

SAFARI Training Course

Remote Sensing Applications in Fisheries and Ecosystem Analysis

National Institute of Oceanography-RC Kochi, India

February 11-13, 2010

Report

In connection with the SAFARI Symposium on Remote Sensing and Fisheries, a training course was organized, intended primarily for young scientists and students participating in the symposium. The training course was organized by Dr. Shubha Sathyendranth, Dr. Trevor Platt, Dr. B Meenkumari and Dr. PS Parameswaran, the instructors at the course being drawn from symposium participants, from experts at the Regional Centre of the National Institute of Oceanography at Kochi (NIO-RC Kochi), in Kerala, India and from INCOIS, Hyderabad. Dr. Vivian Lutz from INIDEP, Argentina, was invited as a guest lecturer. The organizers were assisted by Ms Lisa Delaney from the SAFARI Secretariat and by a team of scientists from the Central Institute of Fisheries Technology (CIFT), Kochi and from NIO-RC, Kochi. The goal of the training course was to provide a broad overview of remote sensing applications for ecosystem management in general and fisheries applications in particular, and included discussions regarding complementary *in situ* observations that can be made to enhance the interpretation of satellite data. Oral presentations were complemented with extensive written teaching material, to facilitate further learning after the completion of the course.

The course was held from February 11th - 13th, 2010 at NIO-RC Kochi. Initial plans were to limit the course to some 20 participants, but in the face of overwhelming interest in the course (some 70 applications were received before the deadline and further applicants had to be turned away) and given the high quality of the applicants from India and abroad, facilities were stretched to accommodate as many applicants as possible. Final attendance was 55 trainees from 16 countries.

This event was sponsored by the SAFARI Project (with the international coordination provided through a project of the Canadian Space Agency), CIFT, NIO-RC Kochi, the Group on Earth Observations (Dr. Jinlong Fan attended the course as a GEO representative) and the International Ocean Colour Coordinating Group (IOCCG). Several members of CIFT helped with the local organizations and the logistics, in particular: Dr. Muhamed Ashraf, Dr. Pravin Puthra, Dr. M.R. Boopendranath, Ms G. Archana and Dr K. Asokkumar. The facilities for teaching, practical sessions at the computer and the laboratories were arranged by Dr. Parameswaran (scientist-in-Charge, NIO-RC Kochi) and colleagues. Dr. Meenkumari (Director, CIFT) and colleagues arranged for leasing computers for the course and sponsored the lunches, snacks and coffee breaks, which were also served at NIO-RC Kochi. All the hard

work by the local organizers and the contributions from all the sponsors, which made this training course possible, are gratefully acknowledged.

The course opened with an inaugural session, including addresses from Dr. KKC Nair (former Scientist-in-Charge at NIO-RC), Dr. Meenakumari B. (Director of CIFT), Dr. Parameswaran (Scientist-in-Charge at NIO-RC), Dr. Trevor Platt (SAFARI, ChloroGIN) and Dr. Shubha Sathyendranath (PML, ChloroGIN).

Participants came from a broad range of backgrounds - from novice to expert - in various fields relating to remote sensing and fisheries (see Appendix II for a list of participants). Therefore, Drs Platt and Sathyendranath met with each of the participants briefly before the start of the formal sessions, to evaluate their expertise and aspirations from the course, and the teaching material was then tailored to suit the requirements as well as possible. Morning sessions were in the form of lectures given by Dr. Vivian Lutz, Dr. Trevor Platt and Dr. Shubha Sathyendranath. These lectures covered a range of topics in remote sensing and applications, including:

1. Measurement and interpretation of phytoplankton pigments.
2. Marine optics underpinning remote sensing of ocean colour.
3. Applications of satellite data for studies of ecosystem variability and climate change.
4. Use of ocean colour data to address various issues in fisheries and aquaculture.

Afternoon sessions consisted of practical sessions taught by: Dr. NV Madhu, Dr. PS Parameswaran, Dr. Aneesh Lotliker, Ms CK Haridevi, Ms Jemima U, and Dr. Vivian Lutz, and covered such topics as: HPLC pigment analysis, estimation of photosynthesis-irradiance parameters using carbon-14, phytoplankton absorption analysis and satellite data processing. In the computer sessions, these instructors were ably assisted by some of the participants: (e.g., Dr. Kanthi Yapa, Dr. Eduardo Santa-Maria, Dr. Ana Dogliotti, Dr. Li Zhai) who had some prior experience in this area. The computer sessions dealt with the generation, processing and manipulation of satellite-derived data to retrieve geo-physical variables such as chlorophyll concentration. The contributions from all the teachers and all those who assisted are gratefully acknowledged. All participants attended the morning lectures in plenary, whereas practicals were organised on a rotational basis to accommodate the large number of participants. Practical sessions were tailored to the level of experience of each group (see Appendix I for the course schedule). Many students had not been previously exposed to hands-on aspects of ocean-colour studies so Dr. Trevor Platt and Dr. Shubha Sathyendranath also held tutorial sessions in the afternoons and students were encouraged to discuss their particular concerns regarding the use of satellite data for marine ecosystem applications. From the informal feedbacks received, the participants found the lectures, the practicals and the tutorials to be very useful. Many participants expressed the view that they would have benefited from an even a longer training course.

The overall atmosphere of the training course was positive and collaborative, with advanced students readily helping teach the novice students. Having instruction from world-leaders in ocean-colour was engaging on a variety of levels, making this course a rewarding experience for all involved.



Figure 1: Banner on the main road outside NIO-RC Kochi, announcing the training course



Figure 2: NIO-Kochi, the venue for the training course



Figure 3: The computer practical session where students learned how to process satellite data



Figure 4: Morning lectures



Figure 5: Dr. Platt and Dr. Sathyendranath holding a tutorial session



Figure 6: The HPLC system used for the HPLC practicals



Figure 7: The SAFARI Training Course participants and instructors

Appendix I: Schedule for the SAFARI Training Session

February 11th

Welcome and Introduction

08:30 Registration

09:30 Brief interview on a one-to-one basis with the participants

10:30 Coffee Break

11:00 Inaugural Session

Session 1: General Introduction to Remote Sensing and Marine Ecosystem

11:30 Ocean ecosystem *Trevor Platt*

12:15 What is ocean colour? (Overview) *Shubha Sathyendranath*

13:00 Lunch

Session 2:

14:00 Parallel sessions :

Phytoplankton pigment composition *Vivian Lutz*

Computer Session: Satellite data extraction and utilisation *Aneesh Lotliker and Jemima U*

15:00 Coffee Break

Phytoplankton pigment composition *Vivian Lutz*

Computer Session: Satellite data extraction and utilisation *Aneesh Lotliker and Jemima U*

17:30 Close for the day

February 12th

Session 3: Ocean Colour Applications for Ecosystem Studies

09:30 Ocean colour and primary production *Trevor Platt*

11:00 Coffee

11:30 Phytoplankton pigment composition (2) *Vivian Lutz*

13:00 Lunch

Session 4: Practicals & Tutorials

14:00 14:00 Computer Session: Satellite data extraction and utilisation (continued)

Parallel sessions: Laboratory demonstrations and tutorials (see Table 1)

18:00 Close for the day

February 13th

Session 5: Ocean Colour Applications for Fisheries

09:30 Fisheries and ecosystem applications of Earth Observations *Trevor Platt*

11:00 Coffee

11:30 Introduction to Marine Optics and Ocean Colour: Shubha Sathyendranath

13:00 Lunch

Session 6: Practicals & Tutorials

14:00 Computer Session: Satellite data extraction and utilisation (continued)

Parallel sessions: Laboratory demonstrations and tutorials (see Table 1)

18:00 Close for the day

Table 1: Afternoon practical schedule for February 12th and 13th.

Time	Group 1.1 (12 people)		Group 1.2 (6 people)	Group 1.3 (6 people)
14.30	CDOM absorption		Tutorial	P-I
14.45				
15.00	HPLC		P-I	Tutorial
15.15				
15.30	Absorption: total, phytoplankton, detritus		P-I	Tutorial
15.45				
16.00	Tea Break			
16.15				
	Group 1.1 breaks into two groups of 6 people		Groups 1.2 and 1.3 join into one group	
16.30	Tutorial	P-I	CDOM absorption	
16.45				
17.00	P-I	Tutorial	HPLC	
17.15				
17.30	P-I	Tutorial	Absorption: total, phytoplankton, detritus	
17.45				

Appendix II: List of Training Course Participants

	Name	Institute	Country
1	Vivian Lutz	INIDEP	Argentina
2	MeenakumariB.	CIFT	India
3	Trevor Platt	PML	Canada/ UK
4	Shubha Sathyendranath	PML	Canada/ UK
5	Li Zhai	BIO	Canada
6	Irene Alabia	University of the Philippines	Philippines
7	Archana G.	CIFT	India
8	Muhamed Ashraf	CIFT	India
9	Rezah Badal	MIO	Mauritius
10	Usha Bhagirathan	CIFT	India
11	Mariana Elvira Callejas Jimenez	UABC	Mexico
12	Elisa Capuzzo	CEFAS	UK
13	Francois Carnus	MIO	Mauritius
14	Lisa Delaney	Dalhousie University	Canada
15	Ana Dogliotti	Inst. de Astr. y Fisica del Espacio - CONICET	Argentina
16	Sweety Halarnekar	Goa University	India
17	C. K. Haridevi	NIO	India
18	Masataka Hayashi	Tokai University	Japan
19	Jethva Jagdish	CIFT	India
20	Paresh S. Khanolkar	CIFT	India
21	Geeta Chandrakant Kanolkar	NIO	India

22	Aneesh Kumar	CIFT	India
23	Aneesh Lotliker	INCOIS	India
24	Ramakrishnan Madhu	CIFT	India
25	Sourav Maity	Jadavpur University	India
26	Marina Marrari	NASA Goddard Space Flight Centre	USA
27	Nandini Menon	Nansen Environmental Research Center	India
28	Mani Murali	NIO	India
29	Nidhi Nagabhatla	WorldFish	Malaysia
30	Preetha Nair	CMFRI	India
31	Santosh Nulagari	Goa University	India
32	Susanna Nurdjaman	Bandung Institute of Technology	Indonesia
33	Sreejith P Thilakan	CIFT	India
34	Sunita Pandey	NIO	India
35	PJ Vidya	NIO	India
36	Reghu Prakash R	CIFT	India
37	Tiago Queiroz	University Agostinho Neto	Angola
38	Remya Remadevi	CMFRI	India
39	Nutan Sangekar	Goa University	India
40	Eduardo Santa-Maria	University Autonoma de Baja California	Mexico
41	S.S. Shaju	CIFT	India
42	Satheesh Subramanian	Anna University	India
43	Jemima Undrajavarapu	INCOIS	India
44	Ganga Upendra	CMFRI	India

45	Manjusha Usha	CMFRI	India
46	Robert Williamson	University of Cape Town	South Africa
47	Kanthi Yapa	University of Ruhuna	Sri Lanka
48	Shaikh Halima Shagufta	NIO Goa	India
49	Ritu Kumari	NIO Goa	India
50	Sandesh Varik	NIO Goa	India
51	Jinlong Fan	GEO	Switzerland
52	C.O. Mohan	CIFT	India
53	Radhakrishnan Nair	CIFT	India
54	Reny Devassy	NIO	India
55	Meenu Paul	NIO	India