



# IGRGEA LETTER

International Geophysical Research Group /Europe-Africa  
International Geophysical Research Group /Europe-Asia

## IGRGEA

At the end of the IEEY, in 1995, IGRGEA (International Geophysical Research Group Europe Africa) has been organized to follow the research work initiated during IEEY (International Equatorial Electrojet Year), in 1992. Since January 2003 IGRGEA is developing at the Institute of Geophysics in Hanoi.

Brief news since the last letter of IGRGEA from September 2012.

## BURKINA FASO

Jean-Louis ZERBO defended his thesis in Ouagadougou, 20 October 2012, on the theme: "Solar activity, solar wind Geomagnetism and equatorial ionosphere".



He continued his research at the University of Bobo Dioulasso. He will be in France for a post doc at LPP from May to July 2013.

From left to right in this photo:  
Prof. Vafi DOUMBIA University of Cocody /

Abidjan Prof. Frédéric OUATTARA University of Koudougou / Burkina Faso, Dr Jean Louis ZERBO, Prof. John RICHARDSON of MIT and Dr. Christine AMORY-MAZAUDIER, LPP / UPMC.

Prof. V DOUMBIA and Prof. F. OUATTARA got their theses in the State GIRGEA research network in 2008 and 2009.

## CÔTE D'IVOIRE

Médard NIANGORAN must soon defend his thesis at the University of Cocody in Côte d'Ivoire on the theme: 'Statistical study of the penetration of the magnetospheric convection electric field at equator, DP2'. The thesis supervisor is Prof. A. KOBÉA. Prof. A. KOBÉA got his PhD thesis in the research network GIRGEA in 2001.

The COCODY University of Côte d'Ivoire is undergoing renovation. Classrooms and labs are being installed.





On June 3<sup>rd</sup> Prof. Vafi DOUMBIA and Prof. Arsène KOBEA will visit the site of KORHOGO in northern Ivory Coast with Dr Xavier LALANNE from IPGP/Paris to work on the rehabilitation of the observatory. Soon the observatory will be equipped, by Dr Qian WU, with a Fabry Perrot of the NCAR (National Center for Atmospheric Research).

The ISWI coordinator from Ivory Coast Vafi DOUMBIA is organizing with Georg MAEDA from SERC/ Kyushu University/Japon the next ISWI-MAGDAS school. This school will take place in Côte d'Ivoire from 23 to 27 September. The Flyer will be posted shortly on the [www.girgea.org](http://www.girgea.org) site.

school for the Maghreb. This school was held from 6 to 16 May 2013 to USTHB (University of Science and Technology BOUMEDIENNE Hari). The school was funded by Algeria (USTHB, CRAAG, INPTIC, DGRST) and France (PNST / CNRS, Embassy of France in Algiers and the French Institute).

Participants at this school were from the following countries: Algeria, Burkina Faso, Ivory Coast, United States, France, Morocco and Tunisia.

A detailed report on this school will be sent for publication in the letter ISWI.

Site de l'Université d'Alger:

<http://www.usthb.dz/EIM2013>

## FRANCE

A school on the use of GPS data applied to the study of the ionosphere was organized at the National School of Telecommunications Brest from 26 to 30 November 2012 by Roland FLEURY. The school has hosted four students (Algeria, Republic of Congo and RDC))



Pictured from left to right: Rachid BESSAOUDI Rolland FLEURY, Bruno KAHINDO and Wabab Bacha.

## ALGERIA

Naima ZAOURAR, ISWI responsible for Algeria, organized the first Space Weather



School of Alger 6-16 May, 2013

## NIGERIA

Prof. Babatunde RABIU and Christine AMORY-MAZAUDIÉ led two weeks on the Space Weather in Nigeria from January 27 to February 9, 2013. They visited several research centers NASRDA (Nigerian Agency for Space Research and Development Advances) and the following Universities:

*Akure University, Bells University University Covenant, University of Ibadan University Tailorin, University of Anyigba*

In this University of Anyigba (Kogi state), a research Center is under construction. This center



will integrate research from the bottom of the ocean to the sun.



Thu Hong, Dr. Christine AMORY-MAZAUDIER, Dr. Vincent LESUR and Dr. Philippe ZARKA.

**DRC : REPUBLIC DEMOCRATIC CONGO**

After the Space Weather School held in the DRC in September 2011, a research project aimed at strengthening research capacity in Space Weather for the DRC has been defined.

The eight students selected will begin their PhD in 2013.

Each student has a Congolese director and a foreign director. This project involves the following countries and universities:

- RDC: Kinshasa University
- Belgium: *Institut d'Aéronomie Spatial de Belgique*
- Burkina Faso: *University of Koudougou*
- Côte d'Ivoire: *University of Cocody*
- France: *St Denis University, University of Toulouse, University of Strasbourg, UPMC University of Paris.*

**VIETNAM**

Thi Thu Hong PHAM defended her thesis on Oct. 15, 2012 at the University Pierre et Marie Curie. The title is: *"The regular variation of the magnetic field in Vietnam and modeling the ionosphere."*

Hong works at the Institute of Geophysics of Hanoi. She is pursuing studies on long-term changes in the ionosphere in cooperation with the NCAR and the LPP.

A report will be sent for publication in the letter ISWI.

**MOROCCO**



GNSS master was set up CRASTE-LF, Regional Training Centre of the United Nations in French.

Website: <http://iswi-secretariat.org>

Information Letter: Vol 5 No. 42

Morocco will host the second school ISWI MAGHREB. Prof. Anas EMRAN is responsible for this school in MOROCCO. This school will take place in Rabat in 2015.

A ISWI MARRAKECH school will be organized by Prof. Aziza BOUNHIR in May 2014.

In this photo from left to right Dr. Mioara MANDEA, Dr. Minh LE HUY, Dr. PHAM Thi

The observatory of MARRAKECH will soon receive a Fabry Perrot interferometer. The



instrument RENOIR will be installed by J. MAKELA from the University of Illinois.

Network of GPS stations in Morocco



PAUL VILA

Paul VILA passed away April 18, 2013. Until the end of his life Paul worked. He has trained many young scientists IGRGEA, Europe Africa and Asia, equatorial ionosphere. We present here some of his results in 1979, and interpretation that could be made by Ouattara and Amory-Mazaudier in 2012.

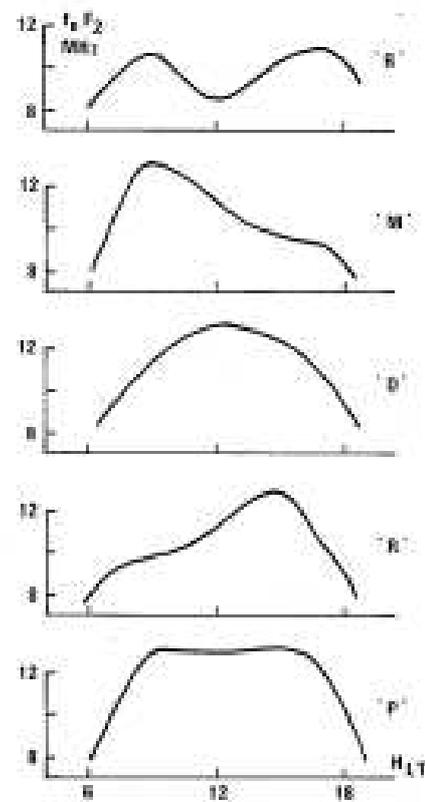


Fig. 2  
Les différents types de variation du  $f_oF_2$  à Ouagadougou.  
B : noon bite-out, M : Morning Peak, D : Duma, R : Raward, P : Plateau. (D'après Faynot et Vila, 1979).

RC : REPUBLIC OF CONGO

Bienvenue Dinga (ISWI coordinator of RC) participated in Abuja at the second conference of the Working Group of the African space.

Bienvenue Dinga represented the Republic of Congo in this working group on the recommendation of the Minister of Scientific Research his country.

The African heads of state want to create the African space agency.

It is envisaged the creation of national space agencies in each African country.

SENEGAL

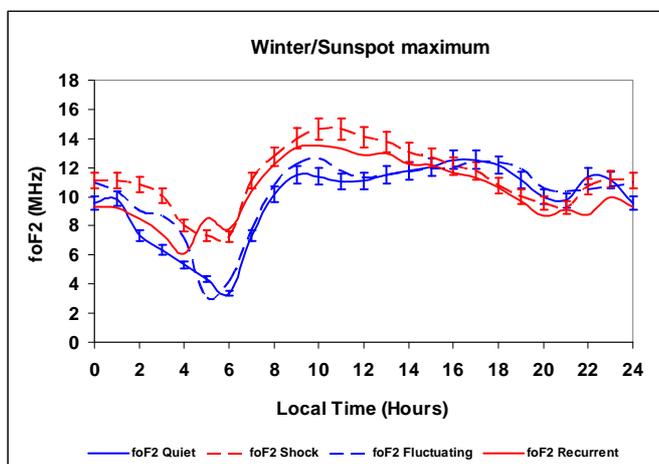
On June 21, 2013, Idrissa Gaye from the University CHEIKH ANTA DIOP of Dakar will defend his thesis on : "Influence of Irradiation and coefficient of damage on the parameters of a silicon solar cell. "

This figure shows the different diurnal variations of the critical frequency of the F region,  $f_oF_2$  observed in Ouagadougou in Burkina Faso, ranked by Faynot and Vila in 1979 (*F region at the magnetic equator, Ann. Geophys. 35, pp 1-9, 1979*). The authors have found five types of diurnal variations noted B, M, D, R, P.

As part of his Ph.D. State Frédéric Ouattara Ouagadougou classified data obtained during the period 1966 - 1998, taking into account three factors:

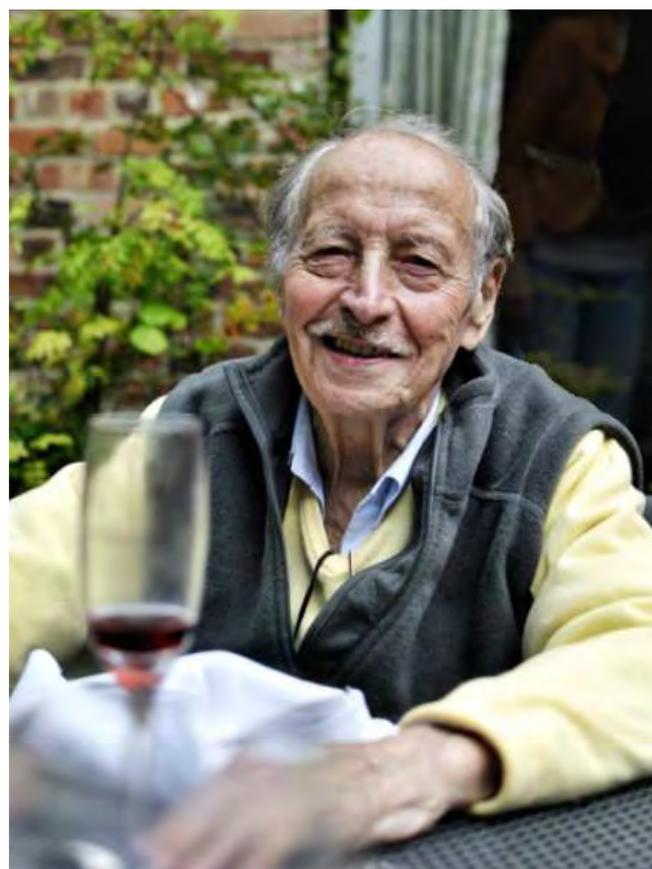
- \* Season (4 classes)
- \* the phases of the sunspot cycle (rising phase, maximum, and minimum down phase)
- \* magnetic activity defined by Legrand and Simon (Annales Geophysicae, 1989), taking into account the solar activity. The magnetic activity includes four classes:
  - 1) activity shocks (CME)
  - 2) the activity of the slow solar wind,
  - 3) the activity related to fast solar wind from coronal holes,
  - 4) other cases are classified as fluctuating activity.

These three factors define 64 classes. This study to understand the different variations of the critical frequency observed in 1979 by Faynot and Vila.



The above figure represents four classes obtained during the winter at the maximum of solar activity. We see that the shape of the plate P corresponds to magnetically quiet days or with fluctuating activity, and that the form M corresponds to the classes of fast winds (recurrent activity) and shock (CME).

Left of the figure Paul Vila during the school of Abidjan, 1995



: Paul Vila in 2012