

TRAINING ACTIVITIES AT THE
REGIONAL REMOTE SENSING CENTRE,
OUAGADOUGOU (C. R. T. O.)

by

Dr. Léon OKIO

and

Dr. J.P. OKANG.

1. INTRODUCTION

As a result of the Conference of Ministers of the United Nations Economic Commission for Africa (E C A) held in KINSHASA, Zaïre in March 1977, the African Remote Sensing Council was created. The Council in turn established five regional remote sensing centres in CAIRO (Egypt), ILE-IFE (Nigeria), KINSHASA (Zaïre), NAIROBI (Kenya) and OUAGADOUGOU (Burkina Faso).

The Regional Remote Sensing Centre, OUAGADOUGOU (CRTO) is managed by a Ministerial Committee of fifteen representing the fifteen member states from Western Africa -- ALGERIA, BENIN, BURKINA FASO, CAMEROON, CONGO, COTE D'IVOIRE, GHANA, GUINEA, LIBERIA, MALI, MAURITANIA, NIGER, SENEGAL, SIERRRA LEONE and TOGO.

The aims of CRTO are to promote, among member states, the use of remote sensing through the following activities :

- operation and maintenance of a receiving station ;
- recording, reproduction and dissemination of data to users ;
- extension of facilities for data analysis to users ;

- development of a programme for training and assistance to users.

The training programmes at CRTO, begun in 1978, are designed to educate and train scientists, engineers and technicians to be able to deal with the problems of preservation, conservation and utilization of renewable and non-renewable resources using remote sensing techniques which permit rapid and efficient methods of data acquisition and analysis by researchers and resource managers.

Field trips form a regular and important part of the training programmes, and are designed to emphasize the importance of ground truthing in remote sensing. Burkina Faso, with its varied terrain conditions, provides excellent facilities for the study of erosion, desertification, deforestation, geology, drought, water resources, agriculture, etc.

CRTO keeps close contact with its former trainees and organises, when necessary, appropriate refresher courses to update their knowledge.

2. TRAINING PROGRAMMES

2.1 - Target Groups

CRTO provides education and training in remote sensing applications to take care of a wide range of requirements for different categories of personnel and at different levels.

The target groups are :

- decision makers and planners ;
- engineers or professionals who are responsible for operational tasks in remote sensing applications in their establishments ;
- technologists and higher technicians who carry out remote sensing tasks under supervision of the engineer ;
- teachers and research workers.

Thus, programmes have been separated into appropriate modes, namely : sensitization, regular, specialised and refresher courses, workshops, seminars, projects and conferences. All courses are available in both English and French.

2.2 - Curricula and Syllabi

2.2.1 - Sensitization Course

Objective : To present to decision makers achievement and potentialities of remote sensing techniques in national development, by lectures, demonstrations and discussions.

Duration : Two weeks.

Syllabus :

First Week : Orientation and introduction to CRTO ; Fundamentals of remote sensing -- image formation, satellite systems, principles of airphotograph and satellite image interpretation, principles of digital image processing, acquisition of aerial photographs and satellite images.

Second Week : Introduction of remote sensing applications in various disciplines -- agriculture, geology, hydrology, rangeland management, human settlements, etc. Discussion of specific problems pertaining to remote sensing activities at the national level : advantages, limitations, financial and legal implications.

2.2.2 - The Regular Remote Sensing Course

Objective : This standard course is aimed at preparing the participant to understand the basic principles of remote sensing technology, and to be able to apply them in his field of specialization.

Duration : Nine months (October to June).
The course is divided into three main parts :

1. Principles of remote sensing (4 months) ;
2. Remote sensing applications (1½ months) ;
3. Individual projects and writing of reports (3 ½ months).

Entry Qualification : Participants must be graduates in any one of the fields of application of remote sensing.

Syllabus :

Part 1 : Principles of Remote Sensing

Theory and practice (28 hours per week) in the following topics : History of remote sensing, fundamentals of remote sensing, elements of photographic systems, elements of aerial photo interpretation, photogrammetry, radiometric characteristics of aerial photographs, aerial thermography, multispectral scanners and pattern recognition, microwave remote sensing, spaceborne remote sensing, ground truthing.

Part 2 : Remote Sensing Applications

The applications programme which includes a two week course each in Remote Sensing Management and Digital Image Processing, stresses the application of remote sensing techniques in the fields of agronomy, cartography, forestry, geology, hydrology, etc.

Part 3 : Individual Project

Participants work on projects in their own fields of specialisation under the supervision of experts. They must submit an acceptable project report.

2.2.3 - Specialized Courses

These courses are specialized either in one technique of remote sensing (photography, photo interpretation, digital image processing, etc) or in one special application of remote sensing (agricultural statistics, water resources managements, rangeland inventories, census cartography, human settlements, etc.).

Duration : One month to five months.

Entry Qualification : The minimum entry qualification for the course depends on the course being offered, and may be at the technician or engineer's level.

2.2.4 - Research and Study Courses

High level scientists working in any field of remote sensing applications can find at CRTO technical and material aids appropriate to their research or study course.

Duration : Depends on the background and progress of the student.

2.2.5 - Refresher Courses

Objective : To develop exchange of information between CRTO and its former trainees. For participants, the aim is to update their knowledge of remote sensing techniques, methodologies and available products of remote sensing. For CRTO, the aim is to continually re-evaluate the needs of users.

Duration : Eight weeks.

2.2.6 - Outreach Seminars

CRTO has initiated an outreach programme in the sub-region to inform both member and non member-states of the role and importance of remote sensing as a management tool and to advertise the services offered by the Centre.

Duration : One week.

2.2.7 - Workshops

CRTO's experts offer special practically oriented courses either at CRTO or, by special request, at clients'

offices for a small group of participants in specific fields of remote sensing application.

Duration : Two to six weeks.

2.3 - Trainee Enrolment - 1987

Enrolment at CRTO is generally low due partly to inadequate facilities and partly to few applications. Enrolment for courses offered in 1987 are as follows :

XXIII Regular Course (Francophone)	15
II Specialised Course in Resources Management (Francophone)	5
XXIV Regular Course (Anglophone)	5
I Sensitizing Course (Francophone)	8
XXV Regular Course (Francophone)	16.

2.4 - Countries of Origin of Trainees

From 1978 to the end of 1987, CRTO had trained a total of 255 engineers and technicians in more than 20 disciplines of the earth sciences.

The numbers of trainees from member states and non-member states are as follows :

Member States

1. BURKINA FASO	63		9. NIGER	11
2. MALI	24		10. CAMEROON	10
3. GHANA	22		11. LIBERIA	8
4. GUINEA	20		12. SIERRA LEONE	8
5. SENEGAL	15		13. COTE D'IVOIRE	6
6. BENIN	14		14. MAURITANIA	4
7. TOGO	13		15. ALGERIA	2
8. CONGO	12			
			Total	= 232

Non-Member States

1. NIGERIA	7		4. GABON	3
2. C. A. R.	5		5. GAMBIA	2
3. CHAD	4		6. ZAIRE	2
			Total	= 23

3. ACADEMIC STAFF

The academic staff consists of specialists of the different sciences and technologies related to remote sensing.

Apart from the permanent staff, CRTO receives substantial support for its training programmes from international agencies which provide visiting professors/experts, scholarships for trainees and remote sensing equipment. The agencies which provided assistance to CRTO in 1987 are FAC (Fonds d'Aide et de Coopération), FAO (United Nations Food and Agricultural Organisation), FED (Fonds Européen de Développement), JOHN-PAUL II Foundation for the Sahel, UNDP (United Nations Development Programme), University of OUAGADOUGOU, UNSO (United Nations Sudano-Sahelien office) and USAID (United States Agency for International Development).

Without aid from the international organisations it will be difficult for CRTO to provide all the experts required for all the fields of application. Indeed it is not practicable for CRTO to employ experts in all these fields.

In 1987 a total of 38 professors/experts were involved in the training programmes. These can be grouped into three categories as follows :

- Permanent Staff of CRTO	8
- Staff seconded by Donors/International Agencies	13
- Part-time Staff from Ouagadougou	17
Total	= 38

4. EQUIPMENT

Equipment and facilities at the disposal of trainees at CRTO include :

- Colour Photographic Laboratory, equipped with the most modern facilities, such as 2 King Concepts Color Processor, Versamat 11 Film Processor, Durst Color Enlarger
- 16 mm Film Projector Model RT-1
- Buhl Overhead Projector
- Map-O-Graph 55 C-2
- Chromaline Diazo Printer
- Singer Caramate 3300 Slide Projector/Cassette Player
- Kodak Slide Projector Model B-2 AR
- Radiometer - EXOTECH Inc. Model 100 AX
- NUMELEC Mini-Computer PERICOLOR 1000 with EMI 8800 Tape Reader and CANNON PJ/080 A Color Printer
- Zero Setting Planimeter
- Pantographs
- Mirror and Pocket stereoscopes with Parallax Bars
- Light Tables
- Special Drawing Instruments
- Field Trip Equipment
- Library
- Archives : aerial photographs, satellite images, maps, etc.

5. PROBLEMS AND DIFFICULTIES

A few problems and difficulties hamper the smooth running of courses at CRTO. Among them are :

1. Equipment and Materials : The high cost of equipment and remote sensing data affects the running of the courses, especially since images have to be ordered from time to time. Besides, efforts to secure demonstration copies of images free of charge from the appropriate agents have been futile.
2. Books and Journals : There is lack of sufficient reference books and journals particularly in the French Language. As a result, trainees do not have access to recent research results for reference in their project assignments.
3. Late Commencement of Courses : Courses often start one to two weeks late because of late arrival of participants. This is due to the poor communication system in the sub-region, and to the late submission of application forms by directors of applicants.
4. Sponsorship of Trainees : Because of the high cost of training and the poor financial standing of the Centre, all applicants are advised to approach their governments or international agencies for sponsorship. Most of the time they are not successful and rely on CRTO to find scholarships for them. But the limited number of scholarships available through technical aid agreements imposes limitations on the intake of applicants
5. Unqualified Applicants : CRTO's policy is to give equal opportunity to all member states to benefit from its training programmes. Therefore, for every course, at least one scholarship is awarded to each member state which nominates the participant. Even though entry qualifications are always specified, there have been instances where unqualified applicants have been recommended for the courses.

6. FUTURE COURSES

The following courses are scheduled for 1988/1989 :

- October 1988 : The XXVIth Regular Course (9 months) in English and French ;
- October 1988 : The First Refresher Course (8 weeks) in French ;
- April 1989 : The IVth Specialised Course in Crop Forecasting (12 weeks) in French ;
- October 1989 : The XXVIIth Regular Course (9 months) in English and French ;
- October 1989 : The IIInd Refresher Course (8 weeks) in English ;
- One-week Seminars in member states.

7. CONCLUSION

Since its inception CRTO has produced a number of experts who use remote sensing as a tool in their own fields of specialisation.

The numbers trained, the diversity of disciplines and countries of origin, are evidence of a progressive introduction of remote sensing techniques in the sub-region as well as evidence of the enviable position of CRTO among similar institutions.

Many of the graduates of CRTO are occupying high positions of responsibility in their countries, and are actively involved in the application of remote sensing techniques in investigating renewable and non-renewable resources.

Since 1986 training programmes at CRTO have been improved considerably with the introduction of new courses.

Although CRTO has made remarkable progress in remote sensing training, it is not resting on its oars until the numerous bottlenecks have been surmounted. The Centre will always cherish and maintain its contacts with international organisations for technical assistance.

REFERENCE : OKANG J.P. and OKIO L., "Operational Remote Sensing Training Programmes at the Regional Remote Sensing Centre, Ouagadougou (CRTO) -- Successes and Bottlenecks", a Paper presented at the UN Meeting of Experts on Space Science and Technology and its Applications within the Framework of Educational Systems, LAGOS, Nigeria, April 1987, 28 pp.