Evaluation Report
October 27, 2013

CEOS Working Group on Capacity Building and Data Democracy - **WGCapD**

Course: International e-Learning Course on Introduction to Remote Sensing Technology

Period: February 18 to June 10, 2013

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Appendixes:

1- Background

The Mission of the CEOS Working Group on Capacity Building & Data Democracy (WGCapD) is to build upon the CEOS Data Democracy principles in an effort to increase the capacity of institutions in less developed countries for effective use of Earth Observation data for the benefit of society and to achieve sustainable development.

One of the WGCapD´s targets is to provide education and training for enabling end users to gather the information they need, building autonomy and emphasizing open internet resources (open dataset catalogs, software and literature).

Given that Education is a tool for wider outreach to the world community, CEOS Agencies have joined efforts to conduct an e-learning course named *International e-Learning Course on Introduction to Remote Sensing Technology*.

The **main objectives** of the course, which reflect WGCapD's overall goals, were:

- Providing wider and easier access to Earth Observation data;
- Increasing the sharing of software tools such as the use of open source software and open systems interface;
- Increasing data dissemination capabilities, transferring relevant technologies to end users.

2- Course Outline

The course was free of charge and targeted at University Lecturers in Earth Sciences, who can enhance the multiplier effect by preparing practitioners to use remote sensing in Earth sciences.

INPE proposed the preliminary syllabus and the course structure and interested CEOS Agencies provided points of contact to be potential instructors for the course. A core team (INPE, NOAA, USGS and NASA SEO) was set up and held several teleconferences until the course was completely assembled.

The 19 instructor volunteers came from nine CEOS Members and Associates: CNES/IRD, CONAE, INPE, ISRO, NASA (SEO), NOAA, SANSA, UNOOSA and USGS. (See Appendix I)

The main issue for this kind of course is selecting committed students who could help building knowledge hubs for EO data democracy. This pilot course aimed at developing countries in Africa where there were regional organizations and points of contact that could help identifying target participants.

We targeted at those African countries where there were regional organizations, such as in:

- **Nigeria**: African Regional Centre for Space Science and Technology Education - in English Language (ARCSSTE-E), affiliated to the United Nations and National Space Research and Development Agency (NASRDA).
- **Kenya**: Regional Center for Mapping of Resources for Development (RCMRD).
- **South Africa**: South African National Space Agency (SANSA).

The pilot course had English as the official language, but future events may consider offering the course in other languages too.

A website was created at INPE containing information about the course, as well as, a form for online applications. (http://www.dpi.inpe.br/ceos/e_learning)

In December 2012, the course was widely advertised through CEOS website (http://www.ceos.org), CEOS lists, WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) newsletter and a special list of contact-points in universities of South Africa, provided by SANSA.

The course was divided in 4 modules (180 hours total), covering the following main topics:
1- General view of Remote Sensing in the world.
2- International Coordination and Data Exchange (CEOS, GEO, UNOOSA).
3- Principles of Remote Sensing, Sensors and Platforms.
4- Datasets Access and Tools.
5- Remote Sensing Applications (Natural Disasters, Agriculture, Fire Mapping and Urban Planning.

Please see Appendix II for the complete syllabus.

The initial proposal was to encourage the development of an **Application Project**, which would help demonstrate Student´s ability to apply the new skills learned to a real-world problem. Unfortunately, due to lack of coordination among Instructors, it was not possible to pursue this idea. One option was given to the Students though: if interested they could develop a project afterwards, in the following 2 months. Out of the 16 approved Students, 7 decided to take this opportunity, in the areas of Flood Monitoring and Urban Sustainability, advised by ISRO and INPE. Instructors contacted them but, unfortunately, there were no responses and no projects were pursued. We believe we lost the momentum by postponing this activity. Students probably went back to their busy lives and activities, and didn´t find time to do it.

Course materials included well-organized tutorials, selected datasets and internet links. Using NASA´s license to *GoToMeeting*, two live classroom sessions per week were held, recorded and made available afterwards for downloading. Students were exposed to a variety of resources, software tools and datasets, all of open and free access.

Teleduc, a free and open Learning Management System (LMS) developed by researchers at the State University of Campinas –UNICAMP, Brazil, was used to support the course fostering the interaction among instructors and students with different backgrounds.

Although during the course access to materials was placed behind authentication restrictions in the LMS, afterwards it was opened up, following Instructors permissions, into a WIKI of total free access, motivated by the Open Educational Resources initiative. (http://wiki.obt.inpe.br/doku.php?id=e-learning)

Of the more than **70 people who signed up**, **30 participated** (South Africa, Nigeria, Kenya, and Tanzania) throughout the 4 months that the course ran, and **16 completed all of the requirements and received the certificate**. It is worth pointing out that, from the 14 Students that failed, we can say that there was a real dropout from **6 of them** (they were signed to

Teleduc and never accessed the system after March). The other **8 Students** kept accessing *TelEduc*, mainly the Readings Tool and participated in the web-sessions, but never handed out the required assignments. Our hunch is that they were interested in the course but not in the certificates. Some of them might have thought of using the material to study on their own afterwards.

Follow-up questionnaires were sent to Students and Instructors seeking information that would enable assessment of the contribution of the course as well as suggestions for improvement. **Twenty one Students** (15 that successfully completed the course and 6 who did not) and **fifteen Instructors** completed the survey. There were Yes/No, multiple choices and open questions. (See Appendices III and IV).

The successful participants received an email to congratulate them. In this email there was also a request to confirm the physical address that they used during the application. This step was necessary to be absolutely certain that the package containing the certificate was sent to the correct address. The package participants received contained:
- a printed and signed certificate issued by INPE (in Portuguese);
- an official translation of the certificate to English

3- Compiled results from Students´ Surveys

The **Students´ survey** was divided into 3 blocks: Personal Information, Course Organization and Structure and Overall Expectations.

The results of our study reveal that most Students (90%) were satisfied by the way the course was organized and 76% of them said it was excellent and 24% said it was good.

It was first online education experience for 67% of them and 90% felt comfortable with it. The main advantage mentioned was the ability to attend the lectures without having to travel to the class to participate in a face-to-face course, thereby saving money and time on transportation: "My online experience was fantastic, in fact amazing. Personally, I was always expectant when we were to have a web-session and feel bad if I wasn´t able to attend. The interaction with instructors during the sessions was nice." Some Students sometimes faced the challenge of slow internet connection, but since the online sessions were recorded, they could download and watch them later, having the benefit of revisiting the sessions through the recordings.

The course met the expectations of 20 respondents, and the one that answered "No" explained he was expecting have had more some hands-on activities in the areas of RS/GIS software's application to solving environmental issues. The graphic below compiles some of these results:
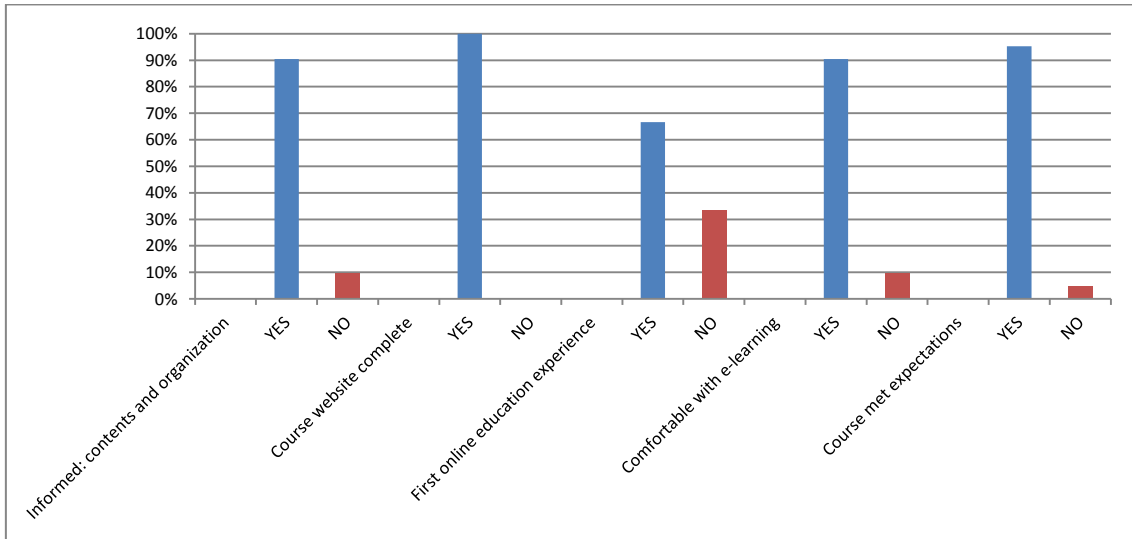
Instructors were well evaluated by Students, mostly with grades Excellent and Good, and the main criticism is related to sometimes late feedback and assignments evaluation. In distance learning, the physical and temporal separation of instructors and students, and between students themselves, can lead to feelings of isolation. Therefore, there must be constant interaction among all participants to avoid this feeling and increase motivation throughout the course: "Activities should be evaluated in time; this will encourage the student to work harder".

For illustration purposes, some quotes concerning the **aspects of the course that most benefitted Students** are presented below:
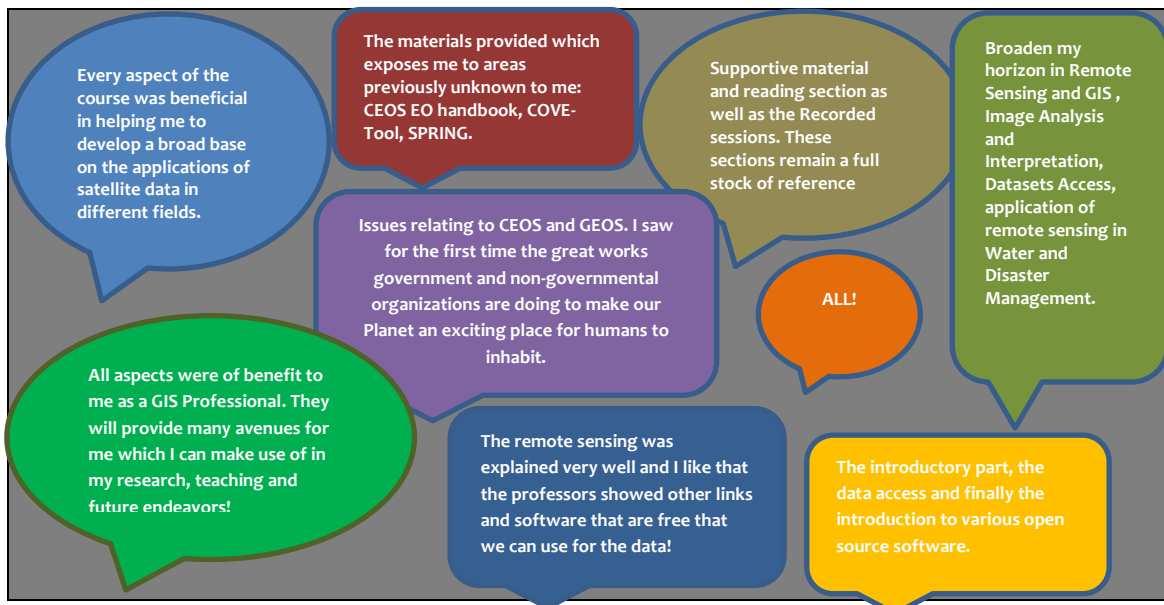
While in general the feedback was positive, participants also had some suggestions and comments. The most commented issues are related to requests for more hands-on activities using a GIS. The suggestions for improvement are related to the following aspects of the course:

Course Organization	− Arrange web-sessions with more time ahead. − Organize alternative dates for web-sessions.
Hands-on Activities	− Introduce training on application software like the SPRING. − Consider asking the participants to formulate and work through a RS/GIS project to test mastery of the concepts learned throughout the course. − Include practical classes where there can be demonstrations and if possible computers (from the lecturer) where students can be given access to work in real time and ask questions. − Explore further ways of ensuring practical understanding and applications in image processing and interpretation.

4- Compiled results from Instructors´ Surveys

Responses from 15 Instructors were received. The results of our study reveal that all Instructors (100%) answered they were well previously informed of course organization and contents; 87% said they were aware of the commitments as Instructors. This was the first online education experience for 47% of the Instructors and when asked to compare this experience to other face-to-face courses they had taught, they commented:

- ✓ More flexibility in terms of hours, but awkward in the sense this is not a live experience.
- ✓ It is strange for the teacher since we don't have visual feedback on the students. We don´t know if they are listening or not.
- ✓ As with any online course, we don't have a feeling of how to work with certain underperforming students.
- ✓ I think this is a very useful opportunity to learn without travel and expenses.
- ✓ I still feel a little bit more confident about the effective delivery of knowledge in face-to-face courses.
- ✓ It was much worse.
- ✓ The face-to-face courses I teach are far more interactive. The students are asked to do hands-on activities and work with each other. That is nearly impossible with GTM due to poor connection speeds and limited camera availability etc.
- ✓ I really prefer the face-to-face courses because you can interact better with the students, you can help them in the moment and because you can obtain an instantaneous feedback with the students questions, interest, expressions and attitudes. In the other hand, face-to-face courses are not always possible.
- ✓ It was very new for me but exciting at the same time.
- ✓ It is as good as other
- ✓ The e-learning increases the possibility of participation from developing countries. The relationship teacher-student is not the same, but it can improve through the time and with the use of multimedia tools
- ✓ On line teaching is more challenging than face to face courses where one can read the facial expression of the student and mold the teaching accordingly, one can make it more interactive etc.
- ✓ More demanding, but interesting

Overcoming all challenges, 100% responded they would be willing to participate in a next edition of the course. Some of the results of the survey are compiled in the graphic below:
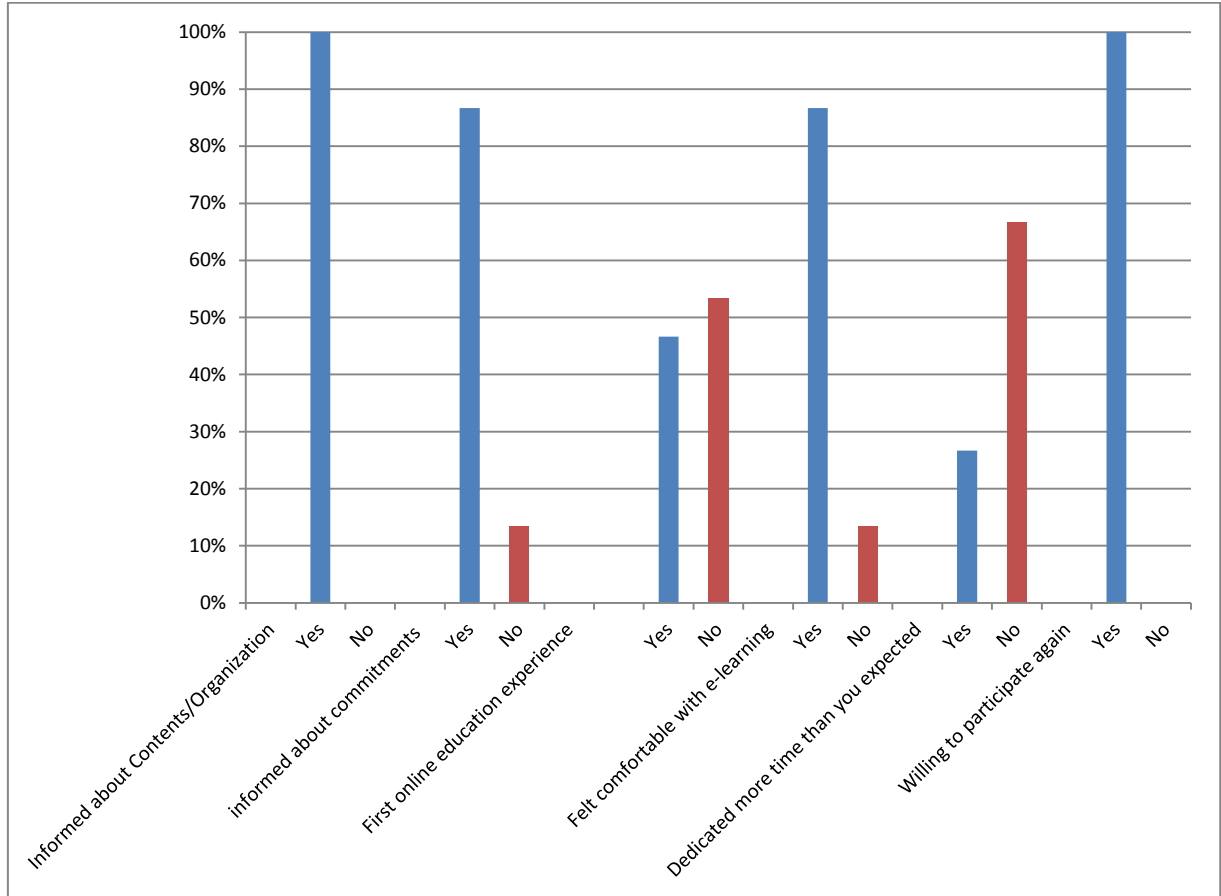
In regards to the overall impression of the course, 29% said it was Excellent, 64% Good and 7% Needs Improvement:

General Comments:

- All the material should be available on wiki except recorded classes (if required edited recorded class may be kept on wiki).
- It was a pleasure to participate.
- A few sessions were less well prepared than others. The non-live sessions I felt were less effective.
- Considering the course is free, it was good.
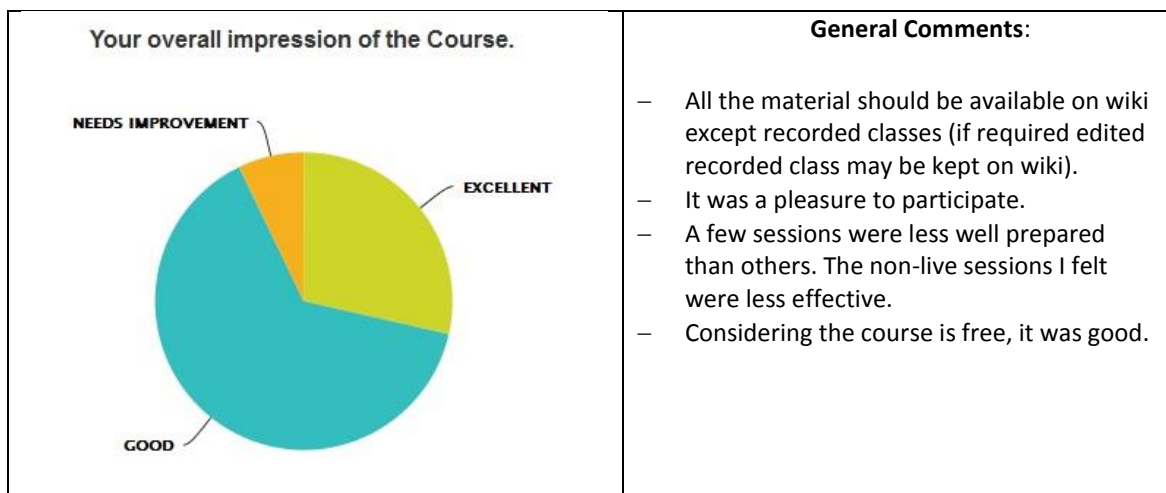
Some suggestions for improvement provided in the survey are listed below:

- ✓ More interaction with the students through GOTOMEETING
- ✓ *Teleduc* system should be improvised and made more interactive.
- ✓ The evaluation needs more control. Perhaps we can increase the consultation time.
- ✓ One face-to-face meeting of faculty and students. I know how challenging this is, but it is certainly worth considering.
- ✓ We need more instructors' cooperation. It is important to select instructors that have more commitment.
- ✓ As a group, need to spend a little more time on a teleconference going through the roles and responsibilities of instructors, what rigor Activities should have etc.
- ✓ There should be more specific structure given to the instructors on what exactly they should be teaching. A little more structure in the program and for the instructors on what is expected from them might help prevent long, boring, rambling classes.
- ✓ When designing the structure next year, it must be VERY CLEAR how the students can utilize what they've learned as they MOVE THE INFORMATION FORWARD in the classroom and elsewhere. If it is not very clear how they can do this or why they should, they never will, and then it is all a wasted effort.

5- Lessons Learned

Instructors
i. More clear objectives and commitments from instructors, since some could not go ahead with the project and did not have their profiles ready on time.
ii. All materials should be ready before the course starts (e.g., PowerPoint presentations with narration did not work)
iii. Since Instructors were volunteers, there should be a type of encouragement for them: certificates of participation, proposing to write a joint paper etc.

Course organization and contents
i. Present clear tutorials on how to use *TelEduc* and *GoToMeeting* Tools, for both Instructors and Students, before the course starts.
ii. Make sure all topics on the syllabus are covered (e.g., we were not able to take in all that was planned: *SOPI, Orfeu, SPRING* (hands-on demonstrations) and projects.
iii. Coordinate better in designing weekly assignments.
iv. Use more the Discussion Forum tool, trying to identify problems having more to do with Students´ real lives
v. Need to be able to overcome real-time Internet problems
vi. Further explore Eumetcast Training Channel as a data delivery mechanism.

vii.   Change Learning Management System, e.g. Moodle. *TelEduc* was found old fashioned.

6- Conclusions

Overall, this has been a successful multicultural experience for accessing education in Remote Sensing in developing countries.

It was essential to have a person dedicated to organize and interact with instructors and students at all times during the course. The collaboration amongst all partners really made this course a success. Being able to draw from several agencies' expertise, tools, software, resources and support made this effort possible. It also enriched the experience for the participants by diversifying the tools and skillsets offered and widening their network considerably. Collecting feedback surveys from the students and instructors at the end of the course is crucial if we are to improve. It also gives participants the opportunity to express their opinions, ask general questions, and reflect on their experience.

Considering the results of our surveys, most of the students were satisfied with their learning and very grateful for the opportunity. At the end, to show their thankfulness, Students sent an appreciation e-card to all Instructors (see Appendix V).

Despite some limitations, the delivery methodology has proved to be efficient and the outcomes of this online course have been encouraging to pursue other courses in the future. Since it was a virtual course and participants never met in person, a group picture was assembled, using the photos they made available in their Profiles in *TelEduc* (see Appendix VI).

Contact

INPE: Hilcéa Ferreira, Course Coordinator (hilcea@dpi.inpe.br)

CNES/IRD: Laurent Durieux and Damien Arvor

CONAE: Sandra Torrusio and Josefina Otero

INPE: Claudia Maria de Almeida, Hilcéa Ferreira, Ivan Marcio Barbosa, Julio Dalge, Laércio Namikawa, María Silvia Pardi Lacruz, Tania Maria Sausen and Teresa Florenzano

ISRO: SP Aggarwal and Shefali Agrawal

NASA (CEOS SEO): Kim Keith

NOAA: Andrew Heidinger

SANSA: Nale Mudau and Phila Sibandze

UNOOSA: Lorant Czaran

USGS: Eric Wood

Course Syllabus

Module 1 – Introduction, History and International Support

Week 1 –February 18 -24
- First steps
- General view of Remote Sensing in the world: history, evolution, legislation and policy, main activities, references, websites etc.

Week 2 – February 25 - March 3
- International Coordination and Data Exchange (CEOS, GEO, UNOOSA)

Module 2 – Principles of Remote Sensing, Sensors and Platforms

Week 3 – March 4 - 10
- Understanding of spectral signatures and interaction of the electromagnetic radiation with the atmosphere and natural targets.

Week 4 – March 11 to 17
- Spatial, temporal, spectral and radiometric resolution of remote sensing Images.

Week 5 – March 18 to 24
- Concepts of Cartography for Remote Sensing.

Week 6 – March 25 to 31
- Sensors and platforms (general view of all sensors that will be used in the course: Landsat Program, CBERS program, MODIS program, SAC-C and SAC-D programs and Sumbandila Program).

Module 3 – Data and Tools

Week 7 and 8 – April 1 to 14
- Datasets Access: satellite images & software.

Week 9 and 10 – April 15 to 28
- Images Analysis and Interpretation.

Week 11 – April 29 to May 5
- Integration with Geographic Information Systems .

Week 12 – May 6 to 12
- Digital Terrain Modeling.

Module 4 – Remote Sensing Applications

Week 13 – May 13 to 19
- Natural Disasters

Week 14 – May 20 to 26
- Agriculture (Crop Monitoring)

Week 15 – May 27 to June 2
- Fire Mapping
- Urban Planning

Week 16 – June 2 to June 9
- Projects finalizations

APPENDIX III

Questionnaire for Students

We kindly ask you to complete this form that will help us evaluating this

Personal Information

*1. Full Name

*2. What Institution or University do you work for?

*3. E-mail Address

*4. What country do you live?

Course Organization

*5. Were you informed in advance about contents and organization?

- ○ YES
- ○ NO

6. Was the course website complete?

- ○ YES
- ○ NO

What was missing?

Online Experience

*7. Is this your first online education experience?

- ○ YES
- ○ NO

8. In case you answered "NO" before, what Learning Management System (such as TelEduc) was used?

*9. How did you get along technically with TelEduc?

*10. Are you comfortable with the idea of doing coursework outside of the traditional classroom without the daily/weekly face-to-face interaction between students and instructor?

- ○ YES
- ○ NO

*11. How would you compare this online experience to other face-to-face courses you have taken?

Overall Evaluation

*12. Course Contents: How would you rate the following?

	Excellent	Good	Fair	Needs Improvement
TelEduc	○	○	○	○
Course Presentation	○	○	○	○
Course Contents	○	○	○	○
Readings (ppts and pdf files)	○	○	○	○
Support Reading Material	○	○	○	○
Websessions (Using GoToMeeting)	○	○	○	○
Recorded Sessions	○	○	○	○
Proposed Activities	○	○	○	○

13. How would you rate the Instructors?

	Excellent	Good	Fair	Unsatisfactory
Hilcea Ferreira	○	○	○	○
Teresa Florenzano	○	○	○	○
Lorant Czaran	○	○	○	○
Shefali Agrawal	○	○	○	○
Andrew Heidinger	○	○	○	○
Julio Dalge	○	○	○	○
Eric Wood	○	○	○	○
Kim Keith	○	○	○	○
Laercio Namikawa	○	○	○	○
Nale Mudau	○	○	○	○
Sandra Torrusio	○	○	○	○
Damien Arvor	○	○	○	○
María Silvia Pardi Lacruz	○	○	○	○
Tania Maria Sausen	○	○	○	○
Ivan Marcio Barbosa	○	○	○	○
Sp Aggarwal	○	○	○	○
Claudia Almeida	○	○	○	○

*14. Which parts of the Course did you find most/least helpful?

Course Expectations

15. Did the course meet your expectations?

○ YES

○ NO

Any Comments?

16. Which aspects of the course were of most benefit to you and why?

*17. Was the amount of time you spent for the course appropriate for the amount you learned?

*18. Your overall impression of the Course.

○ EXCELLENT

○ GOOD

○ FAIR

○ NEEDS IMPROVEMENT

Any Comments?

19. Please give us suggestions for improvement.

*20. Do you intend to develp a thematic project with your students using what you have learned in this course?

○ YES

○ NO

21. In case you answered YES, in which area?

○ Urban Sustainability

○ Water Management

○ Disaster Management

○ Ecology

○ Agriculture

○ Other (please especify)

*22. Thanks for participating in this questionnaire! The last question is a self-evaluation: please reflect on your performance. Based on what you have learned during this course, what grade would you give to yourself (from 1 to 10)?

APPENDIX IV
Questionnaire for Instructors

Evaluation by Instructors

Personal Information

*1. Full Name

[   ]

*2. E-mail Address

[   ]

*3. What is your Space Agency/University?

[   ]

Course Organization

*4. Were you well informed in advance about contents and organization?

○ YES

○ NO

*5. Were you well informed about your commitments as an Instructor?

○ YES

○ NO

*6. Was the course website complete?

○ YES

○ NO

What was missing?

[   ]

Online Experience

*7. Is this your first online education experience?

○ YES

○ NO

8. In case you answered "NO" before, what Learning Management System (such as TelEduc) was used?

[   ]

*9. How did you get along technically with TelEduc?

[   ]

*10. How did you get along technically with GoToMeeting?

[   ]

Evaluation by Instructors

*11. Are you comfortable with the idea of teaching a course outside of the traditional classroom without the daily/weekly face-to-face interaction between students and instructor?

○ YES

○ NO

*12. How would you compare this online experience to other face-to-face courses you have taught?

[   ]

Overall Evaluation

*13. Did you have to dedicate more time for class preparation and students follow-up than you expected?

○ YES

○ NO

Please comment:

[   ]

*14. Would you like to advise one of the students in his/her thematic project in the next 2 months?

○ YES

○ NO

*15. Would you like to participate in a next edition of International e-learning course in 2014?

○ YES

○ NO

*16. I am planning to create a WIKI with all course materials, including ppts, pdfs and recorded classes. I believe this will be helpful for other students all over the world. Do you agree to have your material freely available on this WIKI?

○ YES

○ NO

Evaluation by Instructors

*17. Your overall impression of the Course.

○ EXCELLENT

○ GOOD

○ FAIR

○ NEEDS IMPROVEMENT

Any Comments?

[   ]

*18. Please give us suggestions for improvement.

[   ]

Participants

Abdul Husaini
Abdul-rahman Adeniran Adegbite
Adamu Usman Mohammed
Bolarinwa Balogun
Enoch Elemo
Farai Dondofema
Ganiyu Agbaje
Joseph Olusina
Josiah Nuhu Jabbo
Oladipo Oni
Olakunle Rufus Oladosu
Oluwatoyin Ajayi
Omowumi Alabi
Samson Adia Oro-ghene
Samuel Anih
Temitope Dare T. Oyedotun
Tsekou Toure Kenyanito
Yanina Colberg

(June, 2013)

APPENDIX VI

"Group Picture"