

CEOS WGCV SAR sub-group

- Bruce Chapman, Chair
 - Dirk Geudtner, Vice-chair
-
- May 2020

SAR sub-group meeting

- Held in conjunction with VH-RODA workshop 18-22 November 2019 at ESRI, Frascati, Italy, hosted by Nuno Miranda.
 - Plenary on day 1
 - Day 2: Two sessions, 9 presentations on calibration techniques
 - Day 3: 20 presentations during four sessions on calibration of future missions, calibration techniques, and Analysis Ready Data ([CARD4L a particular focus](#))
 - Evening event sponsored by ESRI was well attended
 - Day 4: 15 presentations during 3 sessions, continuing Analysis Ready Data, processing and algorithms, and cross-calibration and validation. [Afternoon discussion on joint SAR calibration and CARD4L](#).
 - ~110 registered attendees for both workshops
- Next year's meeting planned to be [in Longueuil, Canada, hosted by CSA, October 6-9, 2020](#). We may start discussing in the next few weeks whether this meeting should be postponed.

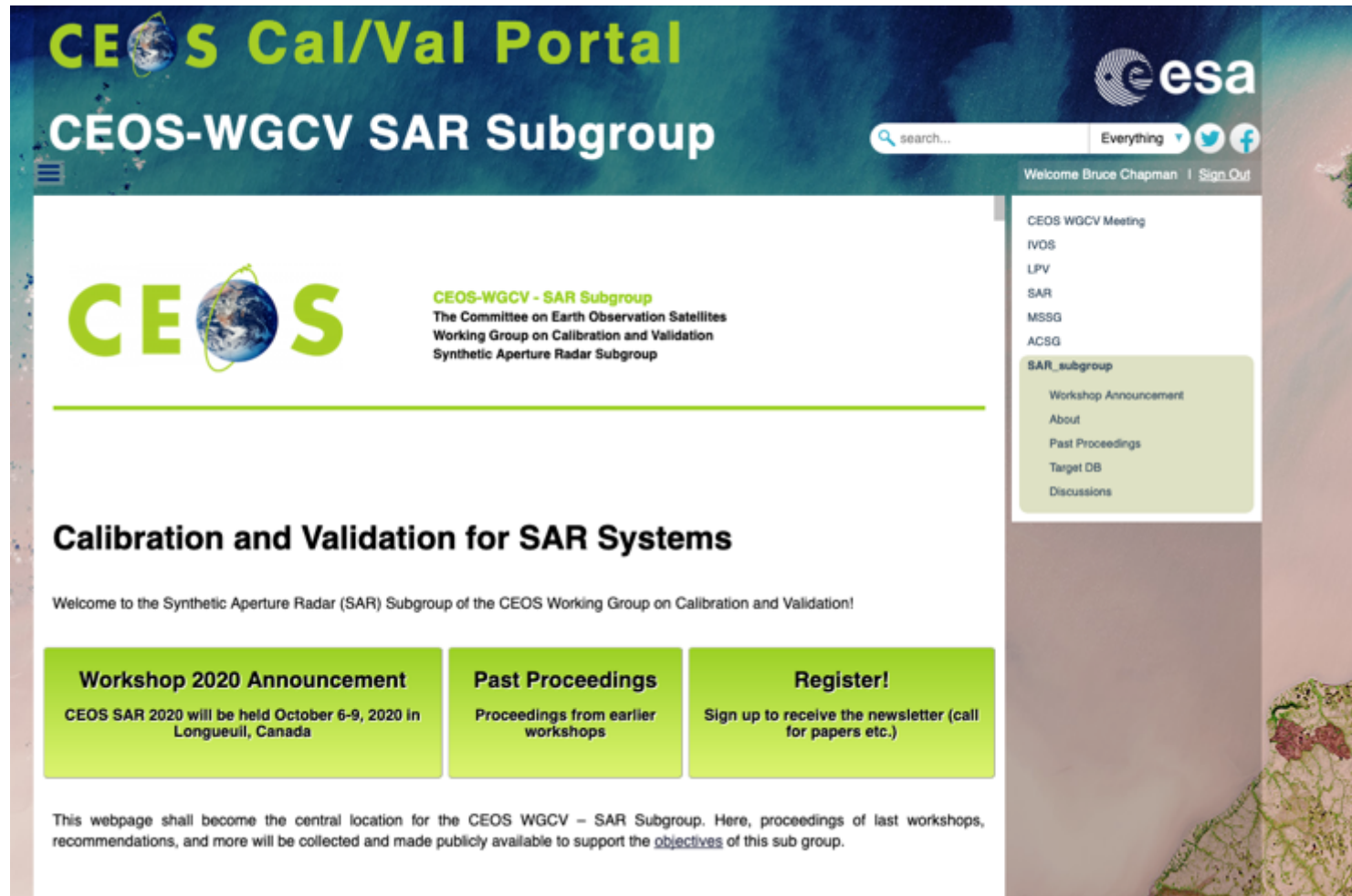




CEOS WGCV SAR subgroup meeting, November 2019, Frascati, Italy

CEOS WGCV SAR subgroup website

- I have been working with Paolo Castracane of ESA to transition the current website to a new server and appearance.



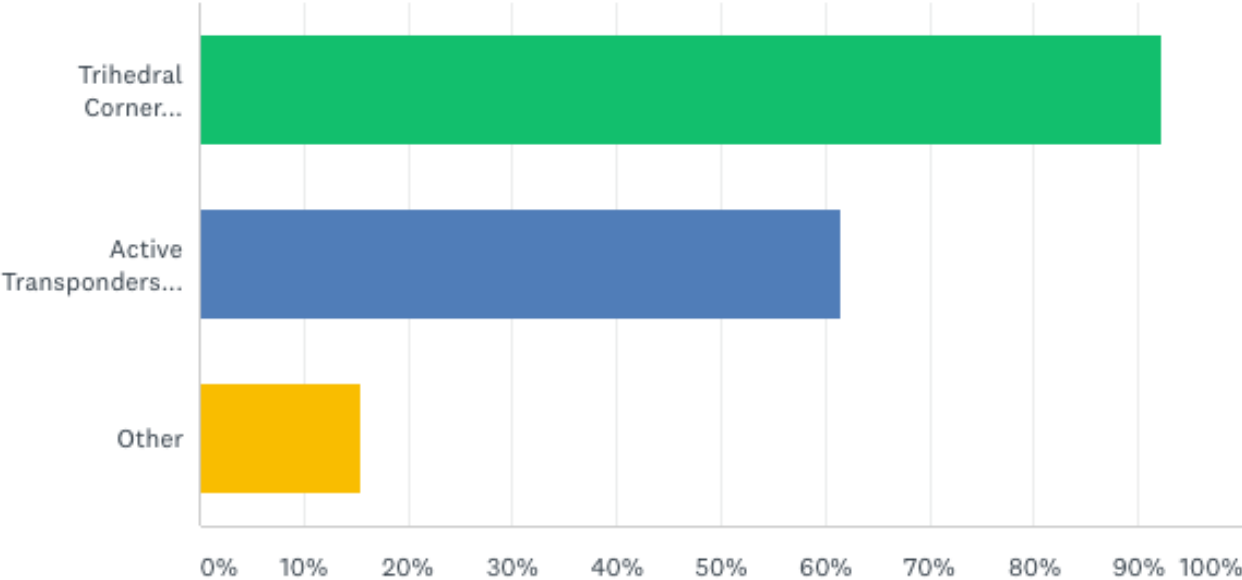
Joint Use of SAR calibration targets

- Survey conducted between Jan 24 and Feb 5, 2020.
- 13 respondents out of 18 invited
- Each person invited has responsibilities for SAR calibration targets
- Survey utilized surveymonkey.com, a free service for less than 10 questions

Bruce Chapman and Dirk Geudtner
CEOS WGCV SAR subgroup

What type of Calibration Targets and their respective number do you or your organization have available for use?

Answered: 13 Skipped: 0



ANSWER CHOICES	RESPONSES	
▼ Trihedral Corner Reflectors	92.31%	12
▼ Active Transponders (indicate single or dual antenna system, and if the pulse time delay is adjustable)	61.54%	8
▼ Other	15.38%	2
Total Respondents: 13		

[Comments](#) (13)

Comments

Showing 13 responses

☐

3 remote controlled CR à 2.9 m leg length 3 reomte controlled transponders (dual antenna System) in C-band about 20 CRs à 1.5 m leg length

2/6/2020 1:12 AM

[View respondent's answers](#)

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☐

40

2/5/2020 11:24 PM

[View respondent's answers](#)

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☐

10 trihedrals

2/4/2020 11:00 AM

[View respondent's answers](#)

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☐

3 CR 3 TR Australian CR Rosamond CR UZH CR

2/4/2020 7:42 AM

[View respondent's answers](#)

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☐

6

2/4/2020 2:06 AM

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☐

Trihedral: 3 motorized, >20 "classical" Dihedral: 2 Transponder: 3 C-band (single Pol, rotation angle adjustable), 1 X-band Prototype (single Pol, rotation angle adjustable, L-Band Prototype in development (dual Pol for Rx & Tx, multiple targets) - all delays adjustable

2/3/2020 11:51 AM

[View respondent's answers](#)

[Add tags](#)

☐

Transponders: - Dual antenna system - Pulse delay adjustable

2/3/2020 8:32 AM

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☐

ESA has three (3) C-band active transponders. These are single-antenna devices with an adjustable pulse delay time to place the radar echo at areas of low backscatter clutter. For the BIOMASS mission, ESA develops one (1) P-band active transponder.

1/29/2020 1:26 AM

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☐

4 trihedrals

1/28/2020 10:26 AM

[View respondent's answers](#)

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☐

3

1/27/2020 5:00 AM

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☐

- 3 trihedral CRs in Japan - 1 transponder (but it is not permanently deployed)

1/26/2020 4:37 PM

[View respondent's answers](#)

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☐

23 Trihedrals 2 Transponders

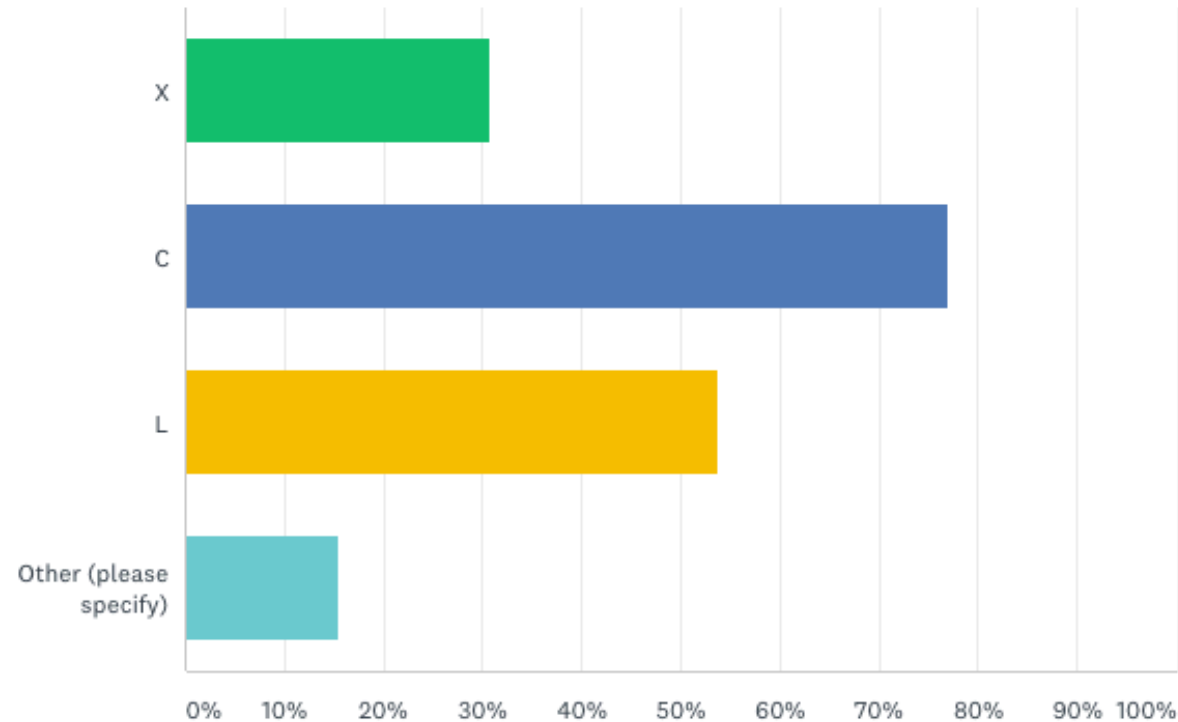
1/24/2020 5:33 PM

[View respondent's answers](#)

[Add tags](#)

What SAR wavelength(s) are these targets designed for?

Answered: 13 Skipped: 0



ANSWER CHOICES	RESPONSES	
X	30.77%	4
C	76.92%	10
L	53.85%	7
Other (please specify)	15.38%	2
Total Respondents: 13		

Comments

☐ For the BIOMASS mission, ESA develops one (1) P-band active transponder.

1/29/2020 1:26 AM

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☐ VHF/UHF-band

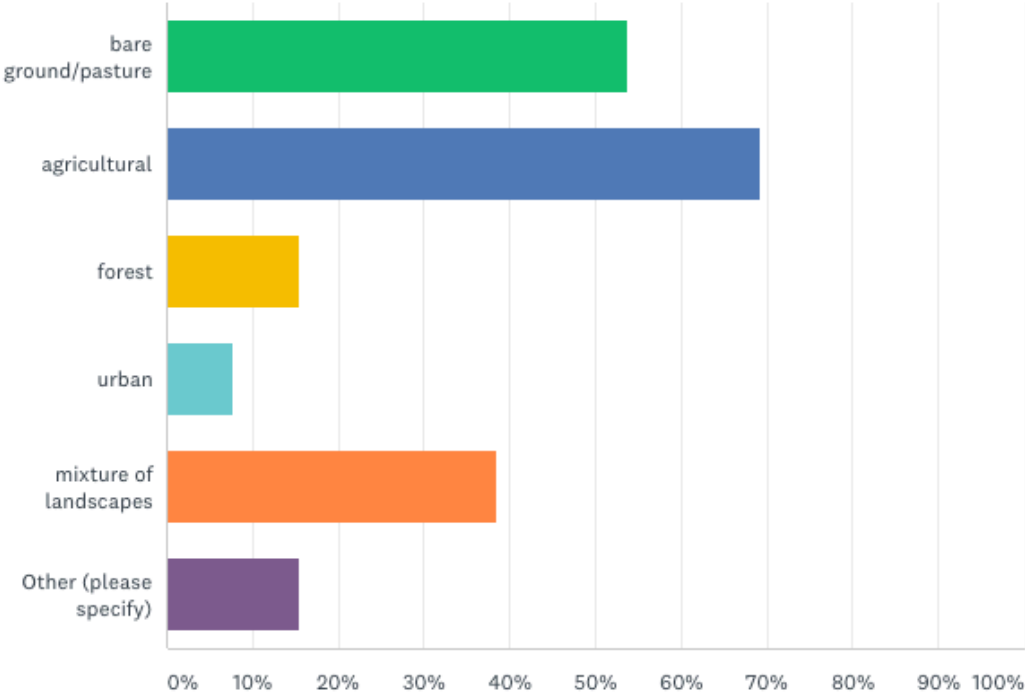
1/27/2020 5:00 AM

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What is the background landscape where these calibration targets are deployed?

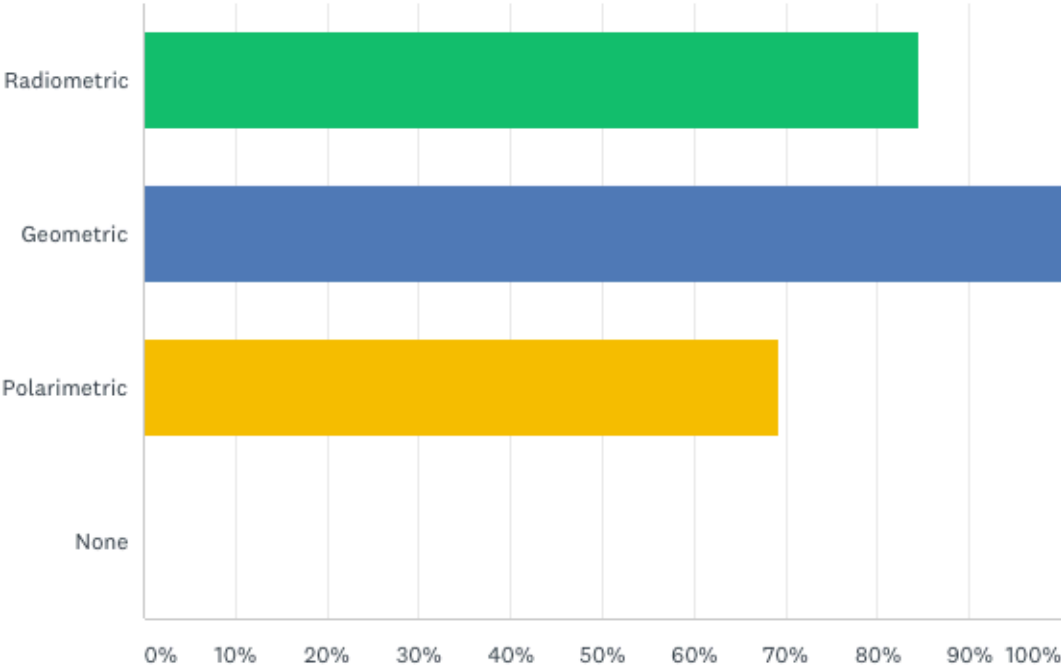
Answered: 13 Skipped: 0



ANSWER CHOICES	RESPONSES	
▼ bare ground/pasture	53.85%	7
▼ agricultural	69.23%	9
▼ forest	15.38%	2
▼ urban	7.69%	1
▼ mixture of landscapes	38.46%	5
▼ Other (please specify)	15.38%	2
Total Respondents: 13		

Are these calibration targets suitable for radiometric and/or geometric calibration?

Answered: 13 Skipped: 0



ANSWER CHOICES	RESPONSES	
▼ Radiometric	84.62%	11
▼ Geometric	100.00%	13
▼ Polarimetric	69.23%	9
▼ None	0.00%	0
Total Respondents: 13		

[Comments](#) (4)

Comments

☐ **radiometric is questionable due to the variability in the overall health of the surfaces. They can vary by up to 1.5dB in our experience.**

2/4/2020 11:00 AM

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☐ **In the frame S-1, polarimetric calibration is limited to the channel imbalance and x-talk**

2/4/2020 7:42 AM

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☐ **dependent on the target type**

2/3/2020 11:51 AM

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☐ **The active transponders provide a simultaneous dual-pol return signal.**

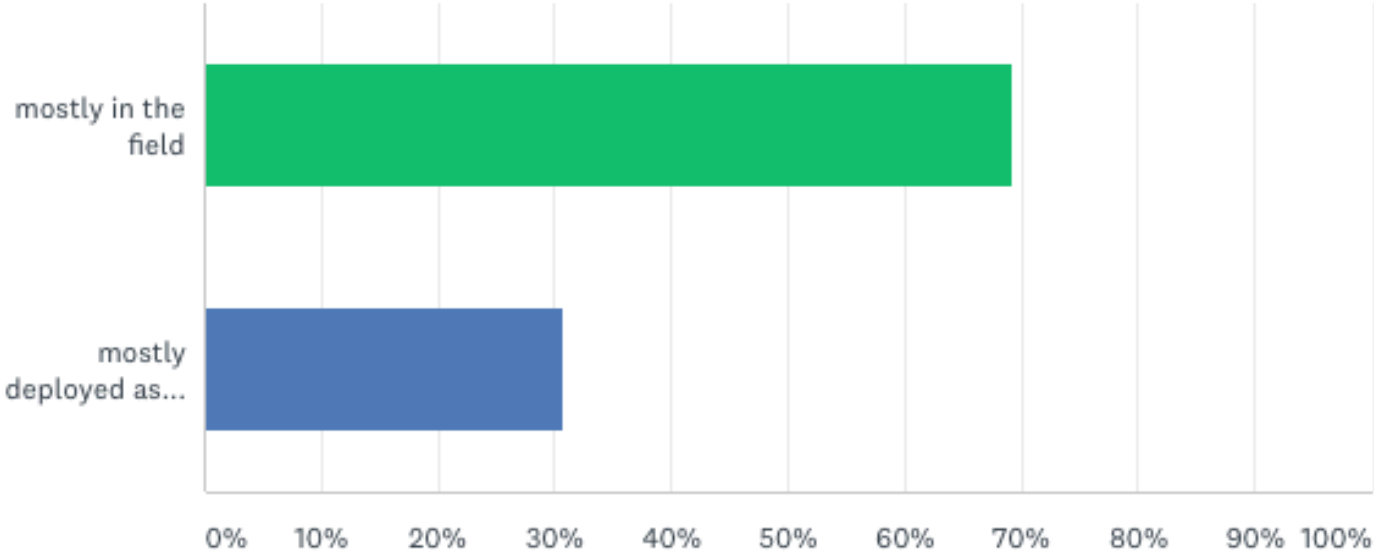
1/29/2020 1:26 AM

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Are these targets normally in the field and ready for imaging by anyone, or are they deployed to field locations as needed?

Answered: 13 Skipped: 0



ANSWER CHOICES	RESPONSES	
mostly in the field	69.23%	9
mostly deployed as needed	30.77%	4
TOTAL	13	

[Comments](#) (5)

Comments



We have the trihedrals stowed as they have not been used in several years.

2/4/2020 11:00 AM

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The DLR TR+CR are activated on demand. There is a specific planning agreed with DLR and the targets are aligned accordingly (motorised mount)

2/4/2020 7:42 AM

[View respondent's answers](#)

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motorized trihedrals and transponders have to be aligned for a given mission

2/3/2020 11:51 AM

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Add tags ▼



The transponders are currently being refurbished and will be re-deployed in spring 2021 and 2022, respectively.

1/29/2020 1:26 AM

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CRs are in the field, but transponder is not.

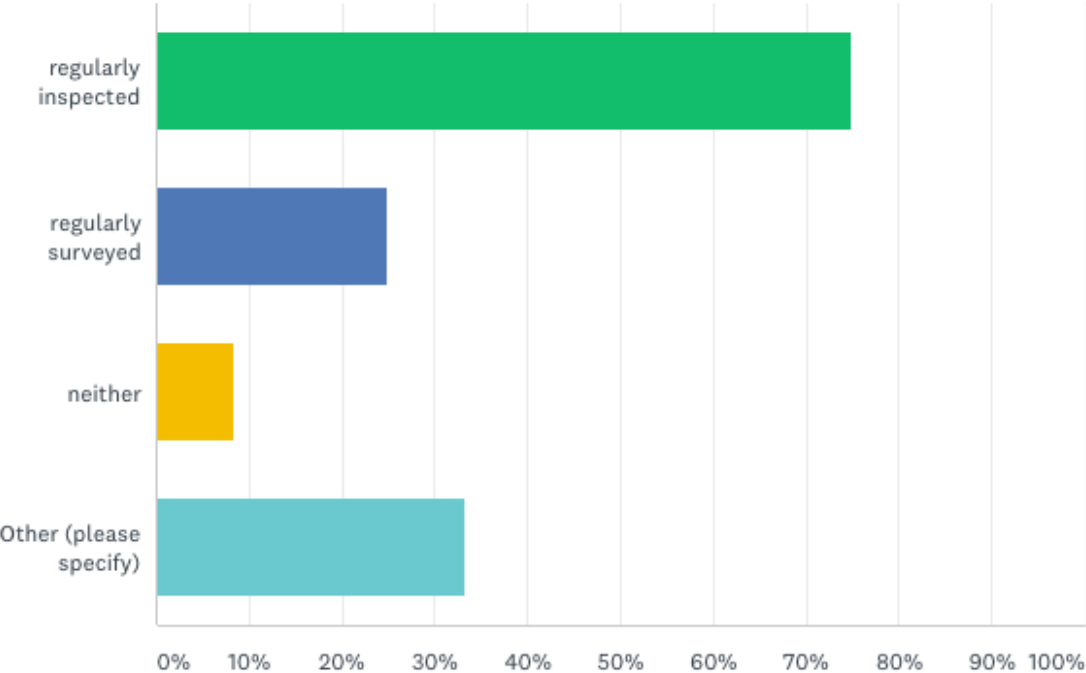
1/26/2020 4:37 PM

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If the calibration targets are usually deployed in the field, are they regularly maintained and/or surveyed?

Answered: 12 Skipped: 1



ANSWER CHOICES	RESPONSES	
regularly inspected	75.00%	9
regularly surveyed	25.00%	3
neither	8.33%	1
Other (please specify)	Responses 33.33%	4
Total Respondents: 12		

Comments

☐ surveyed only if required for a certain mission

2/3/2020 11:51 AM

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☐ Regular surveys are planned, but currently not conducted

2/3/2020 8:32 AM

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[Add tags](#) ▼

☐ Regularly monitored from space but not regularly surveyed on the ground. Inspected from time to time, but may be subject to unexpected changes.

1/28/2020 10:26 AM

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☐ Inspected at irregular times

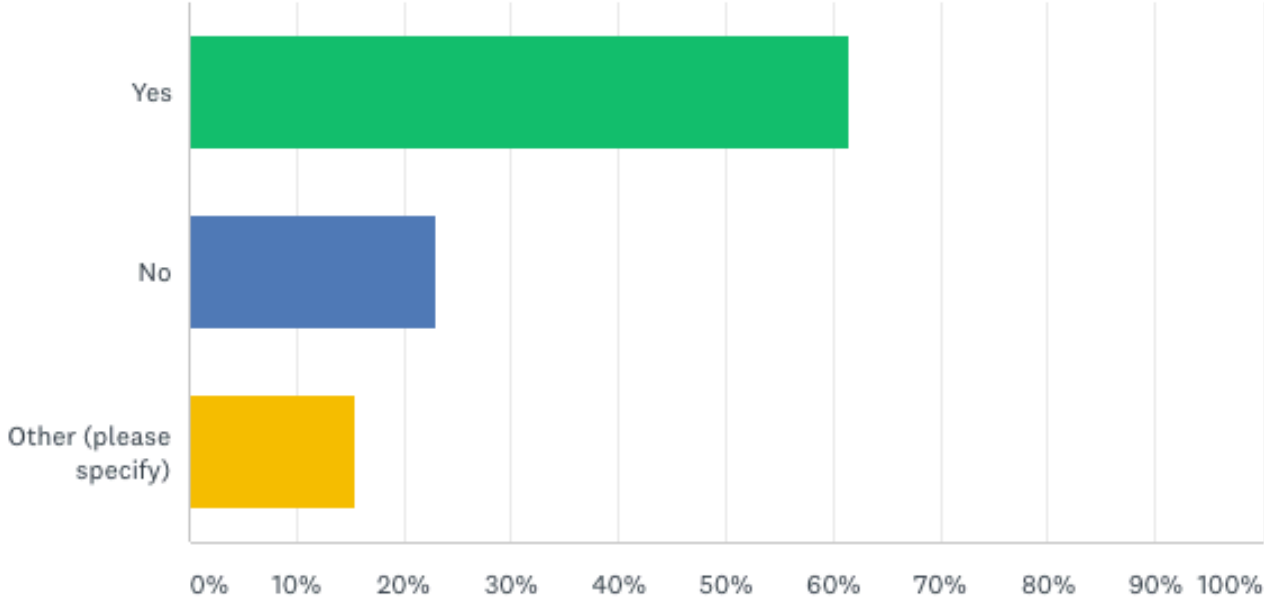
1/27/2020 5:00 AM

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If another SAR mission requested augmenting this target array with other SAR calibration targets, would that be considered if cost was born by the other party?

Answered: 13 Skipped: 0



ANSWER CHOICES		RESPONSES	
▼	Yes	61.54%	8
▼	No	23.08%	3
▼	Other (please specify)	Responses 15.38%	2
TOTAL			13

Comments

☐ depends on costs and our own SAR missions

2/6/2020 1:12 AM

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☐ The augmentation of the ESA transponder target site with other calibration targets may be impossible, because two of the ESA transponders are deployed at other non-ESA locations.

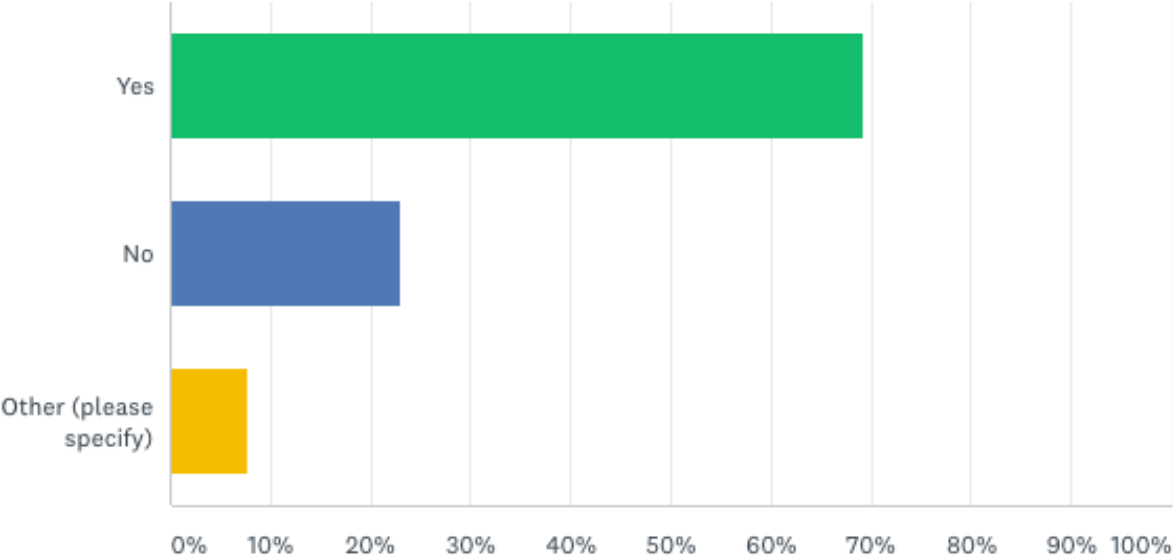
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Would your project consider using artificial targets for calibration that are maintained by others, if you had target properties (type, coordinates, survey method, date of survey, size, orientation, clutter estimate, purpose, permanent deployment or by campaigns,...)?

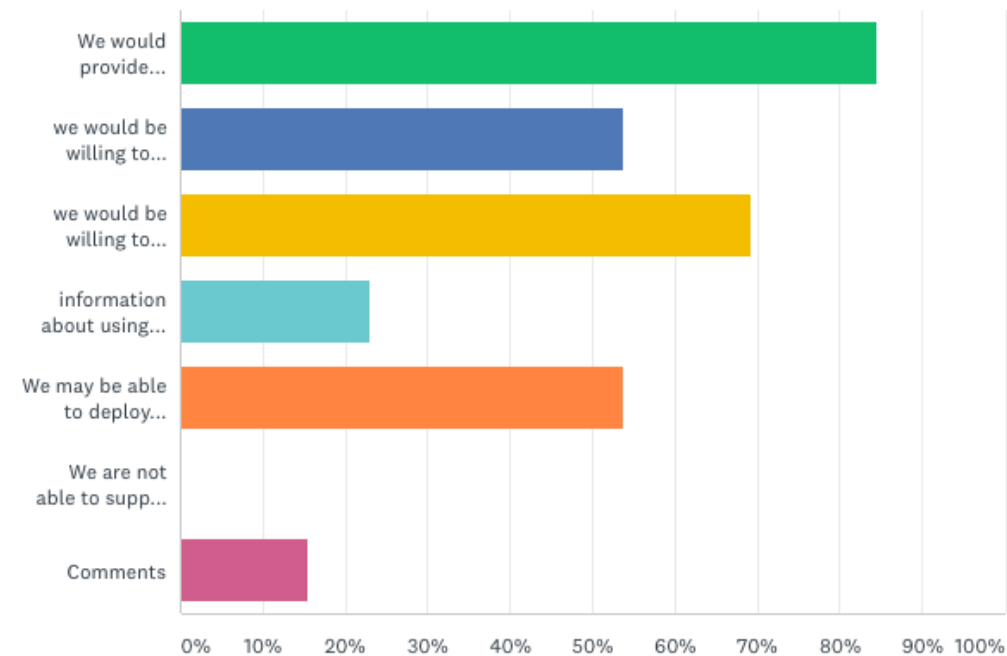
Answered: 13 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	69.23%	9
No	23.08%	3
Other (please specify)	Responses 7.69%	1
TOTAL		13

If another SAR mission requested or wanted to use your calibration targets

Answered: 13 Skipped: 0



ANSWER CHOICES	RESPONSES	
We would provide information regarding the targets including photos of targets and survey results	84.62%	11
we would be willing to repoint deployed targets (depending on funding and available resources)	53.85%	7
we would be willing to coordinate observations with another SAR mission (such as with transponders) if resources are available	69.23%	9
information about using our deployed calibration targets is already online	23.08%	3
We may be able to deploy calibration targets at your request if resources are available to do so	53.85%	7
We are not able to support joint use of our calibration targets	0.00%	0
Comments	Responses 15.38%	2
Total Respondents: 13		

Comments

- ☐ Two of the ESA transponders will be re-deployed at slightly different locations. This will require an update of their survey coordinates.

1/29/2020 1:26 AM

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- ☐ We may provide the latest known information to an individual mission if requested, with caveats that the targets are subject to change at sites that we do not control. However, we prefer not to disclose the information publicly. We cannot re-point the targets except as may be needed by our mission.

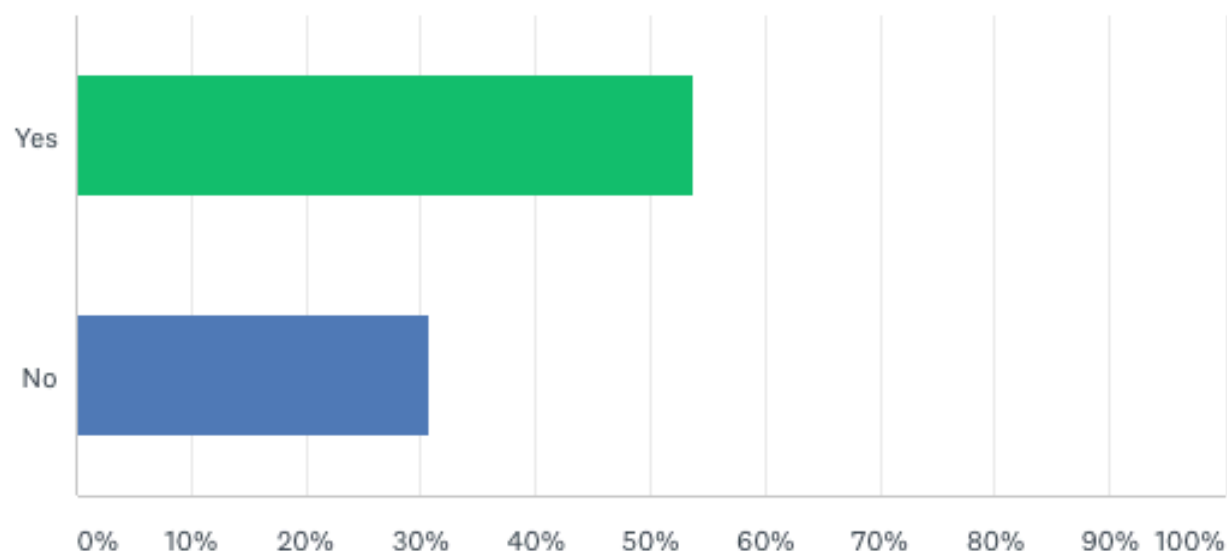
1/28/2020 10:26 AM

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Would your project ever be interested in augmenting (at your cost) another target array site operated by others in support of creating a Calibration Super Site?

Answered: 13 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	53.85%	7
No	30.77%	4
TOTAL		13

[Comments \(6\)](#)

Comments

☐ **depends on the project**

2/6/2020 1:12 AM

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☐ **It is a bit of an unknown at this time. Our contract is with NASA and currently the burden for this lies with the projects, not our facility. However, if there was benefit to NASA or its customers we would be willing to have the conversation with our Contracting Officer's Representative to see if NASA would be willing to support it.**

2/4/2020 11:00 AM

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☐ **but maintaining targets at another site might be very difficult**

2/3/2020 11:51 AM

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☐ **In principle, this is of interest, but the internal governance process would require a firm and conclusive business case focused on the clear benefits to the downstream users served by the missions operated by our institution.**

2/3/2020 8:32 AM

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☐ **ESA is now working on implementing the ROSE-L mission. For this L-band SAR mission, ESA would like to use other available calibration targets. Most likely, ESA will develop some L-band calibration targets, e.g. transponders and CRs, as well, which then could be shared with other missions.**

1/29/2020 1:26 AM

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☐ **have no idea.**

1/24/2020 5:33 PM

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Conclusions

- Most calibration targets are for C-band SAR
- Most targets are deployed in agricultural areas
- Most targets are suitable for both geometric and radiometric calibration
- 2/3 of targets are semi-permanently deployed in the field
- Only ¼ of calibration arrays are regularly surveyed
- 6/10 would consider letting another space agency augment their array of targets
- 7/10 would consider using a calibration array supported by another space agency
- Over half would consider augmenting another space agencies calibration array
- Most would provide information about their targets so that another SAR could use them for calibration