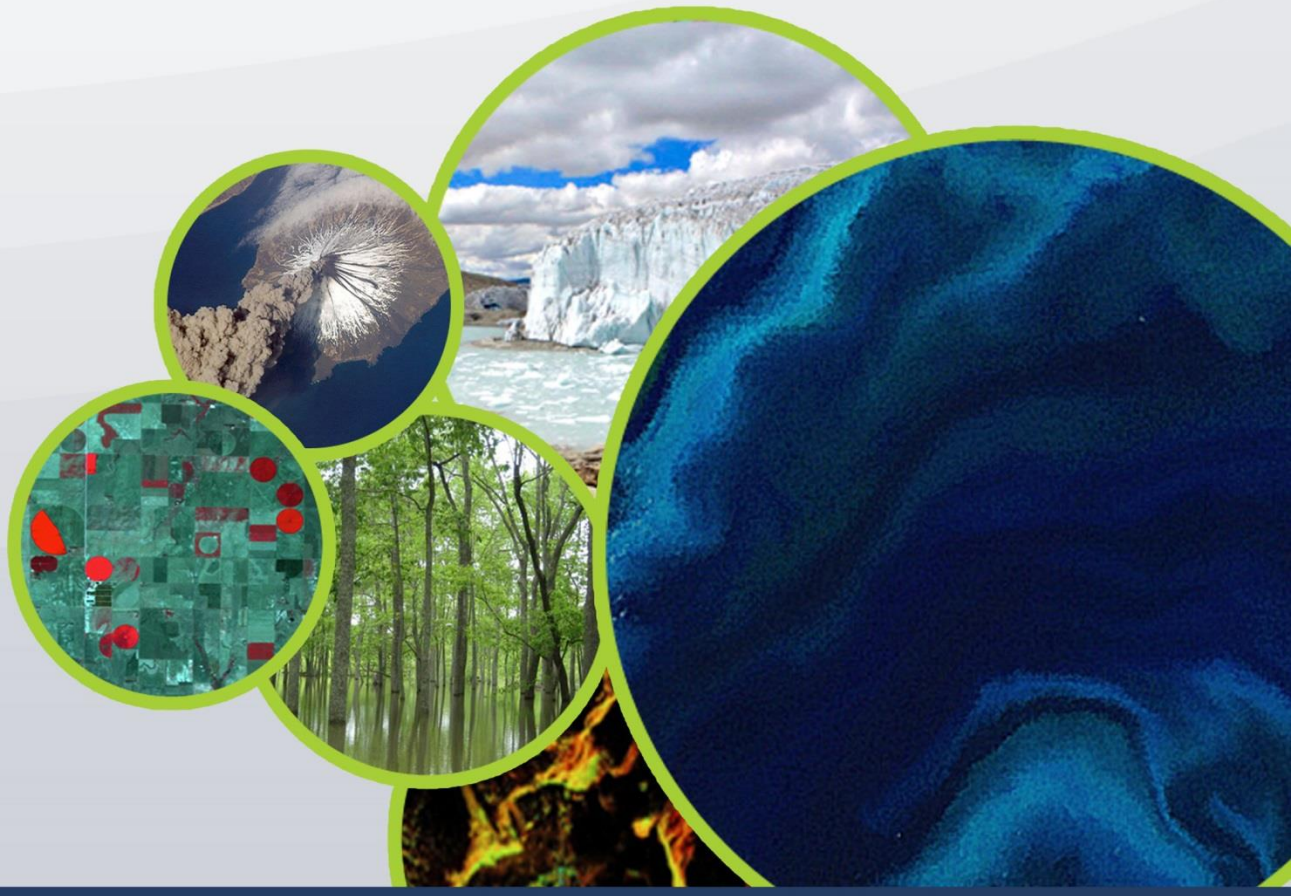
Committee on Earth Observation Satellites



CEOS WGCapD SAR Training Workshop

20-24 February 2017, AGEOS, Libreville

A. Workshop Participants: 23 Participants

Title	Name	Surname	Country	Responsibility
			Rwanda	Participant
			Cameroon	Participant
			Senegal	Participant
			Tunisia	Participant
			Morocco	Participant
			Kenya	Participant
			Senegal	Participant
			Rwanda	Participant
			Ghana	Participant
			Gabon	Participant
			Gabon	Participant
			Gabon	Participant
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			Gabon	Participant
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			Gabon	Participant
			Gabon	Participant
			Gabon	Participant
			Gabon	Participant
			Gabon	Participant
			Nigeria	Participant
			Gabon	Participant
Dr	Matteo	Pardini	Germany	Course Coordinator
Dr	Naiara	Pinto	USA	Course Coordinator
Dr	Chris	Stewart	Italy	Course Coordinator
Prof	Jean Paul	Rudant	France	Course Coordinator
Dr	Konstantinos	Papathanassiou	Germany	Course Coordinator
Mr	Phila	Sibandze	South Africa	Course Coordinator

B. Sponsors

C. Workshop Banner

Figure 1: The workshop banner

Figure 2: Group photo of the participants who attended the course.

The Committee on Earth Observation Satellite Working Group on Capacity Building and Data Democracy (CEOS WGCapD) conducted the CEOS SAR training workshop at The Gabonese Agency for Space and Observation known as “AGEOS” from 20 – 24 February 2017 in Libreville. The workshop as attended by 23 participants from Western and Northen African countries. The idea behind conducting SAR workshops in developing countries was based on the understanding that most training workshops in remote sensing were focusing on optical applications. As a result, that created a vacuum of skills in processing SAR data especially in developing countries. As a working group whose mandate is to build capacity in earth observation, promote the use of open source material and access to data, we therefore decided to focus on closing that skills gap by conducting SAR training workshops.

Since the birth of the data democracy initiative at the 21st CEOS SIT meeting in 2008, there has been significant achievements in accessing free Earth Observation data. Gradually more data custodian agencies are availing their data for free such institutions include the USGS (SRTM DEM and LandSat), ESA (Sentinels), SANSA (Sumbandila) and recently INPE with CBERS-2B and CBERS-4. Such a positive move therefore required the working group to then pay attention to another pillar of data democracy initiative which is building capacity hence the SAR training workshops

Sponsors:

- European Space Agency (ESA) Copernicus
- United Nation Office for Outer Space Affairs (UNOOSA)
- Gabonese Agency for Space and Observation (AGEOS)

Contributors:

- SAREDU
- National Aeronautical Space Administration (NASA)
- Germany Aerospace Agency (DLR)
- The University Paris-Est Marne-la-Vallée (UPEM)
- SAREDU Remote Sensing Education Initiative
- The South African National Space Agency (SANSA)

The workshop was attended by 23 participants from both Western and Northen African countries. The participants had different backgrounds from the academia, Government and private institutions where 48% were non Gabonese and 30% were females. The training programme was similar to the previous two workshops held in Zambia and South Africa, however, emphasy was given to maritime applications due to the coastal geolocation of Gabon and the rest of the targeted audience.

D. Stregths

1. Practical

The training infrastructure provided by AGEOS had the necessary processing capability to handle SAR data. As a result, the hands-on practical session were conducted without any technical disturbances. The lectures were conducted in both French and English depending on the language of instruction by the trainer.

2. Focus on different applications

As the programme was adopted from the previous two workshops, there were no significant changes with the exception of maritime and forest mapping. Otherwise, the course maintained the key focal areas on agriculture, marine and water applications, crop classification, biomass estimation and forestry.

3. Free Open Data and Software
The Sentinel Application Platform (SNAP) which is open source software that was initially developed by ESA to process radar data (Sentinel 1) and has improved over time to also process optical data was the backbone of all the practical sessions. The majority of the participants of which were from AGEOS were already accustomed with the SNAP toolbox; this made the practical sessions much easier for the trainers. Another open source software that was used and shares the same philosophy with SNAP and also with extensive self-learning functionalities, was PolSARpro. The participants were also introduced to another open source software called WaMaPro which mask water features from SAR data. WaMaPro was developed by DLR to mask water features from TerraSAR-X, ENVISAT and Sentinel 1 sensors hence the name "WaMaPro".

4. Preloading of software
SNAP software was already installed on most of the computers, it was also installed on the other computers and updated on the computers at which it existed. The WaMaPro softwares run on Linux, as a result, a Linux virtual machine with WaMaPro was installed on all the computers.

5. Informing Participants of Freely Available Data
The participants were also made aware of how and where to acquired free SAR data (Sentinel 1) from different online sources such as the ESA Copernicus Scihub.

6. **Local Partner**
AGEOS was our point of contact and local partner in Gabon. With the assistance of Mr Aboubakar who at times picked some of the participants from the airport ensured that transport was arranged for airport pickups and commuting from the hotel to the training venue for the duration of the training. In addition, the food which was also sponsored by AGEOS included three meals a day, lunch with morning and afternoon tea.

7. WGCapD Representative
SANSA was the representative of the working group; their responsibility was to coordinate the workshop by;

- Facilitating communication between UNOOSA and the participants for issuing flight tickets.
- Issuing of per diem to non-Gabonese participants.
- Ensuring that accommodation has been secured and paid for all non-Gabonese participants.
- Ensure an oversight of all other activities during the workshop.

8. Take Home Materials
The presentations and training material was shared with the participants but will also be saved at a central place where it can also be accessed by other EO users.

9. Closing Ceremony
On the last day of the workshop, Mr Aboubakar and Mr Phila Sibandze gave a vote of thanks to the participants and later awarded certificates of attendance and completion of the course.

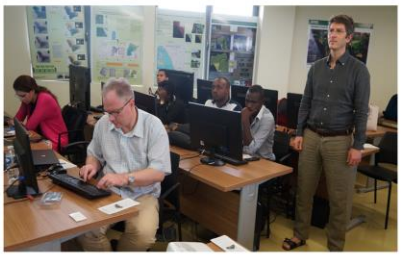
E. Training in Photos












F. Suggestions for Improvement:

- **More time for practical sessions**
  As much as the organiser increased the time allocated to hands-on practical session, the outcomes of the survey suggest that the time was still not sufficient.

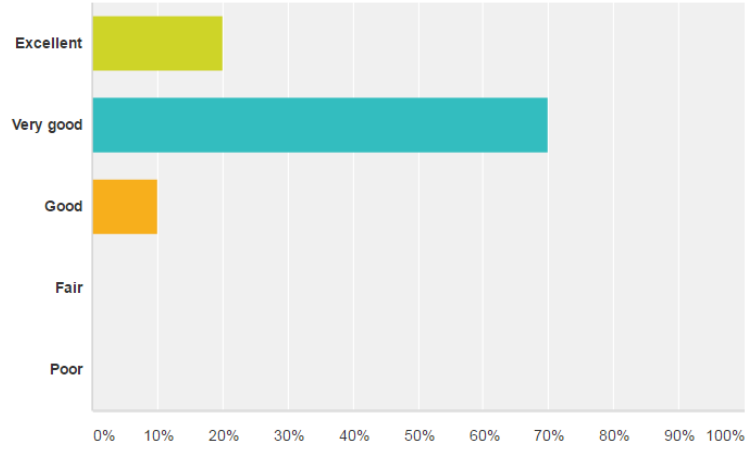
- **Language Barriers**
  Some of the participants indicated that they had challenges understanding either English or French depending on the language of instruction by the trainer.

- **Financial support**
  The participants indicated that financial support should be increased; a plea was made to consider paying for VISA's especially to those participants who are not from the host country.

G. Anonymous Online Survey

How would you rate the course?

Answered: 20 Skipped: 0



Answer Choices	Responses	
Excellent	20.00%	4
Very good	70.00%	14
Good	10.00%	2
Fair	0.00%	0
Poor	0.00%	0
Total		20

Comments (3)

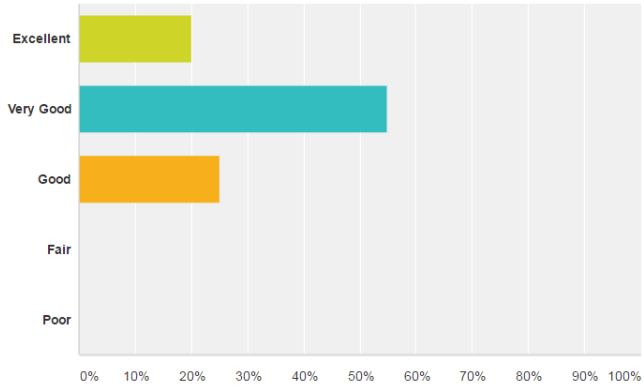
The course is very interesting, but in my case English has been a limit, because some parts like explanations of tomography and practical work on biomass have escaped me.
2/24/2017 3:07 PM View respondent's answers

Good plan but not well organized in terms of taking care of the trainees fro; abroad/ no enough fees to cover the basic needs like visa qnd super
2/24/2017 2:56 PM View respondent's answers

I learnt a lot on SAR processing but I would more practice
2/24/2017 2:55 PM View respondent's answers

How would you rate the lectures?

Answered: 20 Skipped: 0



Answer Choices	Responses	
Excellent	20.00%	4
Very Good	55.00%	11
Good	25.00%	5
Fair	0.00%	0
Poor	0.00%	0
Total		20

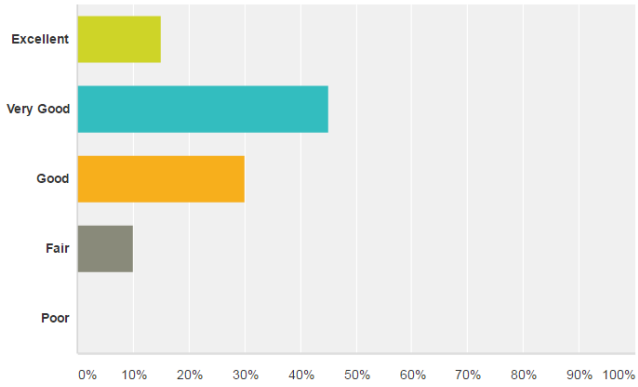
Comments (2)

Course too technical with many mathematical calculations.

2/24/2017 3:07 PM View respondent's answers
Good, very very good, some of them capture my focus but living in a frenchspeaking country, I had problem to tilted between accent from different countries but before a few time, it was better
2/24/2017 2:55 PM View respondent's answers

How would you rate the practical sessions?

Answered: 20 Skipped: 0



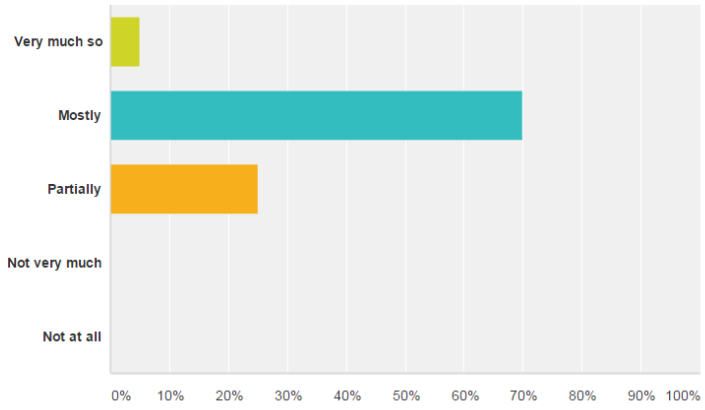
Answer Choices	Responses	
Excellent	15.00%	3
Very Good	45.00%	9
Good	30.00%	6
Fair	10.00%	2
Poor	0.00%	0
Total		20

Comments (8)

Except for TD floods. The trainer was too fast
2/24/2017 3:07 PM View respondent's answers
Mach time should be allocated to practicals
2/24/2017 3:03 PM View respondent's answers
But not that enough
2/24/2017 3:02 PM View respondent's answers
for parctical It must be purely practical.
2/24/2017 3:00 PM View respondent's answers
very good too but the time was too short to go deeper in softwares. I would like to learn more to produce data for applications like flood mapping or forestry
2/24/2017 2:55 PM View respondent's answers
Insufficient time for too knowledges
2/24/2017 2:52 PM View respondent's answers
i would have liked that pratical sessions to be longer
2/24/2017 2:51 PM View respondent's answers
Quick
2/24/2017 2:49 PM View respondent's answers

Was the balance between theory and practical appropriate?

Answered: 20 Skipped: 0



Answer Choices	Responses	
Very much so	5.00%	1
Mostly	70.00%	14
Partially	25.00%	5
Not very much	0.00%	0
Not at all	0.00%	0
Total		20

Comments (5)

Theory was needed, since these concepts are new; but also hands on practicals were much more need; i understand the idea that regarding the time we had(one week) it was not easy to evenly accommodate everything
2/24/2017 3:03 PM View respondent's answers

next time please more practices than theory
2/24/2017 3:02 PM View respondent's answers

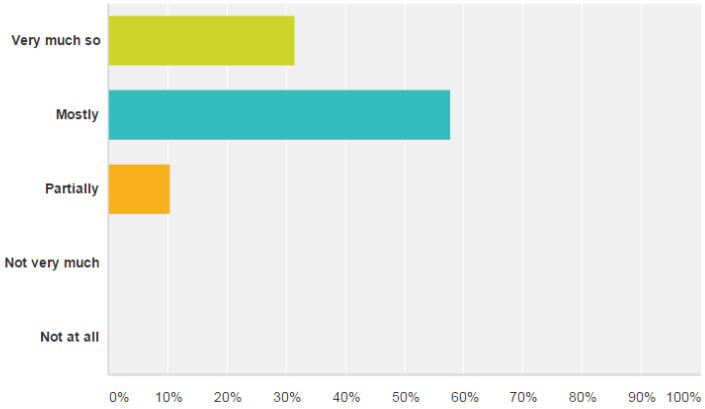
The need to master the practice more than the theory
2/24/2017 3:00 PM View respondent's answers

not equal, learn more on theory when the practice session doesn't follow because of time...
2/24/2017 2:55 PM View respondent's answers

Due to the introductory courses which were in French and i couldnt understand
2/24/2017 2:54 PM View respondent's answers

Did the course meet your expectations? (Was it relevant to your interests?)

Answered: 19 Skipped: 1



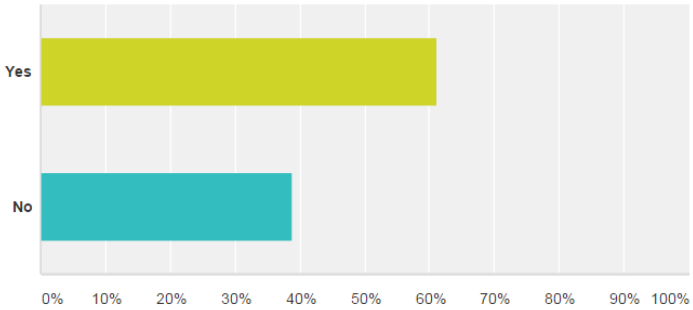
Answer Choices	Responses	
Very much so	31.58%	6
Mostly	57.89%	11
Partially	10.53%	2
Not very much	0.00%	0
Not at all	0.00%	0
Total		19

Comments (7)

Yes, because I do not know anything about radar treatments, now I have a good base.
2/24/2017 3:07 PM View respondent's answers
I HOPED MORE PRACTICAL ON THE FIELD OF FORESTERY, AGRICULTURE, BIOMASS
2/24/2017 2:56 PM View respondent's answers
would like it more practical
2/24/2017 2:56 PM View respondent's answers
they do, but not deeper but they do
2/24/2017 2:55 PM View respondent's answers
It was relevant,though I wish they had more practical exercises on agriculture monitoring.
2/24/2017 2:52 PM View respondent's answers
Insufficient time for too knowledges but it was good practical initiation
2/24/2017 2:52 PM View respondent's answers
Application in coastal vulnérabilties
2/24/2017 2:49 PM View respondent's answers

Are there any additional topics you think should have been included? If so, please comment.

Answered: 18 Skipped: 2



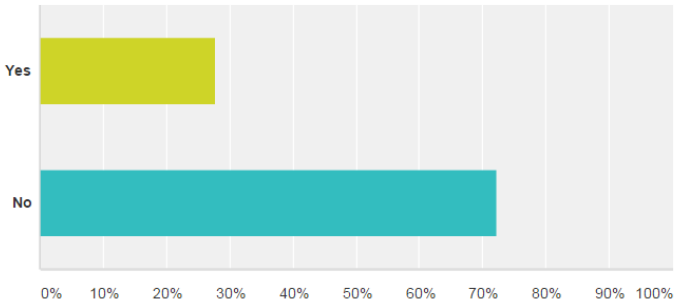
Answer Choices	Responses	
Yes	61.11%	11
No	38.89%	7
Total		18

Comments (13)

Urban an climat
2/24/2017 3:07 PM View respondent's answers
Health topic about vector of infectious diseases, and Prevention
2/24/2017 3:00 PM View respondent's answers
The use radar in other application as urbain, forest, agricultural
2/24/2017 2:57 PM View respondent's answers
SOME PRACTICAL EXERCICES ON VERTICAL AND HORIZONTAL INTREPETATION OF FOREST LANDSACPES
2/24/2017 2:56 PM View respondent's answers
all was there
2/24/2017 2:55 PM View respondent's answers
the use of the radar deta for the other application such as forest, urban
2/24/2017 2:55 PM View respondent's answers
Specific applications, mostly in the area of agriculture
2/24/2017 2:54 PM View respondent's answers
Fully urban experience and pratics
2/24/2017 2:53 PM View respondent's answers
Agriculture monitoring
2/24/2017 2:52 PM View respondent's answers
With this during it's sufficient
2/24/2017 2:52 PM View respondent's answers
DEM and DTM generation
2/24/2017 2:51 PM View respondent's answers
Mining applications Radar and optical images combinations
2/24/2017 2:49 PM View respondent's answers
GIS
2/24/2017 2:49 PM View respondent's answers

Are there any topics you think should have been left out? If so, please specify.

Answered: 18 Skipped: 2



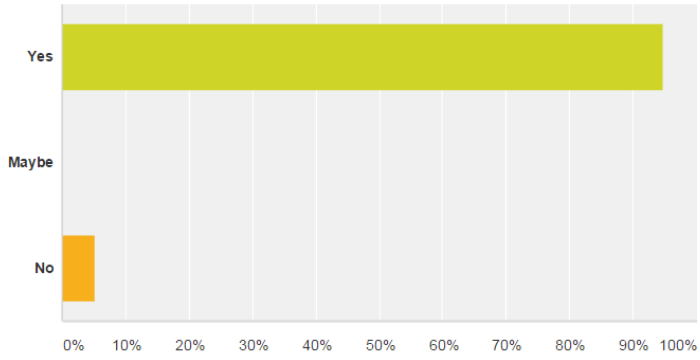
Answer Choices	Responses	
Yes	27.78%	5
No	72.22%	13
Total		18

Comments (6)

Urban and climat
2/24/2017 3:07 PM View respondent's answers
Theory about the creation of sofware
2/24/2017 3:00 PM View respondent's answers
The use radar in other application as urbain, forest, agricultural
2/24/2017 2:57 PM View respondent's answers
Cadastre
2/24/2017 2:53 PM View respondent's answers
There was alot of scientific backgrounds that were too complicated. They should concentrate more on practicals and application presentation.
2/24/2017 2:52 PM View respondent's answers
SAR Applications to Agric and forest degradation mapping
2/24/2017 2:51 PM View respondent's answers

Will you use Sentinel-1, or any other data from ESA, for your work?

Answered: 19 Skipped: 1



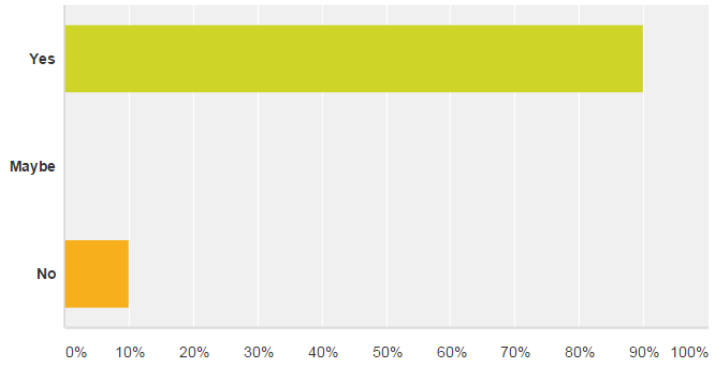
Answer Choices	Responses	
Yes	94.74%	18
Maybe	0.00%	0
No	5.26%	1
Total		19

Comments (4)

The habitat of insects or animals responsibles of infectious diseases must be known
2/24/2017 3:00 PM View respondent's answers
SENTINEL-2
2/24/2017 2:56 PM View respondent's answers
I alreaday do that and I'll do more
2/24/2017 2:55 PM View respondent's answers
Monitoring Ecological Center (www.cse.sn), CSE
2/24/2017 2:49 PM View respondent's answers

Will you use SNAP, LEOWorks, or any other ESA software toolboxes for your work?

Answered: 20 Skipped: 0



Answer Choices	Responses	
Yes	90.00%	18
Maybe	0.00%	0
No	10.00%	2
Total		20

Comments (3)

For all of i want, SNAP, LEOworks or any other is easy to use
2/24/2017 3:00 PM View respondent's answers
mostly SNAP
2/24/2017 2:55 PM View respondent's answers
I am beguining
2/24/2017 2:49 PM View respondent's answers

Any other comments

I want to participate regularly in these courses to improve myself and have mastery of the subject
2/24/2017 3:07 PM View respondent's answers
I have much appreciated the training; the skills acquired are really invaluable.I also think it is a good idea to bring people from different country; and i understand it requires a lot of financial resources; but there should be some minimum financial standards that organizers need to meet for such events. It becomes more interesting when organizers are financially ready for an event like this to be really unforgettable.MANY THANKS
2/24/2017 3:03 PM View respondent's answers
Good initiative
2/24/2017 3:02 PM View respondent's answers
This kind of Workshop is more interesting health activity
2/24/2017 3:00 PM View respondent's answers
no
2/24/2017 3:00 PM View respondent's answers
I HOPE THAT IT WILL HAVE OTHER SESSIONS MORE SPECIALLAZED SUCH ON APPLICATIONS OF BIOMASS/AGRICULTURE/FOREST
2/24/2017 2:56 PM View respondent's answers
I would recommand a follow up of the trained staff after the training and support the; in on work application of the acpuired skills, and plan for further training in order to uplift the knowledge in this filed
2/24/2017 2:56 PM View respondent's answers
Thank you for the workshop
2/24/2017 2:54 PM View respondent's answers
It was a good workshop. It has motivated me to read more on radar and later on apply it on my projects. Thanks to ESA for the will to disseminate their knowledge and data products.
2/24/2017 2:52 PM View respondent's answers
It was an excellent experience with great facilitation
2/24/2017 2:51 PM View respondent's answers
Ce fut un réel plaisir d'avoir assisté à cette formation. Ce serait intéressant d'organiser une telle formation en Afrique de l'Ouest dans un pays comme la Côte d'Ivoire que detient plusieurs centres de recherches en télédétection. Merci encore
2/24/2017 2:49 PM View respondent's answers
I like the workshop and i'll need the same at Senegal (in CSE)
2/24/2017 2:49 PM View respondent's answers

SAR Training Workshop Programme

Date: 20-24 February 2017
Hosted by: AGEOS
Location: AGEOS Ground Station Facility
Presented by: CEOS Working Group on Capacity Building & Data Democracy (WGCapD)

Day One: Monday, 20 February 2017:

Item #	Time	Activity	Presented By
0	08.30-09.00	**Registration**	All
1	09.00–09.30	**Welcoming Remarks**	AGEOS Representative
2	09.30–10.15	**Overview of AGEOS**	AGEOS Representative
	10.15–10.30	Tea Break	
3	10.30–11.00	**Introduction to CEOS** **SAR Course Overview**	Phila Sibandze (SANSA) Jean Paul Rudant (UMLV)
4	11.00–12.30	**Introduction to SAR Remote Sensing**	Jean Paul Rudant (UMLV)
	12.30–13.30	**Lunch**	
5	13.30–15:00	**Exercise: Basic SAR Processing with SNAP**	Jean Paul Rudant (UMLV)

	15.00–15.15	Tea Break	
6	15.15–16.00	**The SAR EDU Platform**	Kostas Papathanassiou (DLR)

Day Two: Tuesday, 21 February 2017:

Item #	Time	Activity	Presented By
7	09.00– 10.30	**Introduction to SAR Interferometry and Polarimetry**	Jean Paul Rudant (UMLV)
	10.30–10.45	Break	
8a	10.45-12.15	**POLinSAR & SAR Tomography**	Kostas Papathanassiou (DLR) Matteo Pardini (DLR)
	12.15–13.15	Lunch	
8b	13.15–13.45	**POLinSAR & SAR Tomography** cont.	Kostas Papathanassiou (DLR) Matteo Pardini (DLR)
9	13.45-14.45	**SAR Applications: Biomass & Foresty**	Naiara Pinto (JPL)
	14.45-15.00	Break	
10	15.00-16.15	**Exercise: Advanced SAR Processing** (Calibration, Filtering, Geocoding)	Jena Paul Rudant (UMLV)

Day Three: Wednesday, 22 February 2017:

Item #	Time	Activity	Presented By
11	09.00-10.00	**SAR Application: Landcover & Agriculture**	Naiara Pinto (JPL)
12a	10.00-11.00	**Exercise**: **Biomass & Forestry**	Matteo Pardini (DLR) Kostas Papathanassiou (DLR) Support by Naiara Pinto (JPL)
	11.00-11.15	Break	
12b	11.15–12.15	**Exercise**: **Biomass & Forestry cont.**	
	12.15–13.15	Lunch	
13a	13.15–14.15	**Exercise: Landcover & Agriculture**	Naiara Pinto (JPL) Support by DLR
	14.15–14.30	Break	
13b	14:30–16.00	**Exercise Landcover & Agricultire cont.**	Naiara Pinto (JPL) Support by DLR

Day Four: Thursday, 23 February 2017:

Item #	Time	Activity	Presented By
14	09.00– 10.00	**SAR for Disaster Applications**	Chris Stewart, ESA
15a	10.00–10.45	**Introduction to ESA Toolboxes I**	Chris Stewart, ESA
	10.45–11.00	Break	
15b	11.00–12.00	**Introduction to ESA Toolboxes I**	Chris Stewart, ESA
	12.00–13.00	Lunch	
16	13.00–14.15	**SAR data access & Sentinel data hub**	Phila Sibandze, SANSA Chris Stewart, ESA
	14.15–14.30	Break	
17	14.30–16.00	**Exercise: Oil slickmapping**	Chris Stewart, ESA

Day Five: Friday, 24 February 2017:

Item #	Time	Activity	Presented By
18	09.00–10:00	**Demo: Flood mapping with Snap**	Chris Stewart, ESA
19a	10.00–11:00	**Exercise: Flood mapping w. WaMaPro**	Phila Sibandze, SANSA
	11.00–11.15	Tea Break	
19b	11.15–12.15	**Exercise: Flood mapping w. WaMaPro**	Phila Sibandze, SANSA
	12.15–13.15	Lunch Break	
20	13.15–15.00	**Exercise: Deformation mapping**	Chris Stewart, ESA
21	15.00–16.00	**Support options through the UN-SPIDER Programme implemented by the UN Office** **For Outer Space Affairs in accessing very High resolution satellite imagery for disaster management**.	Lorant Czaran, UNOOSA
22	16.00–16.30	**Feedback from Participants**	SANSA/ESA/JPL/AGEOS
23	16.30–16.45	**Awarding Of Certificates & Workshop Closure**	SANSA/AGEOS