OISA' 2014

A "Space Weather" school was held at the University Cady Ayyad from 5 to 10 May 2014. The organizing committee can be proud of its success through quality courses teached, student involvement, and good organization.

REPORT : **SCHOOL ON SPACE WEATHER**
MARRAKECH
MOROCCO [05-10 May 2014]

Ambassade de France
En Cote d'Ivoire

Organization : **A. Bounhir** (LPHEA/Morocco) and **C. Amory-Mazaudier** (LPP/ France).

1- Brief history:

This school is within the scope of the ISWI program; "International Space Weather Initiative". The ISWI initiative is a program of international collaboration which aims to develop the scientific and experimental tools for understanding and predicting the weather of the near-Earth space.
A major goal of the ISWI initiative is to promote the culture of space weather by installing a set of instrumentation in emerging countries and the African continent. These experiences can not succeed without the support of local researchers. For that reason the ISWI Executive Committee promotes international and regional thematic schools.
In 2010 an ISWI delegation arrived to Morocco with proposed installations of observation instruments. Our laboratory, in this framework installed the RENOIR "Remote Equatorial Nighttime Observatory of Ionospheric Region" experiment in collaboration with the University of Illinois in November 2013. This experiment aims to characterize the mid-latitude ionosphere, the instabilities taking place as well as the coupling between the ionosphere and thermosphere.

2- Organizing and scientific committees

Organizing Committee

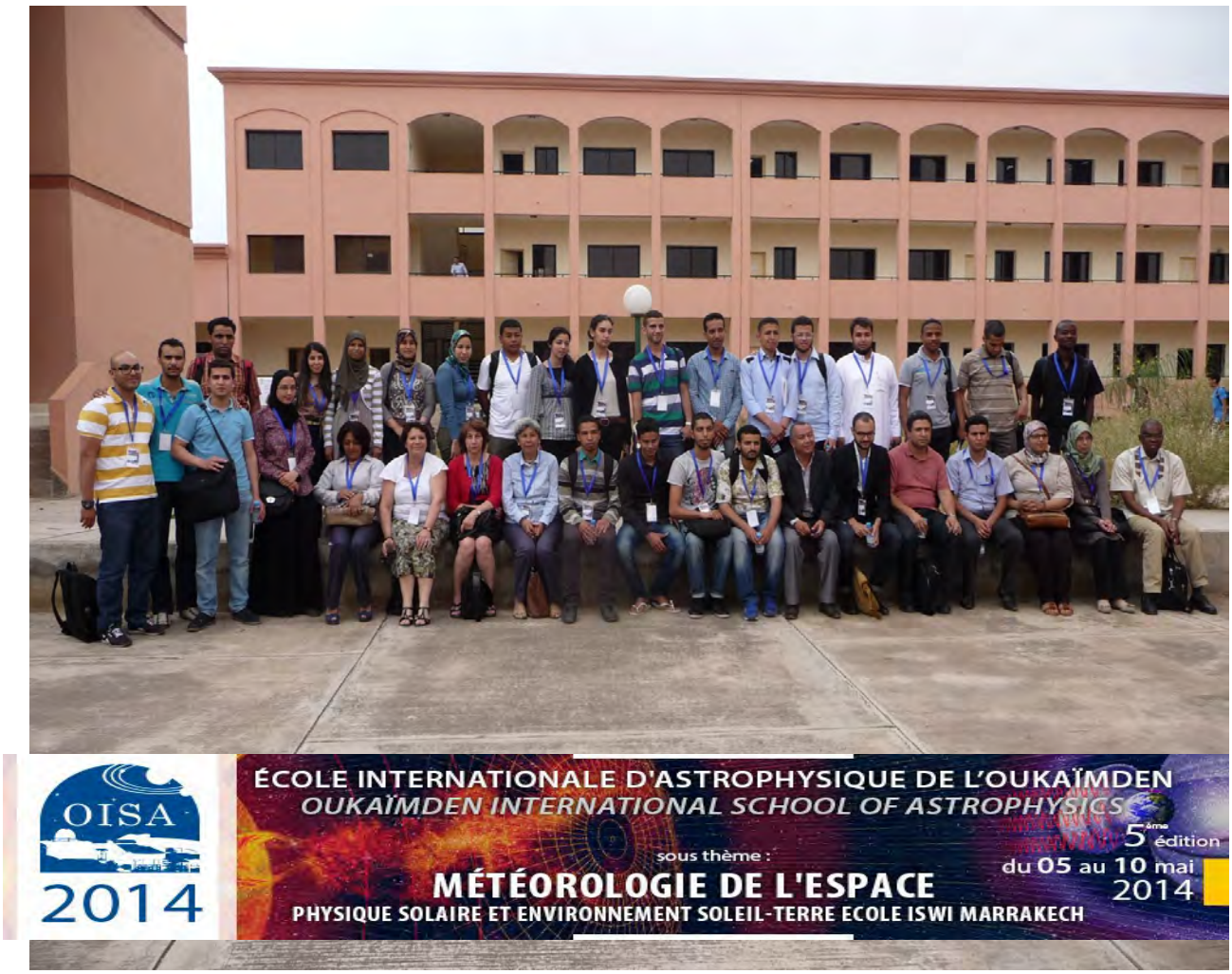
Bounhir Aziza FST, LPHEA, UCA.	**Zouhair Benkhaldoun** UCA Observatory Director.
Abdelhadi Jabiri FSS, LPHEA, UCA.	**Lazrek Mohamed** FSS, LPHEA, UCA.
Chabab Mohamed FSS, LPHEA, UCA.	**Tarik Khalla** FSS, UCA.
Attaourti Younes FSS, LPHEA, UCA.	**Ahmed Daassou** FSS, LPHEA, UCA.
Mamoun Ait My Larbi LPHEA, UCA.	**Malki Khalifa** LPHEA, UCA.
Mohamed Ali Haf ili AAAM.	**Mohamed Younes Jamjari,** AAAM.
Ilyass Azzouzi UMV.	**Boskri Abdelkarim** FSS, UCA.

UCA : University Cady Ayyad at Marrakech, Morocco.
FST : Faculty of Sciences and Technics.
ENSA : « Ecole Nationale des Sciences Appliquées ».
FSS : Faculty of Sciences Semlalia.
LPHEA : Laboratory of High Energy Physics and Astronomy.
AAAM : Association af Amateur Astronomers of Marrakech.
UMV : University Mohamed V of Rabat Agdal, Morocco.

Scientific Committee

Christine Amory-Mazaudier LPP, Paris, France.	**Benkhaldoun Zouhair** UCA Observatory Director.
Jonathan Makela University of Illinois, USA.	**Nicole Vilmer** LESIA, Paris, France.
Monique Petitdidier LATMOS, France.	**Naima Zaourar** USTHB, Algeria.
Aziza Bounhir FST, Marrakech, Morocco.	**Annas Emran** Scientific Institute of Rabat, Morocco.

LPP ; Laboratory of Plasma Physics at « Ecole Polytechnique » Paris France.
LATMOS : « Laboratoire Atmosphères, Milieux, Observations Spatiales ».
LESIA : « Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique » at Observatory of Paris-Meudon.
USTHB : University of Sciences and Technics Houari Boumediane.



National School of Applied Sciences (ENSA) where practical work were held.

3- Professors, courses and schedule

1	**Christine Amory-Mazaudier** (LPP) Christine.amory@lpp.polytechnique.fr	*** Introduction to Space Weather** *** Dynamos**; Solar, Terrestrial, Ionospheric and Magnetospheric dynamos. **PW** ; magnetic indices
2	**Karine Bocchialini** (IAS) Karine.bocchialini@ias.u-psud.fr	*** Sun : General presentation** **PW**; Heliospheric data (SOHO, SDO, ACE satellite data, HELIO and AMDA tool)
3	**Nicole Vilmer** (LESIA) nicole.vilmer@obspm.fr	*** Solar Events Effects on the Terrestrial Environment**. **PW**; Solar flares, CME, energetic particles (GOES, SOHO, RHESSI, STEREO, ACE and WIND satellite data)
4	**Dominique Fontaine** (LPP) Dominique.fontaine@lpp.polytechnique.fr	*** Plasma Physics Introduction** *** Magnetosphere Physics ; * Formation and Transport**
5	**Frédéric Pitout** (IRAP) frederic.pitout@cesr.fr	**High-latitude Ionosphere** **PW**; Magnetic storm (data Propagation Tool, AMDA INTERMAGNET, EISCAT and IMAGE)
6	**Vafi Doumbia** (UCocody) vafid@yahoo.fr	**Equatoriale Ionosphere, Magnetic Variations & Ionospheric Dynamo**
7	**Monique Petitdidier** (LATMOS) monique.petitdidier@lamos.ipsl.fr	*** Atmospheric Emissions (I) and (II)**
8	**Elisabeth Blanc** (CEA) Elisabeth.blanc@cea.fr	**Atmosphere : Dynamics and perturbations (I) and (II)**
9	**Alain Hilgers** (ESA) Alain.Hilgers@esa.int	**Effects of Solar Events onTechnological Systems**
10	**Naima Zaourar** (USTHB) naimaboulasba@gmail.com	**PW** ;Fast solar wind, coronal hole (SPIDR, INTERMAGNET, ISGI, WDC for Geomagnetism Kyoto, data)
11	**Jonathan Makela** (University of Illinois USA) jmakela@illinois.edu	*** Ionosphere/Magnetosphere Coupling** *** Thermosphere/Ionosphere Response to Geomagnetic Storm**
12	**Brian Harding** (University of Illinois USA) bhardin2@illinois.edu	**Instrumentation for Studying the Upper Atmosphere**
13	**Ilyasse Azzouzi** (UMV) Ilyasse.azzouzi@gmail.com	**PW** : GPS data

IAS : « Institut d'Astrophysique Spatiale », CNRS-Université Paris Sud, Orsay, France.
CEA : « Commissariat de l'Energie Atomique ».
ESA : European Space Agency.
IRAP : « Institut de Recherche en Astrophysique et Planétologie » at Toulouse, France.
Ucocody : University of Cocody-Abidjan, Côte d'Ivoire.
PW : Practical Work.
***** : Courses.

Courses Schedule

Sunday, May 4, 2014: reception of participants

	Monday, May 5	Tuesday, May 6	Wednesday, May 7	Thursday, May 8	Friday, May 9	Saturday, May 10
9h-10h 30	Opening ceremony	Magnetosphere Formation **D.Fontaine**	Equatoriale Ionosphere & Ionospheric Dynamo **V. Doumbia**	Atmospheric Emissions (I) **M.Petitdidier**	Ionosphere/ Magnetosphe Coupling & Response to geomagnetic Storm **J.Makela**	Atmospheric Emissions (II) Interpretation of results **M.Petitdidier**
10h30 -12 h	coffee break	coffee break	coffee break	coffee break	coffee break	coffee break
11h-11h45 11h45 -12h30	From the Sun to the Earth : the Dynamos **C.Amory-Mazaudier** Introduction to Plasma Physics **D.Fontaine**	Transport in the Magnetosphere **D.Fontaine**	Auroral Ionosphere **F.Pitout** High and Low Latitudes Coupling **C.Amory-Mazaudier**	Atmosphere and Perturbations (I) **E.Blanc**	Effects of Solar Events on Technologi-cal Systems **A.Hilgers**	Instrumenta-tion for Studyind the Upper Atmosphere **B.Hardin**
12h30-14h30	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch
14h30-16h	The Sun ; Introduction **K.Bocchialini**	PW The Sun **K.Bochialini** PW Interplanetary medium **N.Vilmer**	PW Magnetic Storm **F.Pitout** PW Ionosphere / Magnetism **C.Amory-Mazaudier**	Basic Concepts : Earth Thermosphere Ionoshere **J.Makela**	PW GPS data **I.Azzouzi** PW Magnetic Indices **N.Zaourar**	Observatory Visite
16h - 16 h30	coffee break	coffee break	coffee break	coffee break	coffee break	coffee break
16h30-18h	The Sun and the Interplanetary Medium **N.Vilmer**	PW The Sun **K.Bochialini** PW Interplanetary Medium **N.Vilmer**	PW Magnetic Storm **F.Pitout** PW Ionosphere / Magnetism **C.Amory-Mazaudier**	Atmosphere and Perturbations (II) **E.Blanc**	PW GPS data **I.Azzouzi** PW Magnetic Indices **N.Zaourar**	Observatory Visite

4- Participants:

Family name	First name	E-mail
Daassou	Ahmed	ahmed.daassou51@gmail.com
Mraini	Kamilia	kamilia_oumaima@hotmail.com
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El Mahir	Abdeljalil	elmahir15@gmail.com
Rachid	Sidi Mohamed	rachid.sm@gmail.com
Fouraz	Hasna	h.fouraz@gmail.com
Malki	Khalifa	malki.khalifa@gmail.com
Kouassi	Komenan Benjamin	benjamin.kouassi@gmail.com
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Wakrim	layla	layla.wakrim@gmail.com
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Malki	Mourade	mouradkkk@gmail.com
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Moulane	Youssef	moulaneyoussef@gmail.com
Marjani	Mohamed	marjani.phm@gmail.com
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El ghaicha	Keltoum	keltoum.elghaicha@gmail.com
Abdelwahed	El Batoul	ab.elbatoul@gmail.com
El Bouyahyaoui	Khaoula	Khaoula.ayman1@gmail.com
Benelrhali	Azeddine	a.benelrhali@gmail.com
El Bassem	Younes	younes.elbassem@edu.uca.ma
Kaab	Mohamed	mkmahamedkaab@gmail.com

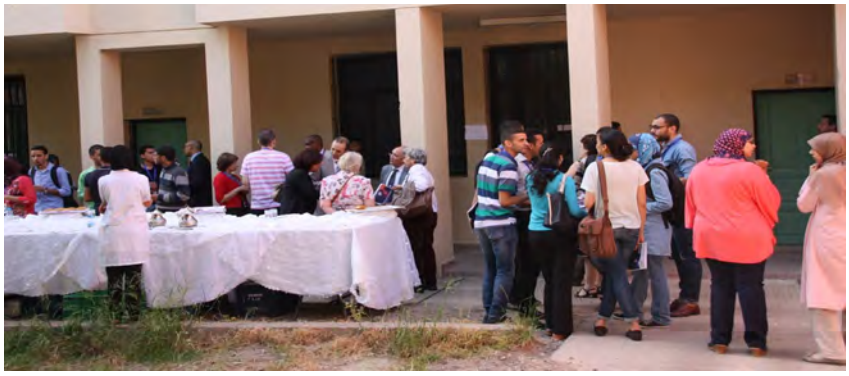
5- Budget

Furnishing	Amount (DH)	Sponsors
Rooms for lectures	Provided free of charges	FST
Rooms for practical works	Provided free of charges	ENSA
Tickets 1 Paris - Marrakech 2 Paris – Marrakech 2 Paris – Marrakech 1 Paris – Marrakech 1 Paris – Marrakech 1 Toulouse - Marrakech 2 Illinois - Marrakech 1 Alger - Marrakech 1 Abidjan - Marrakech **Total**	 5000 8000 16000 4000 5000 10000 30000 4000 12000 **94000**	 Ambassy of France at Morocco LESIA LPP IAS (CNRS) ESA IRAP University of Illinois OISA income Ambassy of France at Abidjan
Lodging of Professors Hotel TICHKA	32000	UCA University
Lunch	20000	UCA University & LPHEA
Coffee break	11000	FSS & GASUP
Impressions	15000	CNRST & RUPHE
BUS	1000	OISA income
TOTAL	**173000**	

GASUP : « Groupement des Assurances du SUPérieur » (Morocco).
CNRST : « Centre Nationale de la Recherche Scientifique et Technique » (Morocco).
RUPHE : « Réseaux Universitaire de la Physique des Hautes Enérgies » (Morocco).

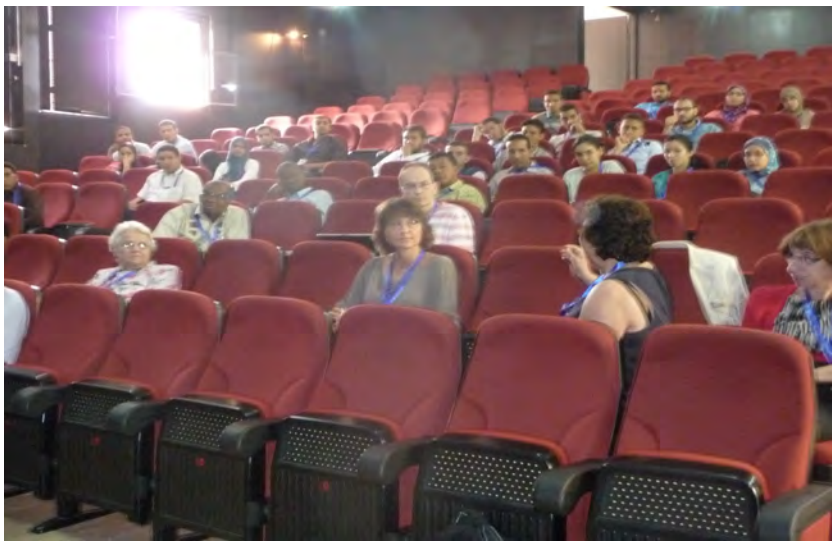
6- Organization and logistics

This "Space Weather" school was held at the University Cady Ayyad from 5 to 10 May 2014. The courses were held at the Faculty of Sciences and Technics (FST) and practical work at the National School of Applied Sciences (ENSA).
A visit to the Oukaimeden University Observatory was held on Saturday, May 10. Participants took knowledge of observations and instrumentations of the observatory. A demonstration of the RENOIR « Remote Equatorial Nighttime Observatory of Ionospheric Region » experiment was achieved.



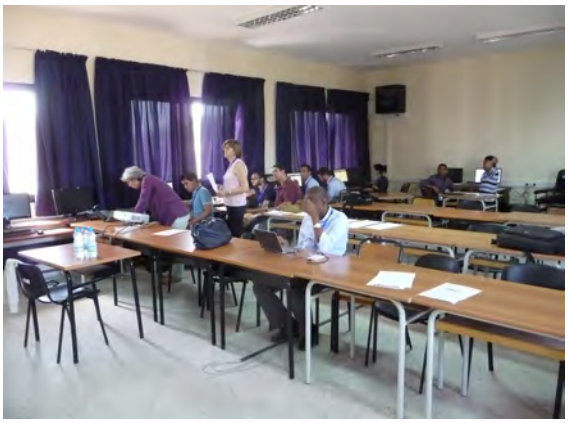
Faculty of Sciences and Technics (FST) where the courses were held.

Lectures

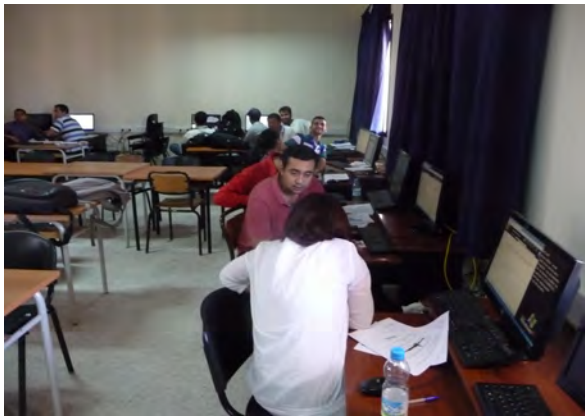


Room for lectures (we can see from right to left Dominique Fontaine, Nicole Vilmer, Karine Bochialini, Monique Petitdidier, Frédéric Pitout, Vafi Doumbia and students).

Practical works

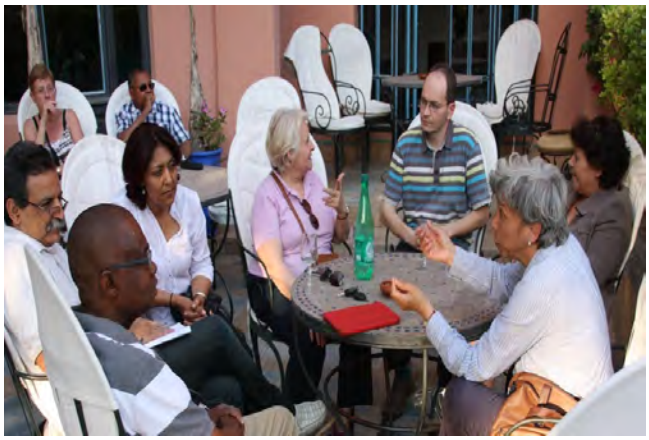


Naima Zaourar practical work on magnetic indices.



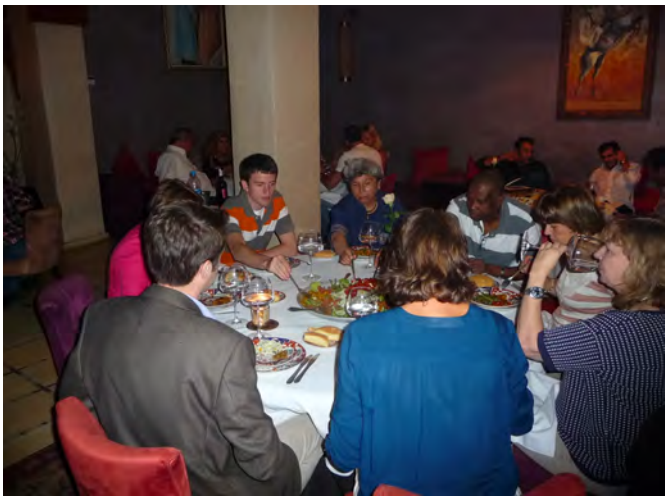
Students during practical works.

Tichka Hotel



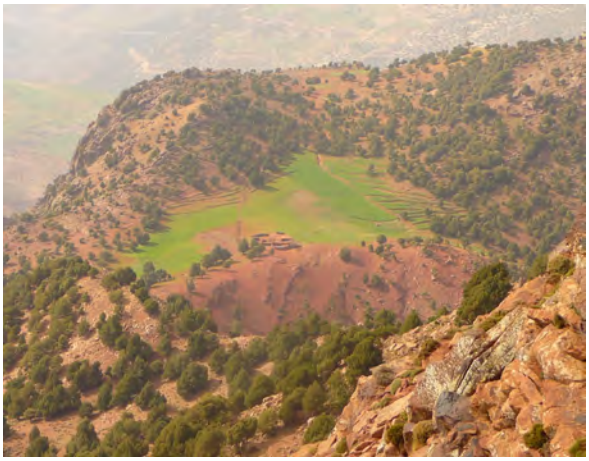
Vafi Doumbia, Zouhair Benkhaldoun, Aziza Bounhir, Monique Petitdidier, Frédéric Pitout, Nicole Vilmer and Christine Mazaudier (from left to right).

Having fun (oriental songs and moroccan food)

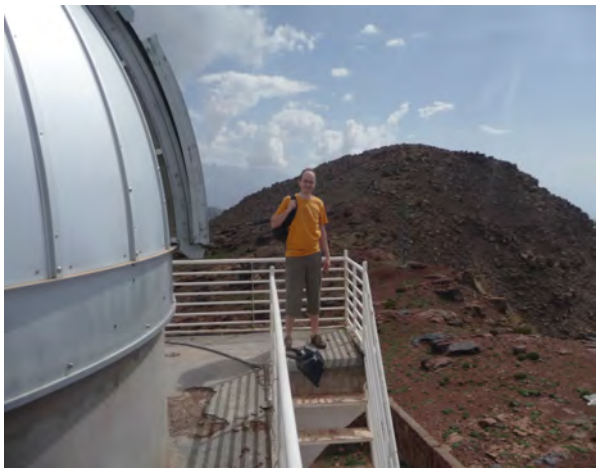


Jonathan Makela, Karine Bocchialini, Elisabeth Blanc Naima Zaourar, Vafi Doumbia, Christine Mazaudier, Brian Harding and Dominique Fontaine.

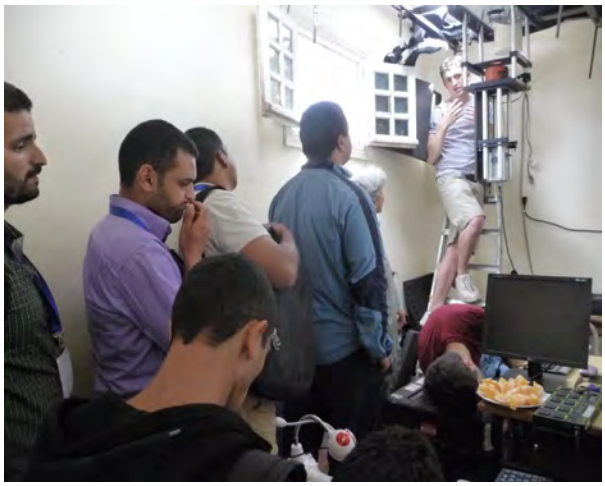
Visite to the Oukaimeden Observatory :



The observatory is in a wonderful place.

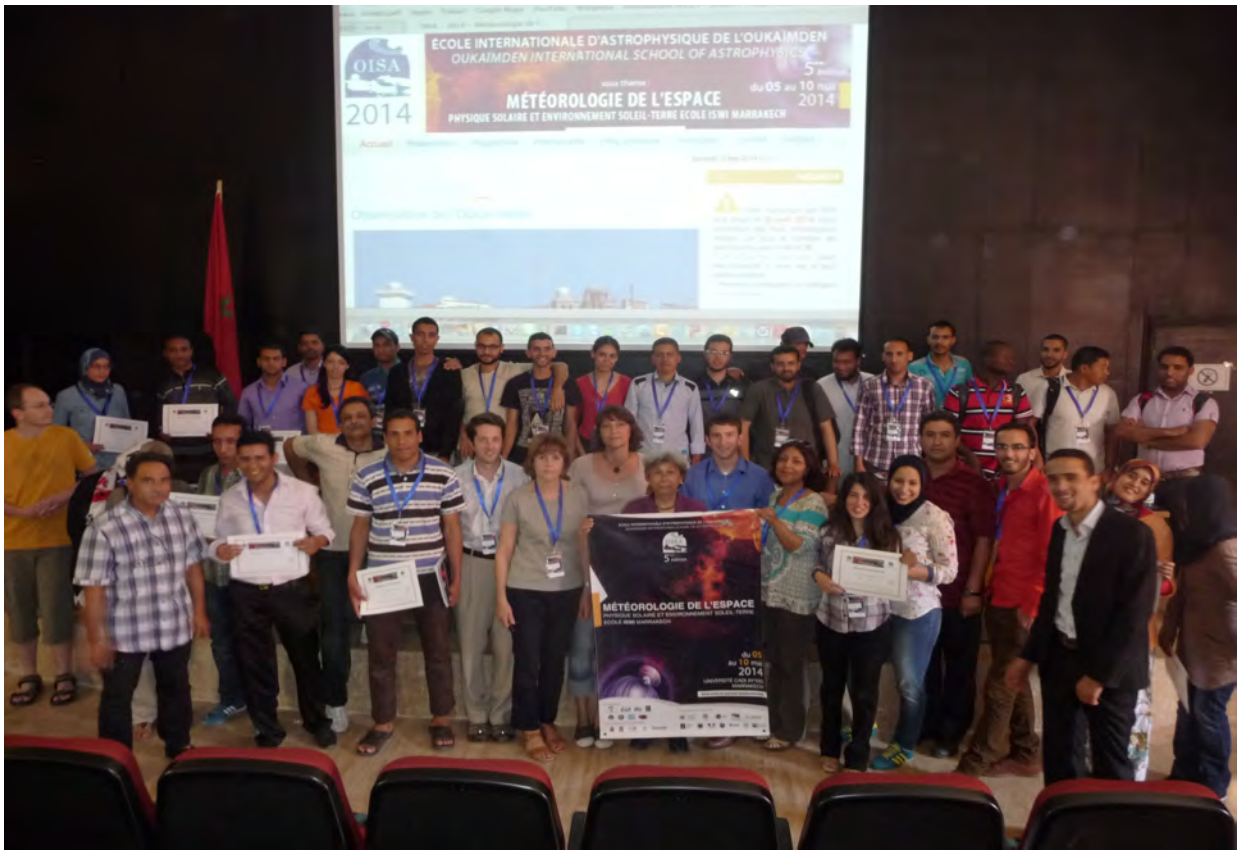


Frédéric Pitout near the dome of a 500mm telescope tracking meteors.



Brian Harding and Jonathan Makela explaning the RENOIR experiment to OISA students.

Final ceremony



Participation Certificate to the OISA'14 school (all courses provided on a USB key)

7- OISA'2014 benefits

The benefits of this school are as follows:

1 - Sapce weather will be taught at the university Cady Ayyad at the master level.

2 - Establishment of a collaboration with Algeria, Burkina Faso, Côte d'Ivoire and France in the development of space weather teaching.

3 - In Morocco, coordinating efforts in Space Weather with the CRASTE-LF "African Regional Centre for Space Science and Technology" which assumes a Master in GNSS "Global Navigation Satellite System".

4 - Concerning the co-directions of doctoral thesis, there would be four subjects :

- Christine Amory-Mazaudier will supervise two students on the effects of ionospheric disturbances on geomagnetic activity in coordination with Bounhir Aziza and Benkhaldoun Zouhair.

- Dominique Fontaine will suprevise one student on the caracterization of the magnetosphere with Cluster satellites in coordination with Bounhir Aziza.

- Frédéric Pitout may supervise a thesis on the auroral ionosphere and its connections with the mid-latitude and equatorial ones in coordination with Bounhir Aziza.