



IGRGEA LETTER

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

IGRGEA

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

ALGERIA

The scientific collaboration between scientists from Houari Boumedienne University in Algiers and from IPAG (Institute of Planetology and Astrophysics of Grenoble) was further deepened with visiting professors/researchers Naima ZAOURAR and Hanane MARIF in Grenoble during three weeks in Autumn 2015. This collaboration with Jean LILENSTEN allowed transferring to Algerian scientists the kinetic code for the resolution of the Boltzmann-transport equation made at IPAG. This is the starting point of an ambitious research program which is to add to the primary Kinetic code a fluid code, to be developed in Algiers.. This multi-year program should result in at least a thesis in future years.

BURKINA FASO

The team 'Heliophysical / Space Weather' LAREME of the University of Koudougou consists of 11 members: 1 professor:

Frédéric OUATTARA, 1 Lecturer:
Emmanuel NAMENA 3 Teaching Assistants: M'bi KABORA, Jean- Louis ZERBO, Doua Allain GNABAHOU, 1 Assistant: Christian ZOUNDI and 5 PhD students.



Photo of Emmanuel Nanema defending his PhD on January 28, 2016 on "*Modeling NmF₂, foF₂ and hmF₂ observed at Ouagadougou station during solar cycle 22 by TIEGCM and IRI 2012 models and appreciations of their predictions*".



Photo of Mahamat Nour ALI defending his PhD on May 21, 2016 on "*Statistical study of the variability of the critical frequency of the F₂ layer at the stations Dakar and Ouagadougou. Comparison of statistical data for 21-22 cycles.*"



CAMEROON

Two students directed by Cesar M'BANE will soon defend their thesis.

Honoré MESSANGA ETOUNDI on the topic:

"Measuring and interpretation of temporal changes in the components (X, Y, Z) of the Earth's magnetic field in Yaounde-Cameroon"

Augustin DAIKA on the topic:

"Study of modulationnelles instabilities of gravity waves generated by the atmosphere-plies interactions of extensive and deep water: the case of murderous rogue waves."

CÔTE D'IVOIRE

Serge TANOHI of the Houphouet Boigny Abidjan University will shortly defend his thesis in Abidjan on the theme: *"Study of vertical movements of the night F layer at the magnetic equator: The equinox transition to solar minimum."*

He was directed by Jean-Pierre ADOHI.

Ivory Coast is organizing this year the AGS



2016 African Geophysical Society Conference

FRANCE

A school on the use of GPS for studies of the ionosphere was organized by Rolland FLEURY at the National School of Telecommunications in BREST. This kind of training concerns few participants who work with GPS data from their countries.



From left to right K. TONDOZI (DRC), I. GAYE (Senegal), R. FLEURY (France), N. ZAOURAR (Algeria) and W. D. WAFULA (DRC).

MOROCCO

The Globe Morocco Association for the Environment was established on 24 December 2014. It is located at the headquarters of the Presidency of the Mohammed V University in Rabat. **Subject:** Galvanizing youth to protect the environment

Project: Environmental education for sustainable development in vulnerable regions of Morocco (Case of the Region of Rabat - Kenitra).

11 kits of equipment dedicated to education and teaching environment were given by NASA (USA) for Moroccan schools.

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RDC

Monique PETITDIDIER and Christine AMORY-MAZAUDIER traveled to Kinshasa / DRC from 17 to 22 January 2016 within the project 'strengthening research capacity in DRC'. They were funded by the Embassy of France in Kinshasa and the University of Kinshasa.

This project involves several areas:

- * The Space Weather and natural hazards (lightning, earthquake etc ...)
- * Theoretical Physics
- * Computing
- * The Physical Geography and GIS

In this project several theses are completed or underway.

Thesis defended

At end of 2015, Polycarpe MANANGA MPAKA of the University of Kinshasa, defended his PhD on the theme: *"Study Equatorial Electrojet: characteristics in DRC"*. He was directed by André ZANA NDONTONI

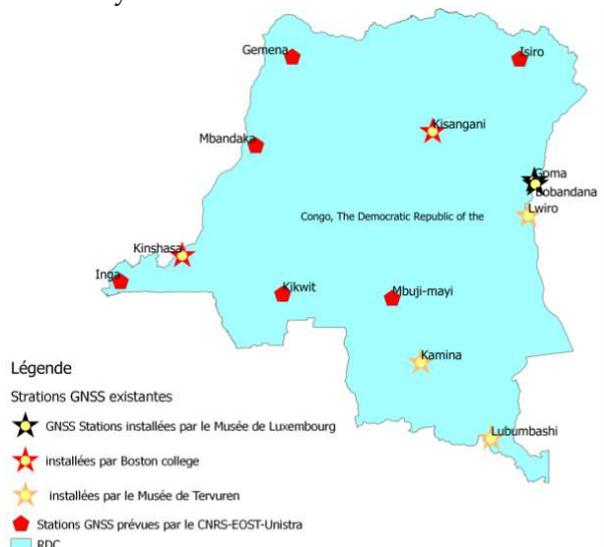
Anscarius MUKANGE BESA, University of Kinshasa, defended his thesis on the topic: *"Design of a physical model for the characterization and monitoring of seismic activity and geological implication."* He was directed by André ZANA NDONTONI (KINSHASA University) and Hamdache MOHAMED (C.R.A.A.G./ Algiers).



Other coming PhD:

Jean KIGOSTI conducted a 6 month research internship (1 September 2015 to 29 February 2016) at the University of Toulouse under the direction of Serge SOULA on *'atmospheric electricity'*. J. KIGOSTI was funded by the French Embassy in Kinshasa and should defend his PhD at the end of the year, on atmospheric electricity.

Raphael MUKHANDILA completed a research internship of 6 months (1 December to 31 May) at the University of Strasbourg under the direction of Frédéric MASSON for his PhD on the theme: *"Development of a GNSS network in DRC - Implication on kinematics and dynamics plate Africa East African rift (west branch)."* His mission was funded by the French Embassy in Kinshasa.





As part of his PhD Raphael MUKHANDILA is also working on the development of a network of GPS stations in the DRC. The map on page 3 gives the location of the stations within the network installed by different laboratories in Belgium (Luxembourg Museum, Museum of Tervuren), France (University of Strasbourg) and USA (Boston University).

Jean KASSOLENE pursues his PhD on the topic: *'Vulnerability of forest landscapes in relation to demographic dynamics agro and climate variability in the North Kivu region. If the Tshiabirimu / national park Virunga'*. He is directed by Jean MALEKANI and Téléphore BROU. J. KASSOLENE is currently in contact with the OSFAC program (in collaboration with WWF) for access to map databases (vegetation maps, topography, land use ...) on Congo. Jean KASSOLENE has just introduced a funding request for the continuation of his PhD project with the GVTC (Great Virunga Transboundary Collaboration).

Kenny KALE is in his first year of PhD at Strasbourg University on *'The study of correlated noise induced by cosmic muons in the experiment on the oscillation of the Double Chooz neutrino'*. He is under the direction of Cécile JOLLET Anselmo MEREGAGLIA .

Current Masters on Informatics

Vianney LOTOY validated his Master1 in computer science at the University of Besancon,

Patient NTUMBA is in Master 2 at the University of Besancon with training period on *'Computing (Cloud Computing)'* at the University of Nantes.

Felicien BARHEBWA is in Master2 in Paris on *'Computers - Operational Research in Paris'*.

Current Master on Environment

Aurélie KAHINDO is in training period Nancy (France) as part of her Master in Environment of the Senghor University in Alexandria / Egypt. The topic of her work is *"Evaluation of social and environmental risk in mining in the DRC / Katanga."*

MAGNETOMETERS/IPGP

The observation of the Earth's magnetic field is coordinated in France by the Central Bureau of Earth Magnetism (BCMT). This service is supported by the Institute of Earth Physics of Paris (IPGP) and the School of Sciences and Earth Observatory (EOST) in Strasbourg that hold 16 observatories distributed around the globe. These observatories are managed in close collaboration between the French institutes and those of host countries.

In a magnetic observatory, two instruments continuously measure the magnetic field of the Earth: vector instrument, which measures the three orthogonal components of the field; and a scalar instrument, which measures its intensity. Manual absolute measurements several times a week, are used to calibrate the records of these instruments. Data quality depends heavily on absolute measures, which should be conducted with special care by trained personnel. The magnetic data are then calibrated, checked and cleaned of artificial disturbances to produce definitive data. This is a long



process that provides reliable time series of the temporal evolution of the magnetic field. Internationally, the INTERMAGNET organization distributes these data and ensures that they meet the established quality criteria.

Three magnetic observatories managed by the BCMT are currently operating in Africa: AAE in Addis Ababa (Ethiopia), MBO in Mbour (Senegal) and TAM in Tamanrasset (Algeria). The MBO observatories and TAM produce data of high quality.

Unfortunately, the observatory of Addis Ababa suffers major disruptions generated by the tram line which took office in September 2015. It is no longer possible to produce final data for the observatory. It will be necessary to move it to a place where magnetic disturbances are absent.

The implementation of a magnetic observatory is a delicate operation that requires an accessible location preserved from artificial disturbances.

Nevertheless two observatories are being implemented or relocated: in Edea (Cameroon) and near Antananarivo (Madagascar). In 2017 there will be the same number of magnetic observatories than few years earlier before the destruction of observatories Antananarivo (Madagascar) and Bangui (Central African Republic).

Other projects of magnetic measurements, are also underway. They use vector magnetometers which cannot perform absolute measurements. We speak then of variometers. The aim is to measure the magnetic effects related to space weather. Two stations were placed in Mali in 2009 forming the WAMNET network. These are

isolated stations; data are collected several times a year. A new station design, developed at IPGP, enable the real-time dissemination of data and will be installed in N'Djamena early 2017.

All data and magnetic observatories BCMT stations are available at: www.bcmt.fr.
COISSON Pierdavid and Vincent LESUR

ICTP/ITALIA

A workshop on the "Use of GNSS Ionosphere Satellite Derived Total Electron Content Data For navigation, Ionospheric and Space Weather Research" will be held at the Abdus Salam ICTP Center from 20 to 24 June 2016, also International Beacon Satellite Symposium will be held from June 27 to July 1 2016 at the Abdus Salam ICTP Center.

PROFESSOR YUMOTO

Prof. Yumoto, University of Kyushu retired. All members of the GIRGEA thank him and his team for the work done under the IHY and ISWI projects (<http://iws-secretariat.org>)



Photo of the farewell dinner

PAPERS 2015-2016

2016

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Day-to day variability of VTEC and ROTI in



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Kafando, P., F. Chane-Ming, M. Petitdidier, 2015, "Stratospheric variability of wave activity and parameters in equatorial coastal and tropical sites during the West African monsoon" , J. Clim. Dyn., doi: 10.1007/s00382-015-2764-1

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