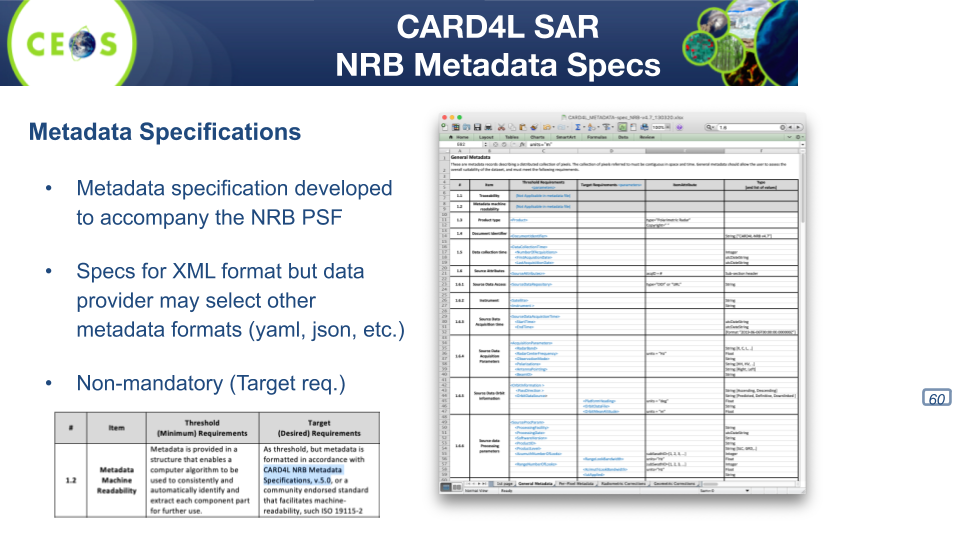
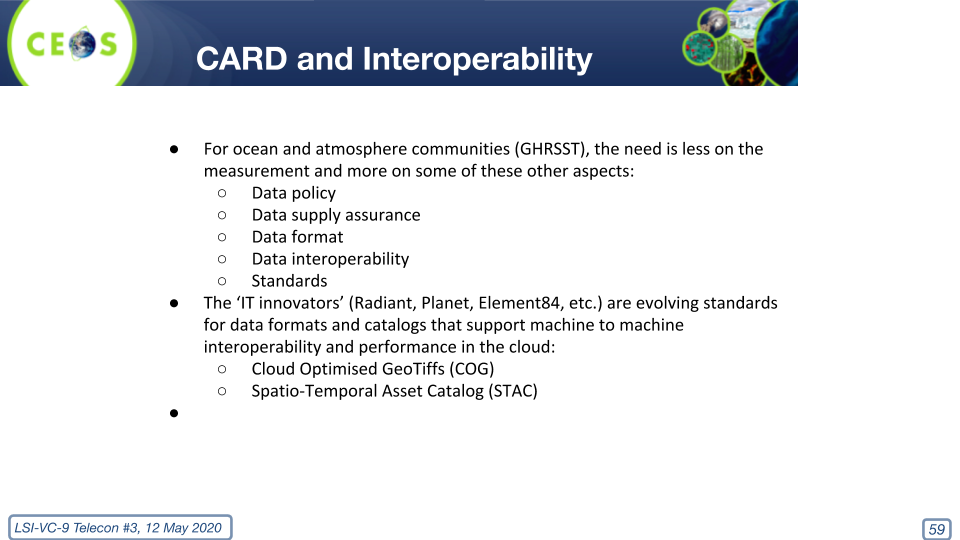
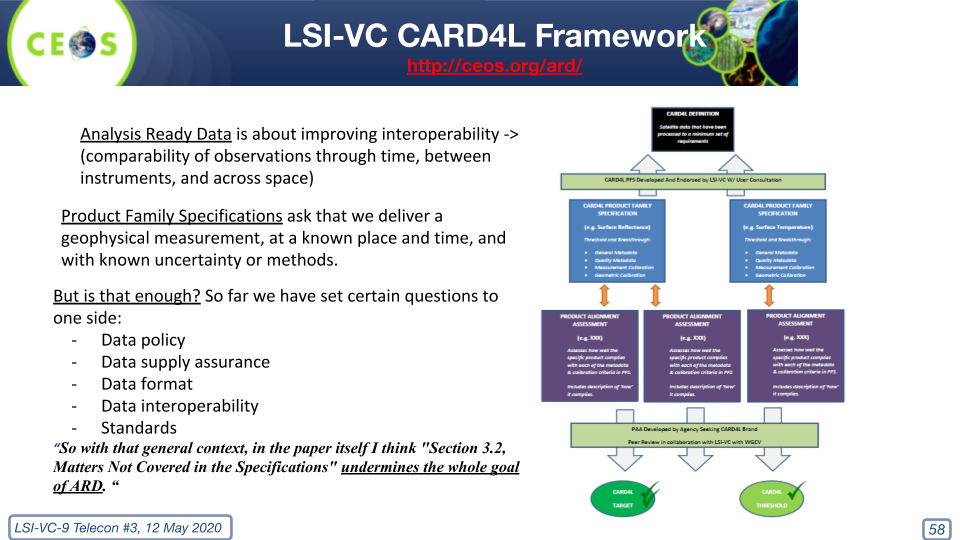
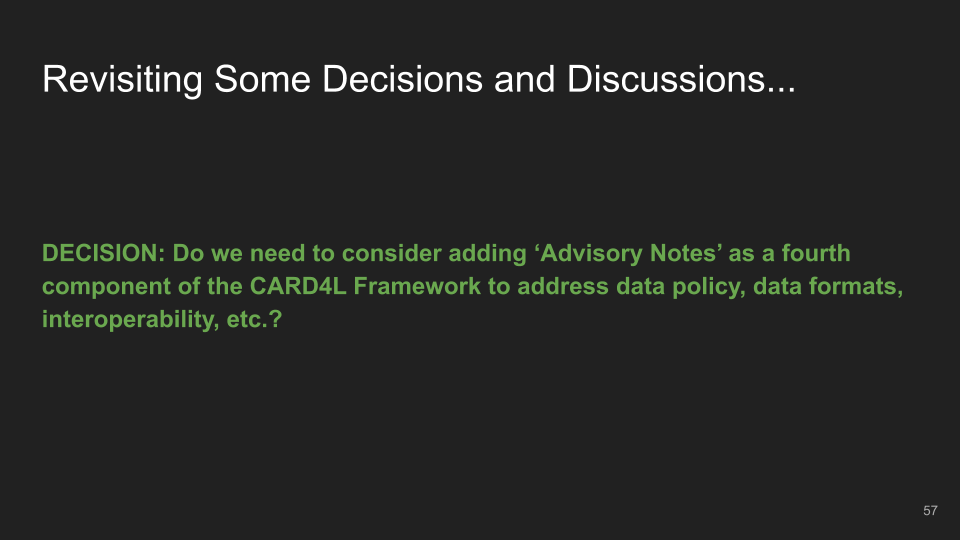
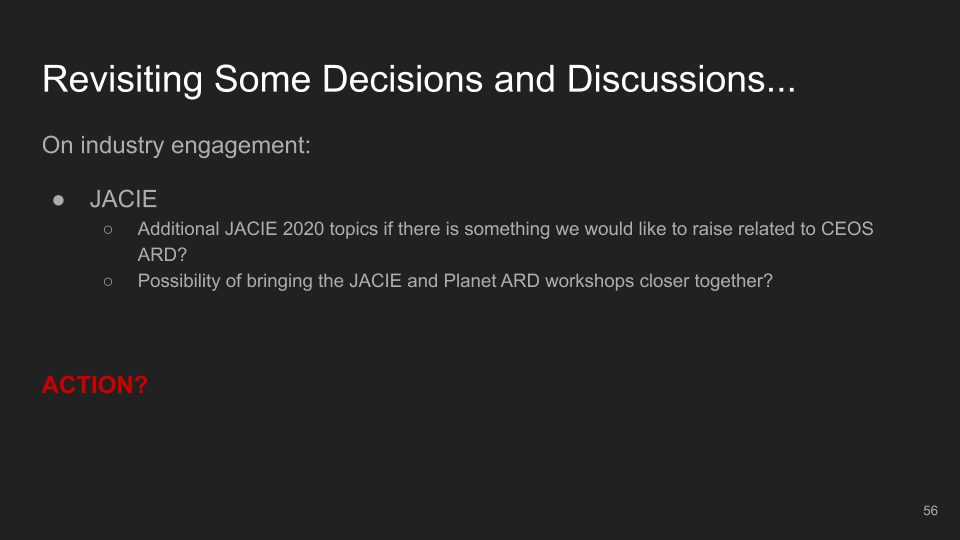
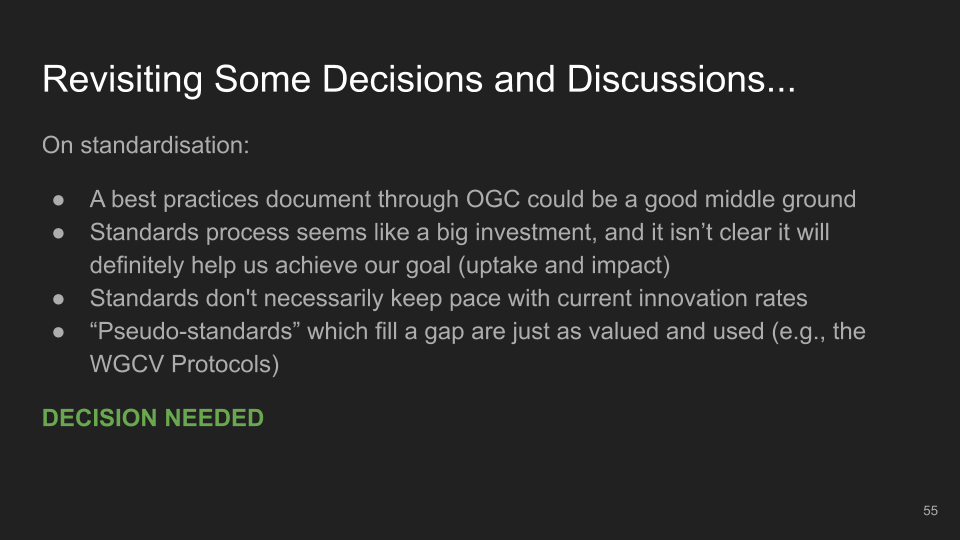
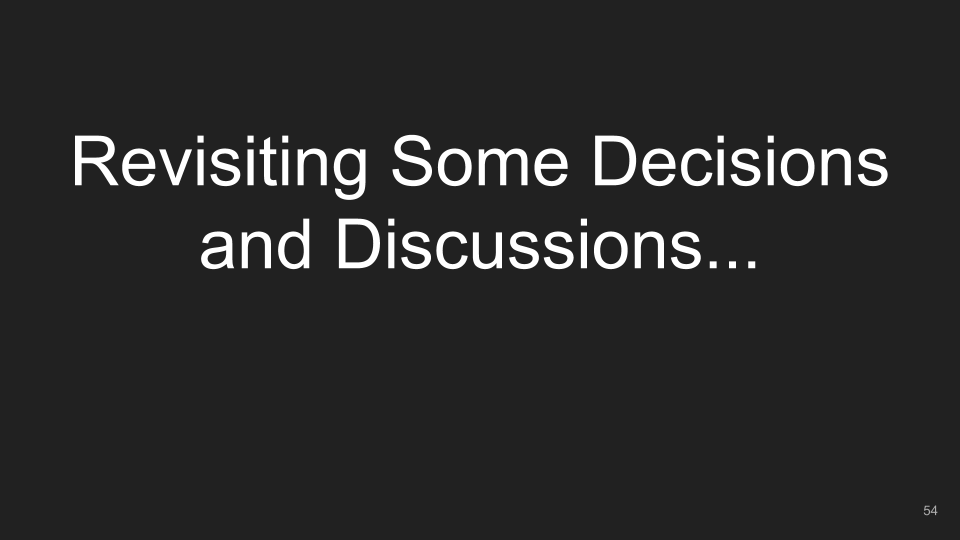
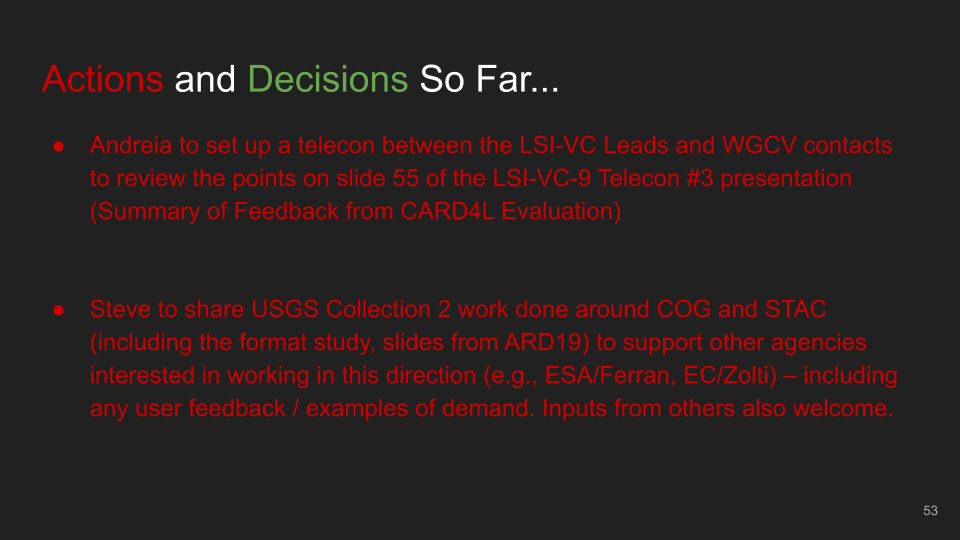
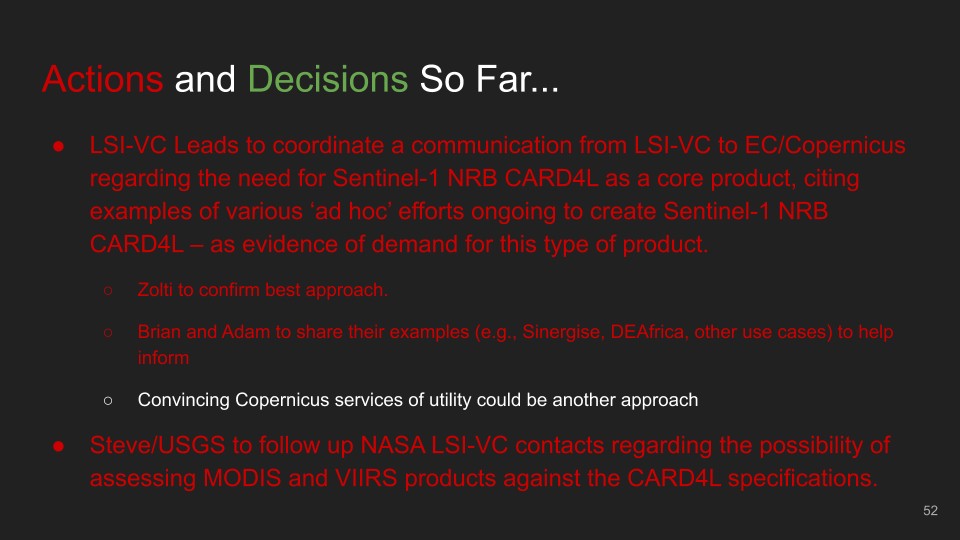
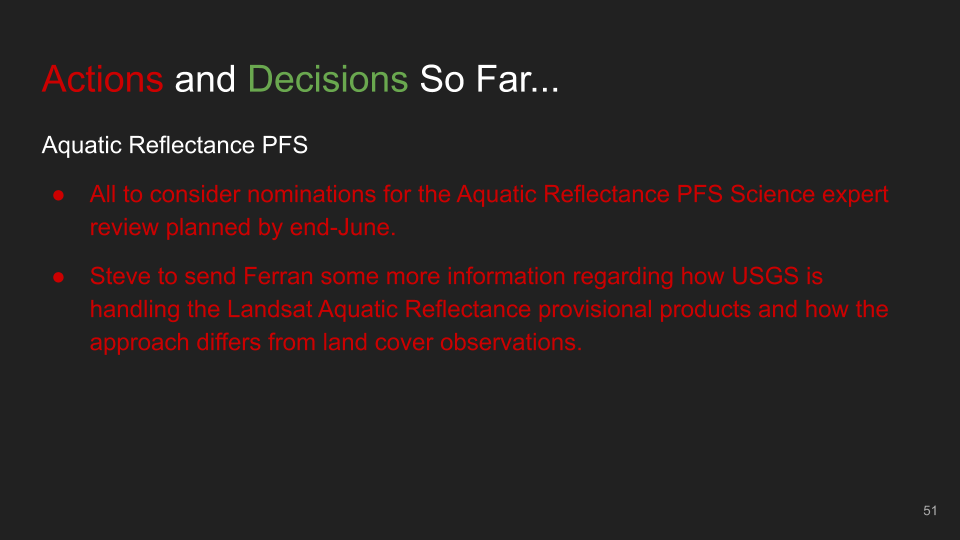
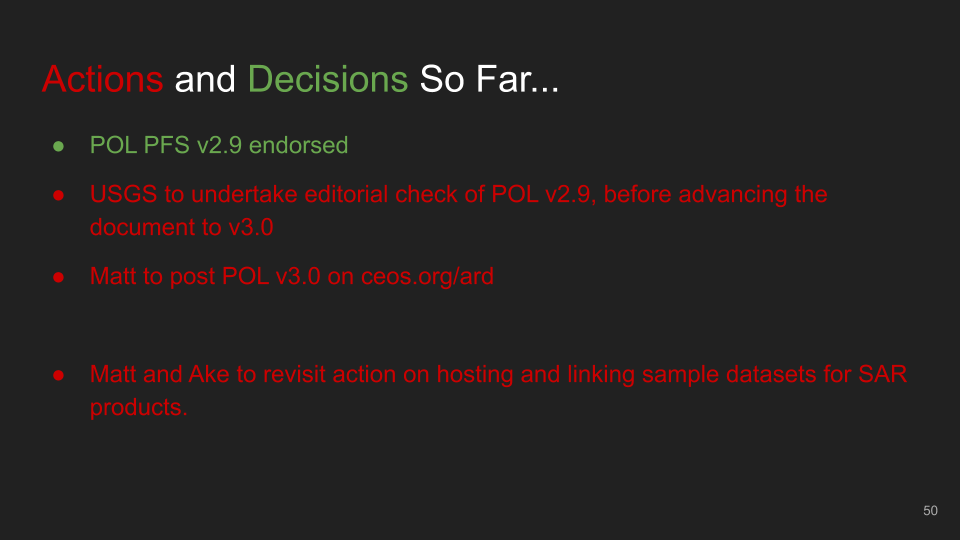
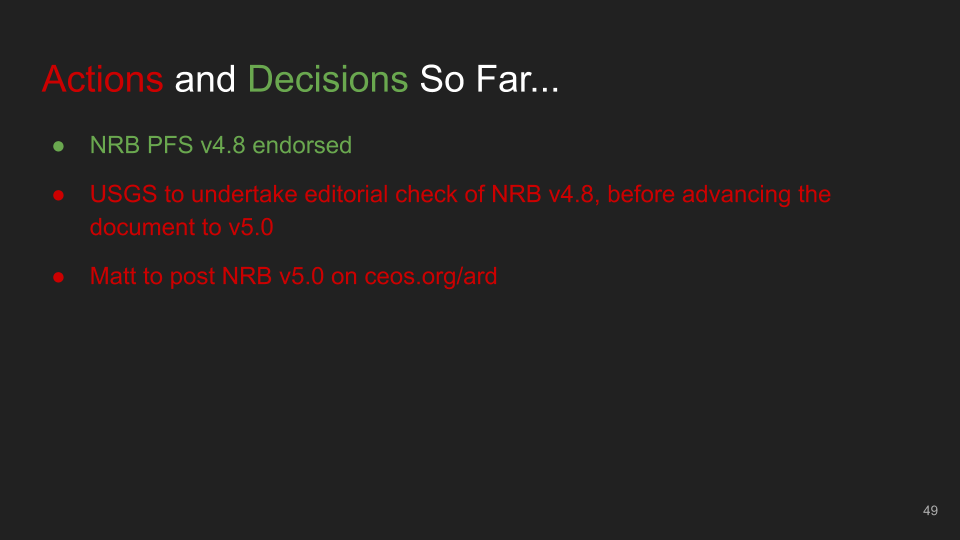
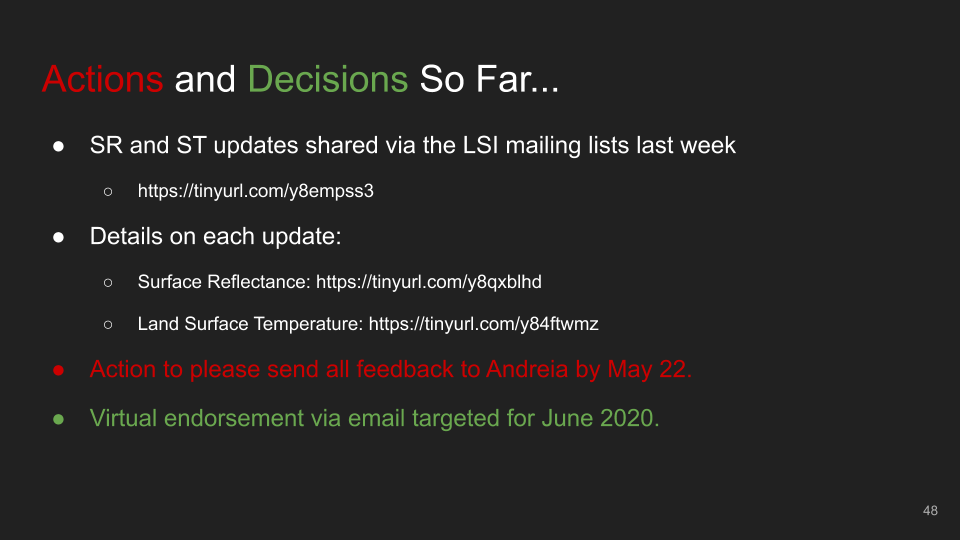
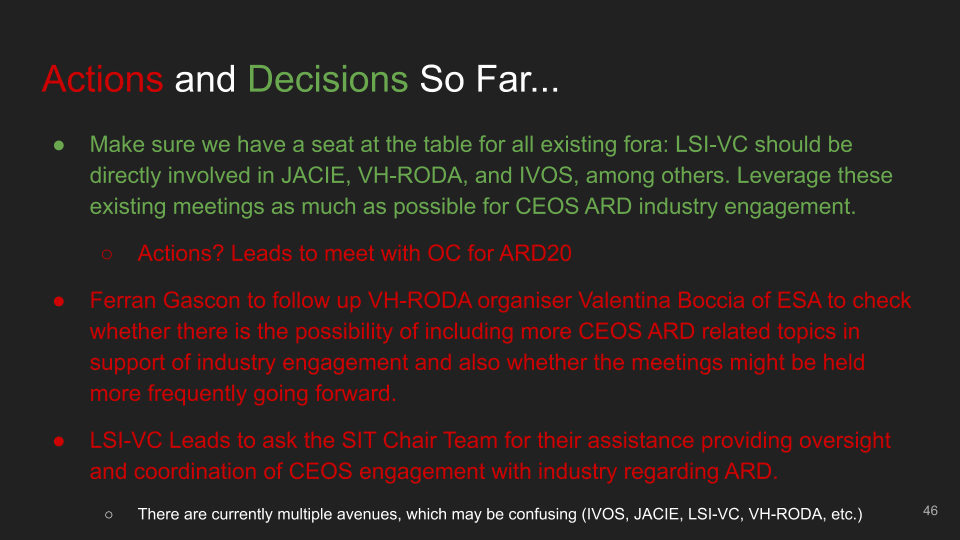
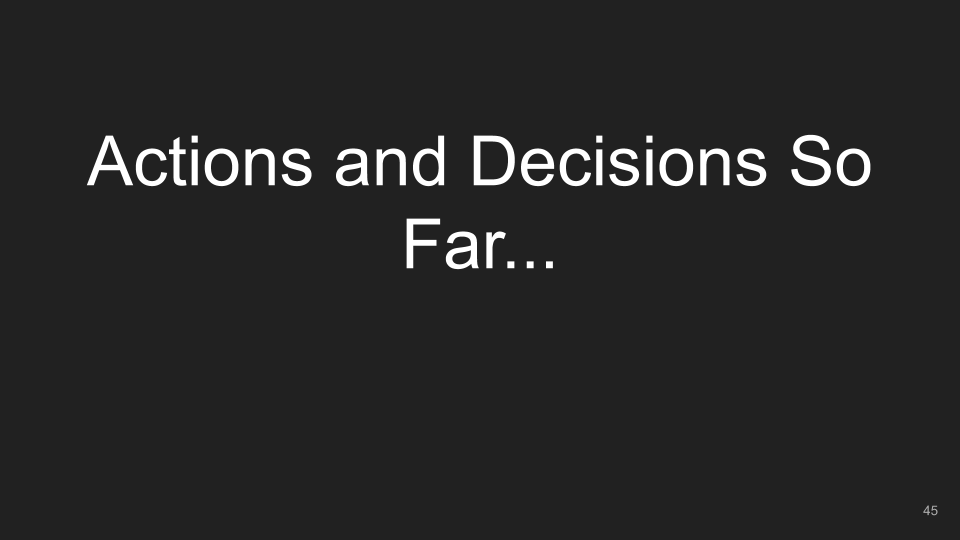
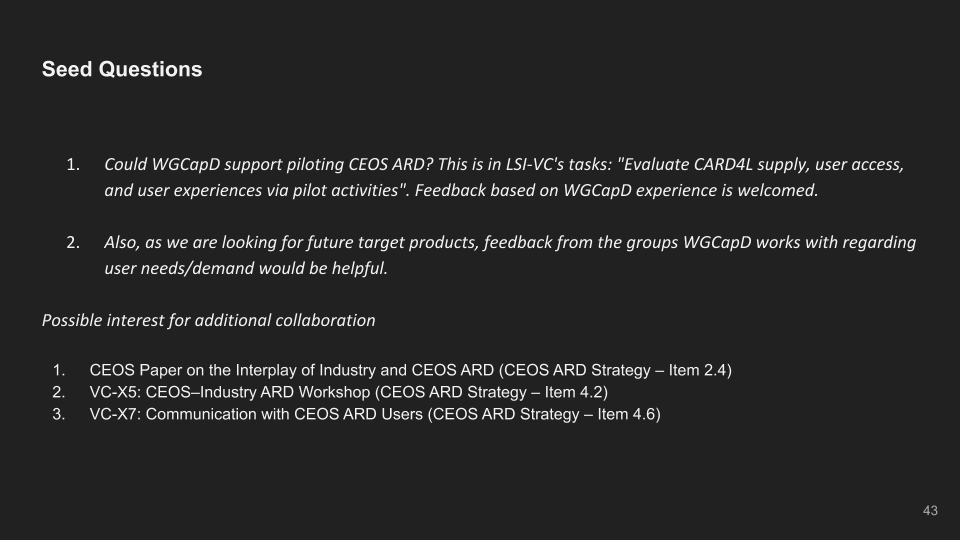
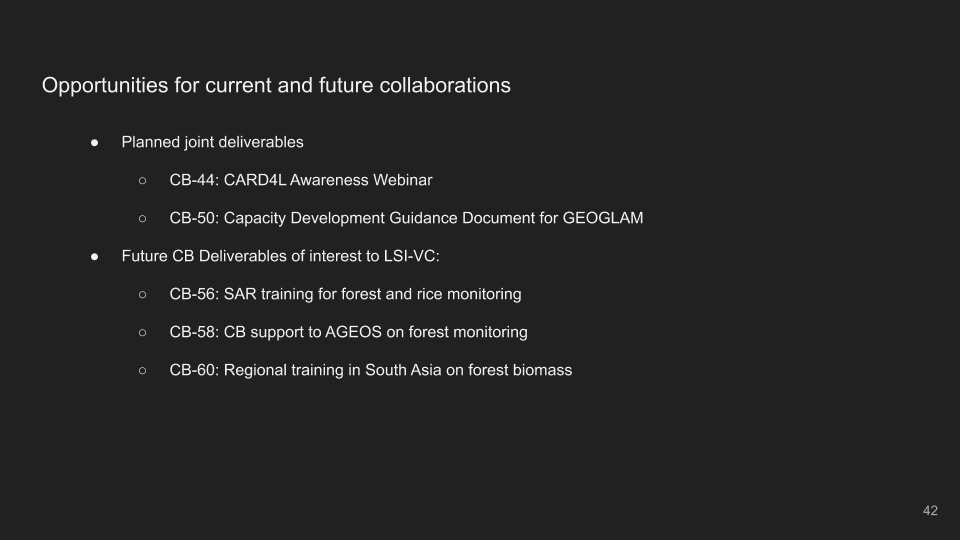
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| **LSI-VC-9-21** | All to share feedback on the virtual meeting approach.  Some feedback already shared: should include greater ability for remote access and chat interventions in face-to-face meetings, shared slide deck is a good approach, virtual break-out discussions could be useful, comfort breaks for longer sessions would be good, encourage people to switch on their cameras. | **June LSI-VC Team Call** |
| **LSI-VC-9-22** | Andreia to confirm the change in cut-off date for updates to the PFS as two weeks before the annual LSI-VC meeting in March. | **ASAP** |

* Matt Steventon (LSI-VC Secretariat, Chair) thanked everyone for their attendance and contributions to the discussions.

**Appendix A: Meeting Presentation Slides**

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