

Annexure V



YEAR 2017 : some ISWI activities

Algeria, Côte d'Ivoire
France, Morocco/CRASTE-LF
RDC, Tunisia

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ALGERIA

Naima ZOURAR : ISWI Coordinator



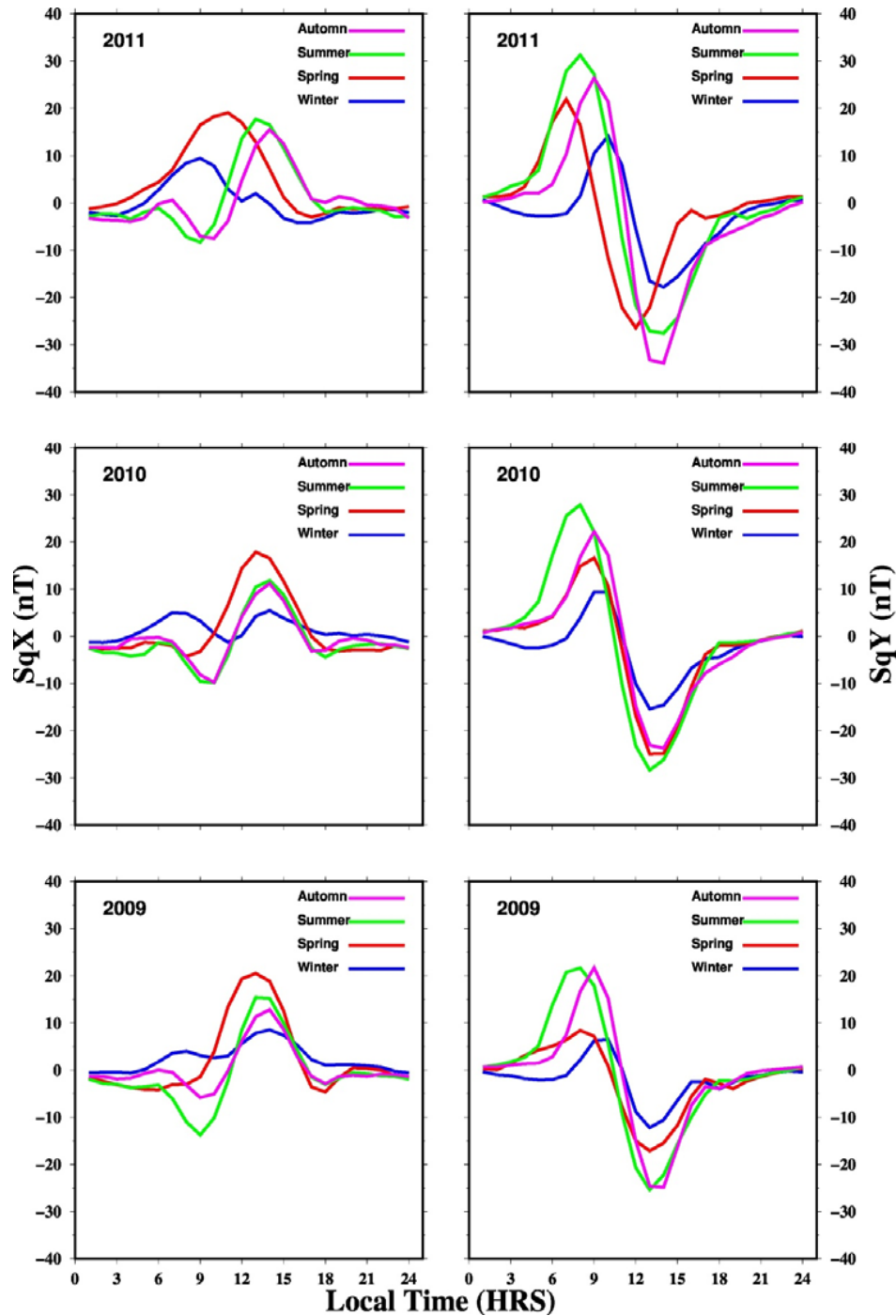
ISWI TOOL : Magnetometer AMBER

Dr Fatma ANAD of CRAAG supported her thesis on 17 May 2017 at the Houari Boumedienne University in Algiers. The title of her thesis is: "*Spatial and temporal modeling of the geomagnetic field*".

Dr Fatma ANAD used among other things the data of the magnetometer AMBER installed in Médéa in Algeria. This magnetometer was provided by Endawoke YIZENGAW of Boston University.)



Sq solar variation at Médéa Observatory (Algeria), from 2008 to 2011,



Anad, F. et al., *Advances and Space Research*, doi10.1026/j.asr. 2016.06029.

CÔTE D'IVOIRE



Vafi DOUMBIA
ISWI coordinator



Olivier OBROU

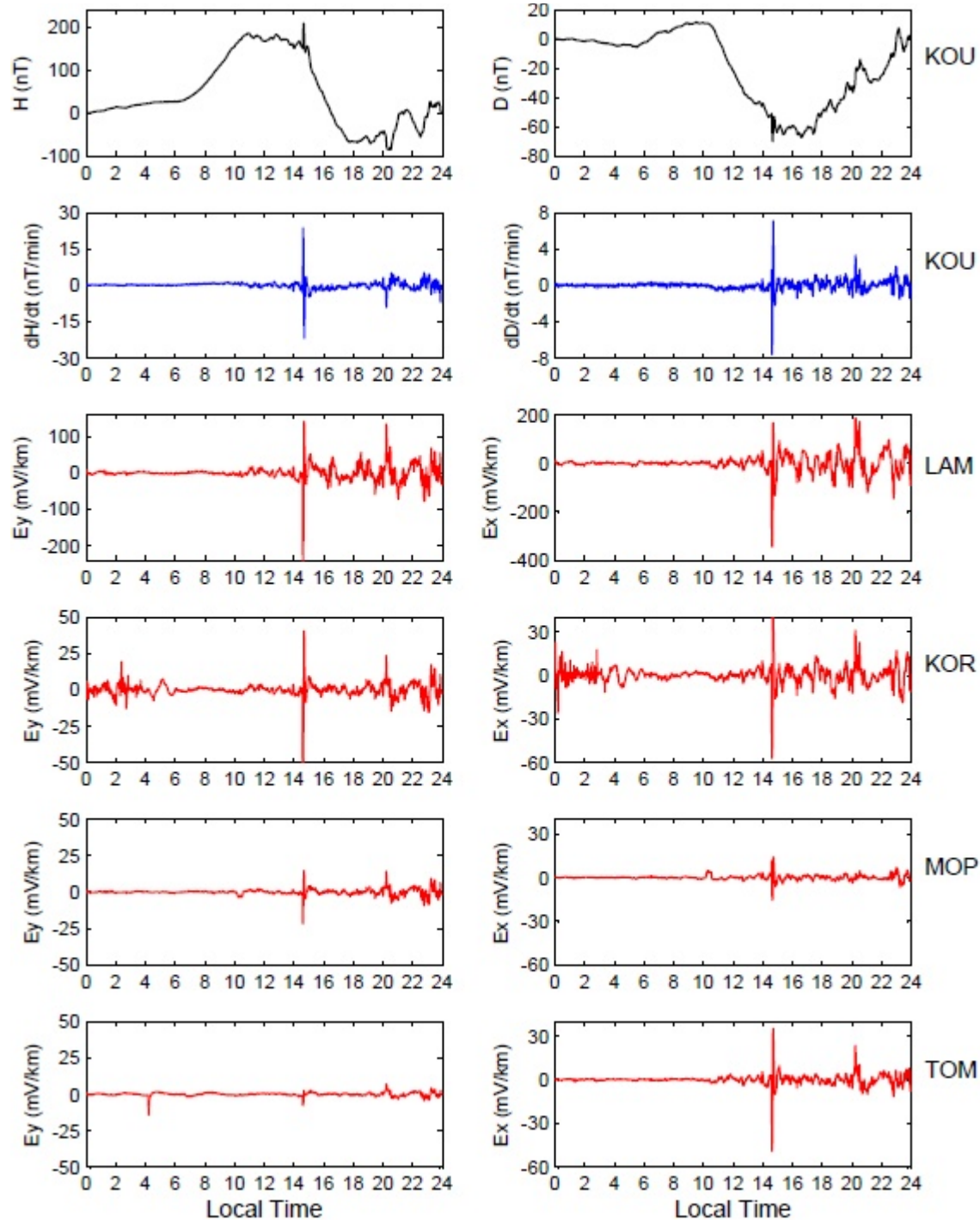
Côte d'Ivoire has organized the 3rd edition of the ISWI-Maghreb-Africa Space Weather School, from 16 to 28 October 2017, in Abidjan.

This school brought together participants from 11 different countries: **Algeria, Burkina Faso, Cameroon, Côte d'Ivoire, France, Guinea Conakry, Morocco, RC, DRC, Senegal, Tunisia.**

The report of this school is on the site:

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





Geo-electric field variations due to the solar flare on 04 April, 1993. The first line panels show variations of H (left) and D (right) and the second line panels show the time derivatives of H (left) and D (right) at KOU. The other panels show variations of the E_y (left column) and E_x (right column) at LAM, KOR, MOP and TOM (Doumbia et al., *Ann. Geophys.*, 35, 1-13, 2017)

GPS School was organized by CRASTE-LF from 16 to 21 January 2017 in the framework of the Master on GNSS.

17 participants from **Central Africa, Niger, Cameroon, Morocco, Tunisia**. Courses are available on the website:

<http://www.unoosa.org/oosa/en/ourwork/icg/activities/2017/icg2017-event.html>



Scintillator given by the national school of telecom Brest / France

France : National school of TELECOM/Brest, Rolland Fleury



GPS on the web
and
ISWI - GPS SCINDA

The 6th edition of the school on the use of GPS for ionosphere studies was organized by Rolland FLEURY at the 'Ecole Nationale des Télécoms in BREST', from 13 to 17 February 2017. This school brought together 9 participants from **Algeria, Burkina Faso, Egypt, Morocco**.

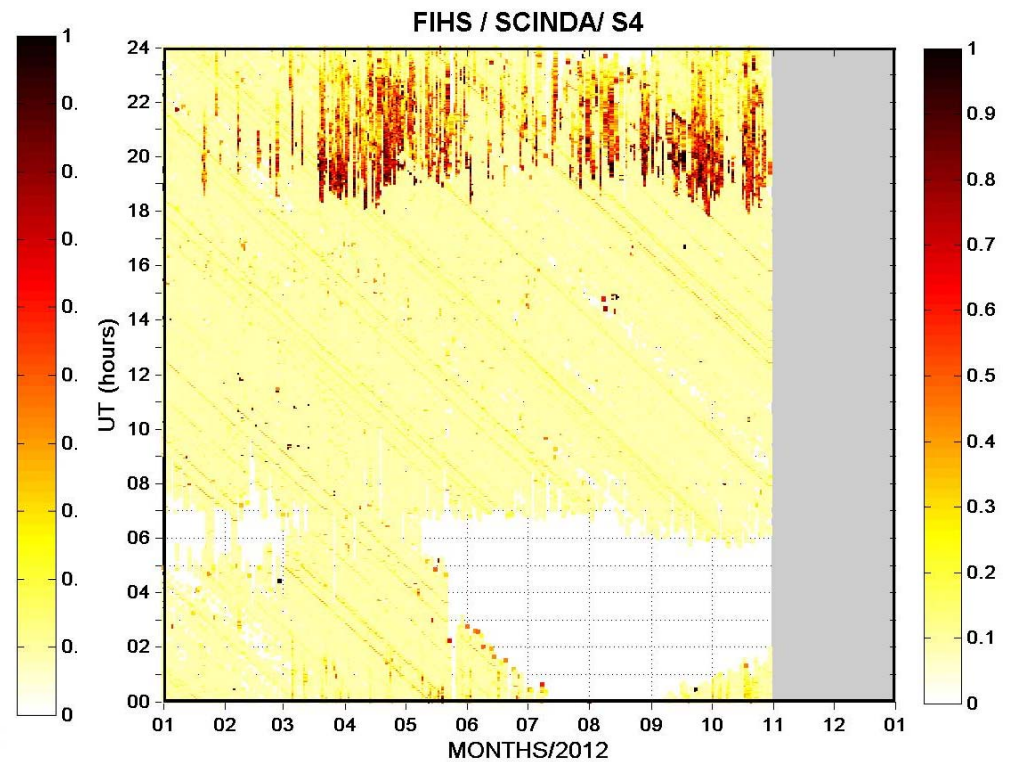
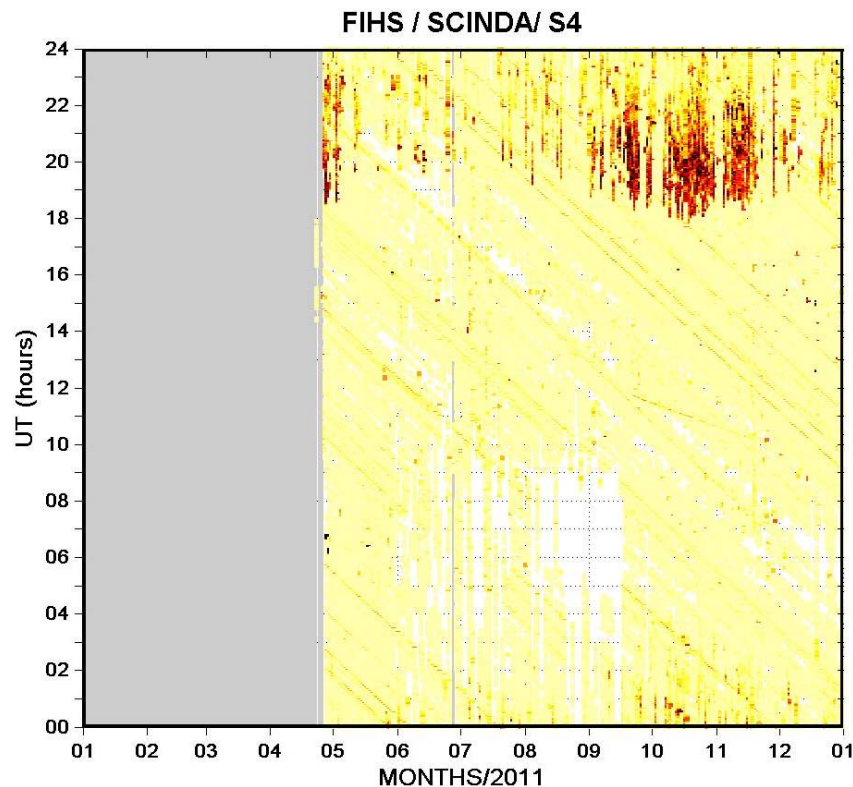


RDC

ISWI TOOL : GPS SCINDA

Scintillations observed at Kinshasa with the SCINDA GPS system (Kahindo et al., *Journal des Sciences*, Vol. 17, N° 2, pp 27-47, Juin 2017.

Bruno KAHINDO
ISWI coordinator



RDC

Dr. Jean KIGOTSI defended his thesis on November 1, 2017 at the University of Kinshasa UNIKIN, on the theme: *'Analysis of the flash activity of storm systems in the Congo Basin'*

Dr. Jean KIGOTSI has benefited from a cotutelle grant between the University of Kinshasa (DRC) and the University of Toulouse (France), funded by the French Embassy in Kinshasa.

He has made several research stays in France under the direction of Serge SOULA.

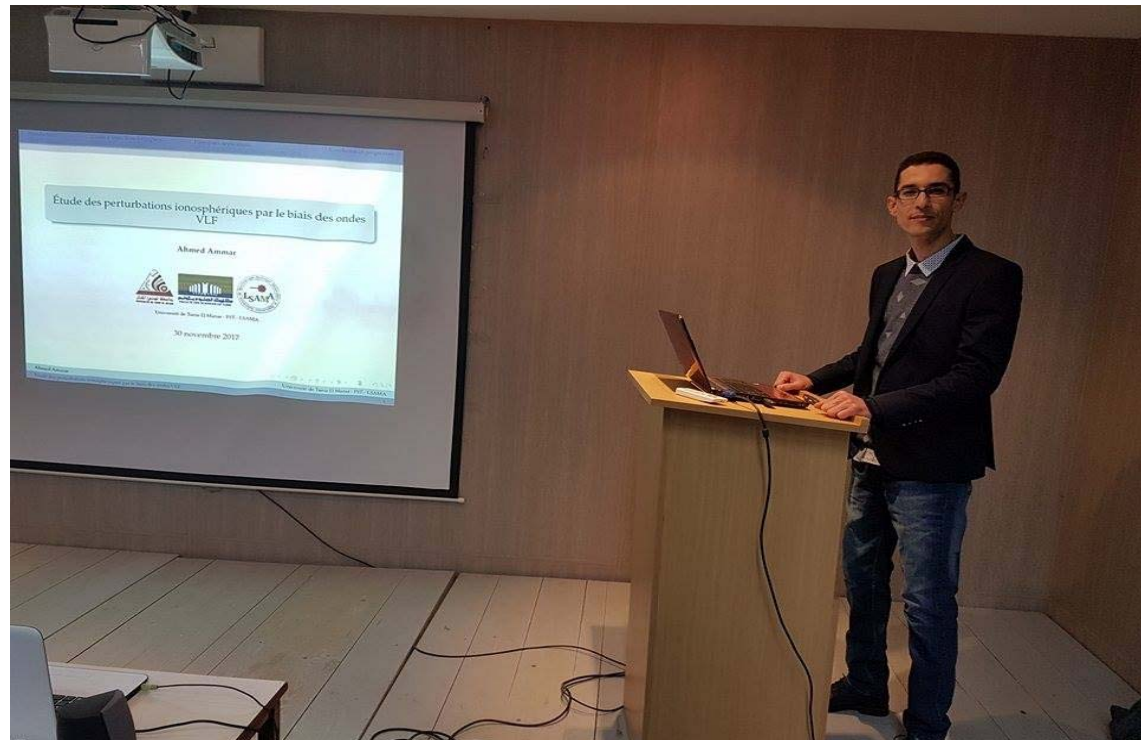


TUNISIA : Hassen Ghalila, ISWI coordinator

Dr. Ahmed AMMAR defended his thesis on the '*Study of ionospheric disturbances through VLF waves*' on November 30, 2017 at the University of Tunis El Manar.

PhD: https://www.dropbox.com/s/r85t66db3t0t1nr/these_AMMAR2017.pdf?dl=0

ISWI TOOLS
AWESOME
SID



AWESOME (Atmospheric Weather Education System for Observation and Modeling of Effects) et SuperSID (Sudden Ionospheric Disturbance Monitor).

Conclusions

- 1991-2017 : 42 PhD in 13 countries
- 2007-2017 : 32 PhD => **due to IHY and ISWI**
- Training in Universities on Space Weather
- More tools
- On school each 2 years [2019 : Senegal, 2021: Tunisia]
- Need of Post doc

Publications

- Amory-Mazaudier, C., R. Fleury, S. Gadimova, A. Touzani (February 2017), Space Weather, from the Sun to the Earth, the key role of Global Navigation Satellite Systems , Part I. From the Sun to the Earth Space Weather and its effects, Coordinates a monthly magazine on positioning, navigation and beyond, <http://www.mycoordinates.org>., invited paper.
- Amory-Mazaudier, C., R. Fleury, S. Gadimova, A. Touzani (March 2017), Space Weather from the sun to the Earth, the key role of Global Navigation Satellite Systems- Part II: training on daily global positioning system GPS, Coordinates a monthly magazine on positioning, navigation and beyond, <http://www.mycoordinates.org>, invited paper.
- Amory-Mazaudier, C., O. Bolaji, V. Doumbia, On the historical origins of the CEJ, DP2 and Ddyn current systems and their roles in the predictions of ionospheric responses to geomagnetic storms at equatorial latitudes, J. Geophys. Res., doi: 10.1002/2017JA024132
- Amory-Mazaudier, C. , Menvielle, M.· Curto, J-J., Le Huy, M.· Recent Advances in Atmospheric, Solar-Terrestrial Physics and Space Weather from a North-South network of scientists [2006-2016]", PART A: TUTORIAL, accepted for publication in Sun and Geosphere.
- Amory-Mazaudier, C., M., Fleury, R., Petitdidier, M., Soula, S, Masson, J-F., GIRGEA team*, Davila, J., Doherty, P., Elias, A., Gadimova, A., Makela, J., Nava, B., Radicella, S., Richardson, J., Touzani, A.· Recent Advances in Atmospheric, Solar-Terrestrial Physics and Space Weather from a North-South network of scientists [2006-2016]", PART B : RESULTS AND CAPACITY BUILDING, accepted for publication in Sun and Geosphere.
- Ankit Jain, Pascal Pagani, Rolland Fleury, Michel M. Ney, Patrice Pajusco, Efficient Time Domain HF Geolocation Using Multiple Distributed Receivers, 11th European Conference on Antennas and Propagation (EUCAP) 2017.
- Doumbia, V., K. Boka, O. D. F. Grodji, C. Amory-Mazaudier, and M. Menvielle, Induction Effects of Geomagnetic Disturbances in the Geo-electric Field Variations at Low-latitude, Ann. Geophys., 35, 1-13, 2017.
- Doumbia, V., F Grodgi, On the Longitudinal Dependence of the Equatorial Electrojet Geophysical Monograph 220,, First Edition. Edited by Timothy Fuller-Rowell, Endawoke Yizengaw, Patricia H. Doherty, and Sunanda Basu. © 2017 American Geophysical Union. Published 2017 by John Wiley & Sons, Inc.

Publications

- Grodgi, F., V. Doumbia, K. Boka, C. Amory-Mazaudier, M. Menvielle, Estimating some parameters of the equatorial ionosphere electrodynamics from ionosonde data in West Africa , *Advances in Space Research* 59, 311-325, 2017.
- Kaab, M., Z. Benkhaldoun, D. Fisher, B. Harding, A. Bounhir, J. J. Makela, A. Laghriyeb, K. Malki, A. Daassou, and M. Lazrek, (2017) , Climatology of thermospheric neutral winds over Oukaïmeden Observatory in Morocco, *Ann. Geophys.*, 35, 161–170, 2017, www.ann-geophys.net/35/161/2017/ doi:10.5194/angeo-35-161-2017
- Kahindo B. Murumba , A. Kazadi Mukenga Bantu, R. Fleury, F. Tondozi Keto, A. Zana Ndontoni, M. Kakule Kaniki, C. Amory-Mazaudier, K. Groves, Contribution à l'étude de la scintillation ionosphérique équatoriale sur la crête sud de l'Afrique, *Journal des Sciences*, Vol. 17, N° 2, pp 27-47, Juin 2017, I.S.S.N 0851-4361
- Kigotsi J. K., Soula S., Georgis J.-F., to appear in 2018, Comparison of lightning activity in the two most active areas of the Congo Basin, accepted in *_Nat. Hazards Earth Syst. Sci._*.
- Loua Rene Tato, Maoro Beavogui, Hassan Bencherif, Alpha Boubacar Barry, Zoumana Bamba and Christine Amory-Mazaudier, Climatology of Guinea : Study of climate variability in N'Zerekore, *Journal of Agricultural Science and Technology A* 7 (2017) 215-233, doi: 10.17265/2161-6256/2017.04.001
- Ouattara F., Zerbo J. L., Kaboré M. and Fleury R., Investigation on equinoctial asymmetry observed in, Niamey Station Center for Orbit Determination in, Europe Total Electron Content (CODG TEC) variation during ~ solar cycle 23, *International of Physics* , Vol. 12(22), pp. 308-321, 30 November, 2017 DOI: 10.5897/IJPS2017.4684, Article Number: C5EF15666744 ISSN 1992 – 1950
- Tran Thi Lan, Le Huy Minh, C. Amory-Mazaudier, R. Fleury (2017) Climatology of ionospheric scintillation over the Vietnam low-latitude region for the period 2006-2014, *Advances in Space Res.* <http://dx.doi.org/10.1016/j.asr.2017.05.005>.
- Zaourar, N., C. Amory-Mazaudier, R. Fleury, (2017), Hemispheric asymmetries in the ionosphere response observed during the high-speed solar wind streams of the 24-28 August 2010, *Advances in Space Research*, doi.org/10.1016/j.asr.2017.01.048.