

How Big is our World ?

ERATOSTHENES



2015



h i g h l i g h t s

Panhellenic congress

Special events

World Space Week

Eratóstenes Plaza Mayor
Bibliotheca Alexandrina
Greek Holidays
Indian Summer

Athens Acropolis

Astronomical events

Solar Eclipse

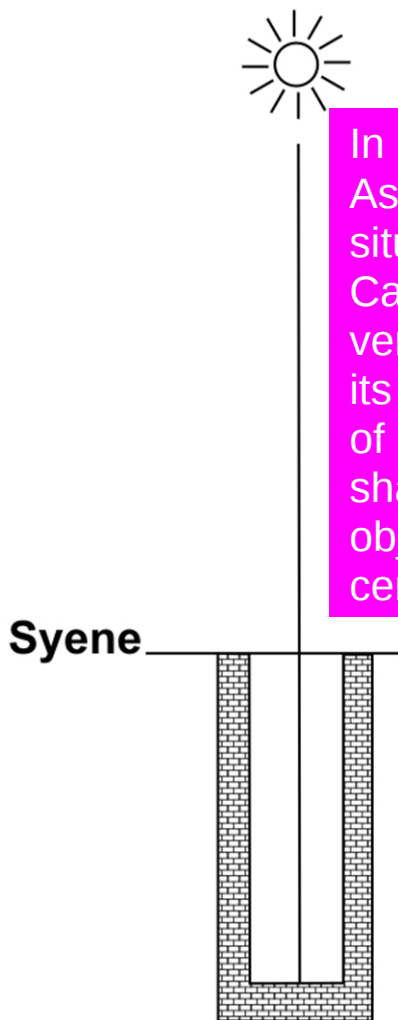
March & September equinoxes
June & December solstices
No noon shadow days

Halloween

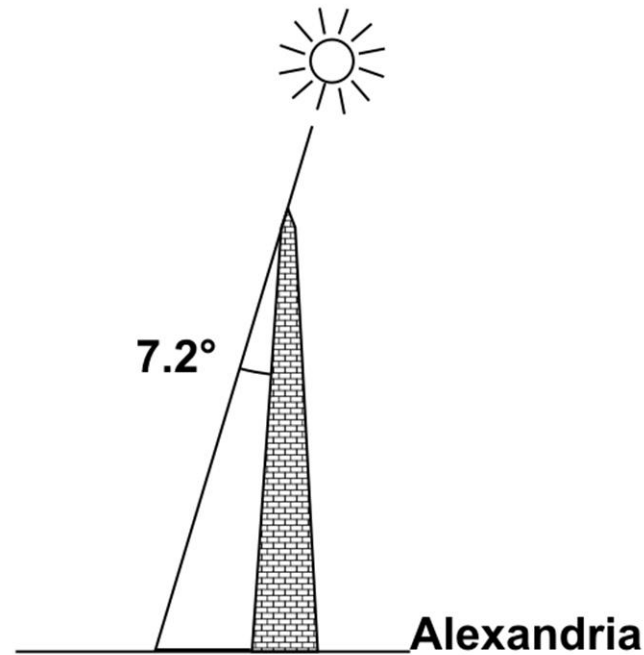
104 schools from **25** countries recorded **567** measurements
over **5** continents, to calculate the circumference of the **Earth**

Eratosthenes historical experiment

In 205 B.C., the Greek astronomer Eratosthenes, at the time Director of the Great Library of Alexandria in Egypt, proposed a purely geometrical method to measure the length of the Earth's circumference



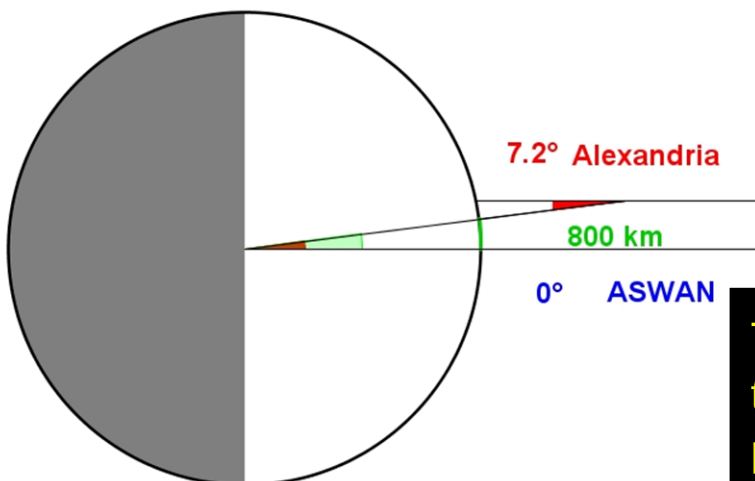
In Syene (Actually Aswan, approximately situated on the tropic of Cancer) the Sun is at the vertical, so much so that its rays reach the bottom of a well: and the shadows of vertical objects are perfectly centred round them.



In Alexandria, on the other hand, the Sun is no longer at the vertical, and these same objects have a very shallow offset shadow. Eratosthenes set about measuring the shadow of an obelisk whose height he knew, and used this information to deduce the angle of the sun's rays from the vertical: he found 7.2°

21 june 200 BC (Alexandria-EGYPT)

21 june 200 BC (ASWAN-EGYPT)



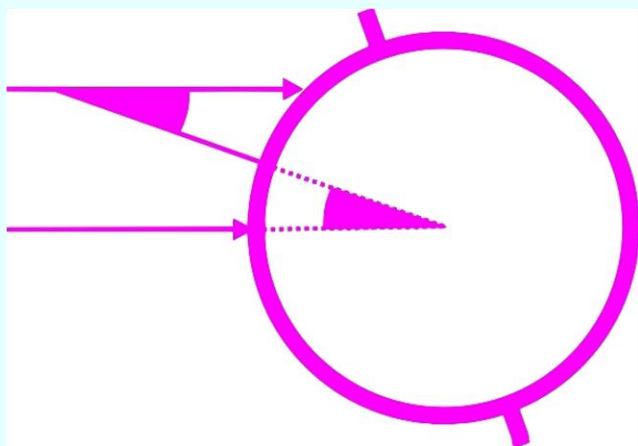
Angle (°)	Distance (km)
7.2	800
360	circumference

X 50

$$\text{Circumference} = 360 \times 800 / 7.2 = 40\,000$$

$$\text{circumference} = \frac{360^\circ \times 800 \text{ km}}{7.2^\circ} = 40000 \text{ km}$$

The proportion of this angle in relation to the 360° of a circle is the same as the proportion of the distance separating the two cities (approximately 800 km) relative to the circumference of a circle



Eratosthenes Greek Team



With 26 participating schools, Greece is the most active country this year

January

City	School	Latitude(+N/-S)	Longitude(+E/-W)
Ioannina	Collège Pilote Expérimental Zosimaïas Scholis	+39.667	+20.850
Athens	Acropolis	+37.971	+23.727
Athens	Protypo Peiramatiko Gymnasio Agion Anargyron	+38.027	+23.726
Lardos	Primary School of Lardos, Rhodes	+36.093	+28.012
Athens	3rd Junior High School of Ilion	+38.037	+23.712
Aigio	1st High School of Aigio	+38.252	+22.079
Petroupoli	4th Junior High School of Petroupoli	+38.036	+23.674
Athens	4th Junior High School of Chalandri	+38.024	+23.821
Athens	1st Junior High School of Agioi Anargyroi	+38.027	+23.726
Aspropirgos	3rd High School of Aspropirgos	+38.061	+23.601
Grevena	2nd primary school of Grevena Greece	+40.086	+21.424
Komotini	3rd Junior High School Komotini	+41.121	+25.394
Drama	13th primary school of Drama	+41.148	+24.136
Drama	8th primary school of Drama	+41.157	+24.147
Patras	Rio-Antirio Bridge	+38.310	+21.779
Kalamata	Georgiou Square	+37.038	+22.111
Rhodes	Moni Amws	+36.327	+28,213
Messinia	1st Kindergarten of Pylos	+36.911	+21.694
Kozani	Junior High School of Krokos	+40.265	+21.815
Alexandroupoli	Pilot Elementary School of Alexandroupolis	+40.843	+25.871
Chania	Primary School DDMN Hellenic Navy Logistic Command	+35.485	+24.082
Schimatari	Lykeio Schimatariou	+38.352	+23.573
Pastida	ΔΣ Πασίδας / Primary School of Pastida	+36.385	+28.138
Kavala	3rd Junior High School of Kavala	+40.938	+24.402
Piraeus	2nd Junior High School of Korydallos	+37.977	+23.655
Eleusis	Archeological Site (3rd Junior High School of Aspropyrgos)	+38.042	+23.539

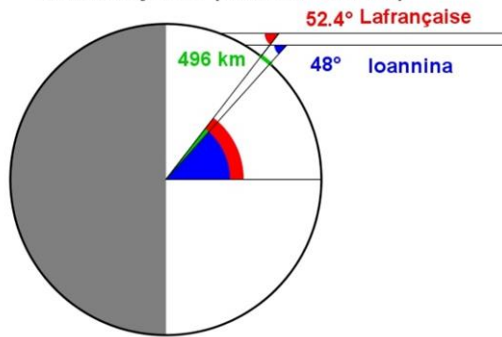


Project kick off (Asia, Europe, Africa)

3 continents, 4 countries, 4 schools, 4 measurements

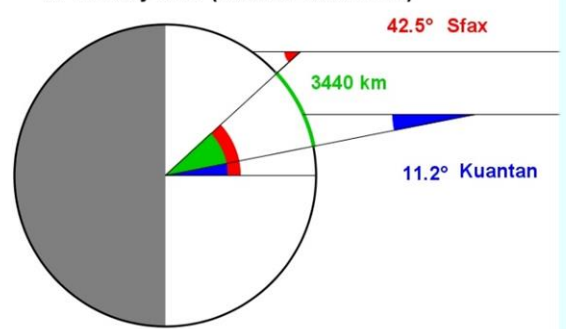
Flag	City	Country	School	Latitude (°) +N/-S	Longitude (°) +E/-W
	Lafrançaise	France	Collège Antonin Perbosc	44.127	1.237
	Ioannina	Greece	Experimental College	39.666	20.845
	Kuantan	Malaysia	SMK St Thomas	3.827	103.339
	Sfax	Tunisia	écoles de Sakiét Eddayer	34.789	10.780

27 february 2015 (Lafrançaise-FRANCE)
27 february 2015 (Ioannina-GREECE)



$$\text{circumference} = \frac{360^\circ \times 496 \text{ km}}{52.4^\circ - 48^\circ} = 40582 \text{ km}$$

27 february 2015 (Sfax-TUNISIA)
27 february 2015 (Kuantan-MALAYSIA)



$$\text{circumference} = \frac{360^\circ \times 3440 \text{ km}}{42.5^\circ - 11.2^\circ} = 39565 \text{ km}$$

February

Collège Perbosc
Lafrançaise, FRANCE



SMK St Thomas,
Kuantan, MALAYSIA

Experimental College
Ioannina, GREECE



Ecole de Sakiet Eddayer
Sfax TUNISIA



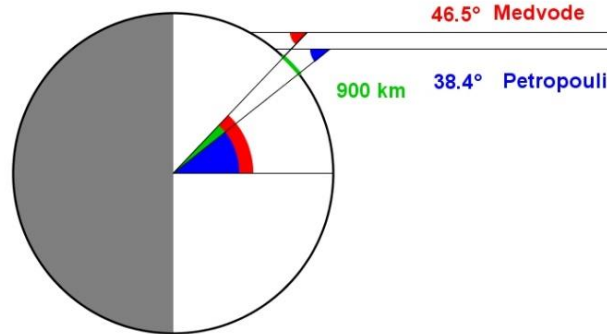
Astronomical event : march equinox

5 continents, 19 countries, 47 schools, 130 measurements

Instituto Diocesano de Formação João Paulo II
São Tomé and Príncipe



19 march 2015 (Medvode-SLOVENIA)
19 march 2015 (Petropouli-GREECE)



$$\text{circumference} = \frac{360^\circ \times 900 \text{ km}}{46.5^\circ - 38.4^\circ} = 40000 \text{ km}$$

Aigio
Anisacate
Aspropyrgos
Athens
Băicoi
Bjelovar
Chiayi City
Dendermonde
Donji Muć
Doreen
Drama

Gressoney St Jean

Grevena

Hô Chi Minh City

Imbassai

Ioannina

Kanchanpur

Kaohsiung

Komotini

Kuantan

Lafrançaise

Lardos

Mandhar

Marina di Carrara

Medvode

Merlara

Mumbai

Nova Bukovica

Ogulin

Palmela

Patras

Petroupoli

Plaški

Pont St Martin

Rio de Janeiro

Saint Félix

São Tomé

Sfax

Shenzhen

Stuttgart

Trần Khai Nguyên High school
Hô Chi Minh City
VIETNAM



Hazel Glen College
Doreen, AUSTRALIA

Scola Secundária Palmela PORTUGAL



3ο Γυμνάσιο Ιλίου,
1st High School of Aigio

3rd High School of Aspropirgos,

Protypo Peiramatiko Gymnasio Agion Anargyron,

In Athens Acropolis, GREECE

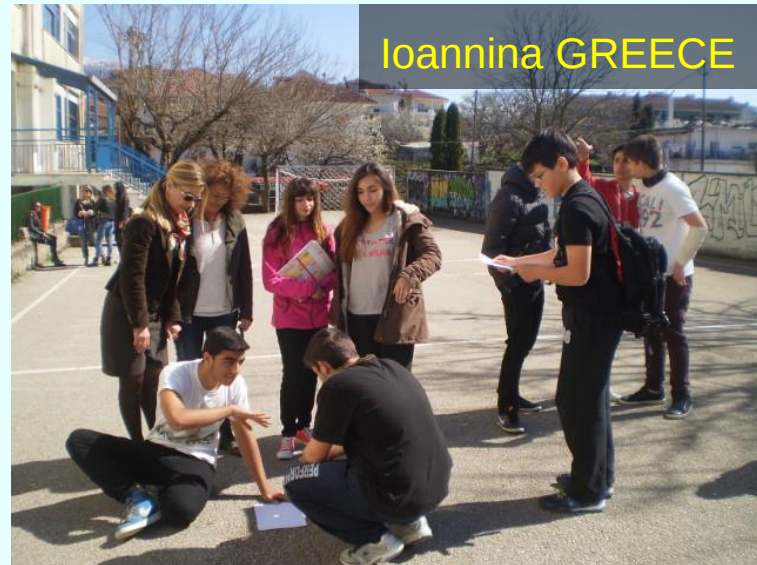


March

Special event: Solar Eclipse



Marina di Carrara ITALY



Ioannina GREECE

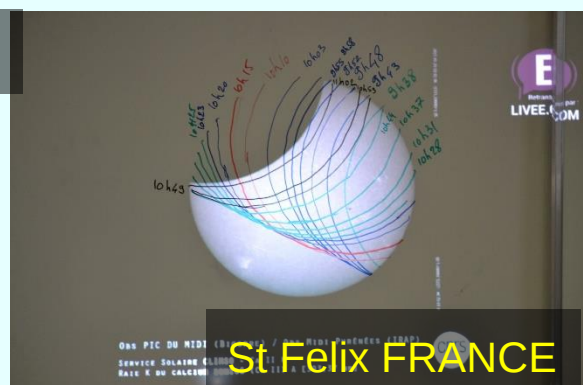
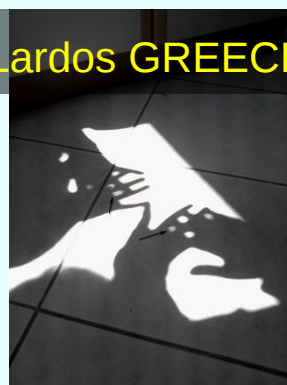


Lafrançaise FRANCE



Medvode SLOVENIA

Lardos GREECE



St Felix FRANCE



Donji Muc CROATIA



Merlara ITALY



Athens GREECE

April measures (Asia, Africa, America, Europe)

4 continents, 7 countries, 16 schools, 30 measurements



Primary School of Lardos,
Rhodes GREECE



Ecole Publique, St Félix FRANCE

April

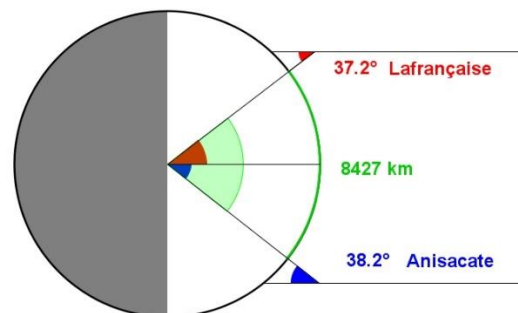


4th Junior High
School Petroupoli



Ecole primaire 16 Rue de Russie
Tunis TUNISIA

07 april 2015 (Lafrançaise-FRANCE)
08 april 2015 (Anisacate-ARGENTINA)



$$\text{circumference} = \frac{360^\circ \times 8427 \text{ km}}{37.2^\circ + 38.2^\circ} = 40235 \text{ km}$$

Flag	City	Country	School	Latitude (°) +N/-S	Longitude (°) +E/-W
	Anisacate	Argentina	Fundación Caminos de Anisacate	-31.717	-64.400
	Maricá	Brazil	Grupo 84° Escoteiro Cidade de Maricá	-22.919	-42.819
	Rio de Janeiro	Brazil	Grupo João Melchior Bosco 96 RJ	-22.890	-43.279
	Aigio	Greece	1st Gimnasium of Aigio	38.252	22.079
	Athens	Greece	4th Junior High School of Chalandri	38.024	23.821
	Athens	Greece	1st JHS of Agioi Anargyroi	38.027	23.726
	Athens	Greece	Experimental College Agion Anargyron	38.027	23.726
	Athens	Greece	3rd Junior High School of Ilion	38.037	23.712
	Ioannina	Greece	Experimental College	39.666	20.845
	Lardos	Greece	Primary School of Lardos	36.093	28.012
	Petroupoli	Greece	4o Junior High School	38.036	23.674
	Lafrançaise	France	Collège Antonin Perbosc	44.127	1.237
	Saint Félix	France	Ecole primaire	43.883	2.983
	Kuantan	Malaysia	SMK St Thomas	3.827	103.339
	Chiayi City	Taiwan	Chia Hwa Senior High School	23.483	120.477
	Tunis	Tunisia	Ecole primaire 16 Rue de Russie	36.795	10.177

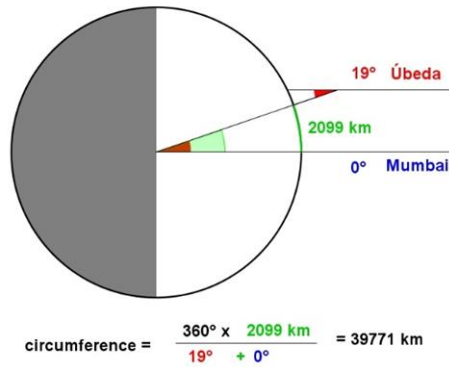


Chia Hwa Senior High School
Chiayi City TAIWAN

Special event : no noon shadow day

4 continents, 9 countries, 22 schools, 52 measurements

15 May 2015 (Úbeda-SPAIN)
15 May 2015 (Mumbai-INDIA)



L.R & S.M Vissanji Academy
Mumbai INDIA

May



Colegio Salesiano
Santo Domingo Savio
Úbeda SPAIN



Istituzione Scolastica Monte Rosa A
Pont Saint Martin ITALY

Estancia Jesuítica
Alta Gracia ARGENTINA



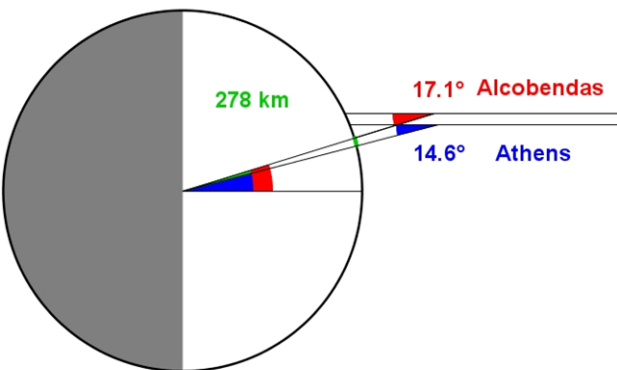
Centro Educacional
Nosso Mundo
Rio de Janeiro
BRAZIL



Special event: Plaza Mayor de Alcobendas

12 June 2015 (Alcobendas-SPAIN)

12 June 2015 (Athens-GREECE)



$$\text{circumference} = \frac{360^\circ \times 278 \text{ km}}{17.1^\circ - 14.6^\circ} = 40032 \text{ km}$$



June



Astronomical event: June solstice in Alexandria

4 continents, 15 countries, 34 schools, 64 measurements



Bibliotheca Alexandrina Alexandria EGYPT

June

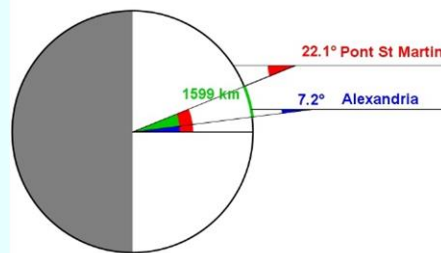


荔園小學南校區
Shenzhen CHINA



Govt. Senior
Secondary School
Karauli INDIA

17 June 2015 (Pont St Martin-ITALY)
17 June 2015 (Alexandria-EGYPT)



$$\text{circumference} = \frac{360^\circ \times 1599 \text{ km}}{22.1^\circ - 7.2^\circ} = 38634 \text{ km}$$

Ecole de
Gressoney
Saint Jean
ITALY

C V Raman Science Club
Har Ki Pauri
Haridwar INDIA



Vashisth Vatsalya Public School
Allahabad INDIA

Special event: Greek teachers on holidays



July

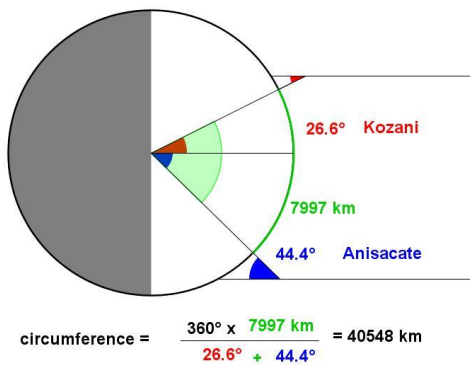


August measures (Asia, America, Europe)

3 continents, 3 countries, 4 schools, 8 measurements

Flag	City	Country	School	Latitude (°) +N/-S	Longitude (°) +E/-W
	Anisacate	Argentina	Fundación Caminos de Anisacate	-31.717	-64.400
	Cephalonia	Greece		38.108	20.562
	Kozani	Greece	Junior High School of Krokos	40.265	21.815
	Dholpur	India	GSSS Tagawali	26.708	77.908

13 August (Kozani-GREECE 40.27)
17 August (Anisacate-ARGENTINA - 31.72)



August

Govt. senior secondary school
Dholpur Tagawali INDIA



Govt. senior secondary school
Dholpur Tagawali INDIA



Fundación
Caminos de Anisacate
ARGENTINA



Kozani
GREECE

Cephalonia
GREECE



Astronomical event: September Equinox

4 continents, 17 countries, 38 schools, 89 measurements

Scola Secundária
Palmela PORTUGAL



Liceo N°1
Paysandú URUGUAY



鳳西國中 FXM
Kaohsiung TAIWAN



School #11
Sverdlovsk UKRAINE



2nd primary school
Grevena GREECE



September

OŠ Neorić – Sutina CROATIA



3rd Junior High School
Kavala GREECE



Colegiul Ion Kalinderu
Busteni ROMANIA



GH Magheru School
Caracal ROMANIA



Primary School
Pastida GREECE



Aigio
Anisacate
Athens
Baghat
Buenos Aires
Busteni
Caracal
Chania
Donji Muć
Đurđevac
Grevena
Ioannina
José de la Quintana
Kaohsiung
Kavala
Kozani
Kuantan
Lafrançaise
Lardos
Mărgineni
Neoric
Nis
Palmela
Pastida
Paysandú
Petrupoli
Pont St Martin
Rio de Janeiro
São João de Meriti
Shenzhen
Supetar
Sverdlovsk
Tunis
Úbeda
Yamunanagar

Special event: Halloween



October



City	Country	School	Latitude	Longitude	Date	Gnomon height [cm]	Shadow length [cm]	Angle (°)
Ioannina	Greece	Collège Modèle de "Zosimaia Scholis"	39.667	20.850	29/9/2015	100.0	133.0	53.1
Donji Muć	Croatia	PS kneza Branimira_Donji Muć	43.694	16.462	30/9/2015	100.0	156.5	57.4
Brštanovo	Croatia	Osnovna škola kneza Branimira	43.658	16.415	30/9/2015	100.0	157.8	57.6
Rome	Italy	Fondazione Mondo Digitale	41.855	12.550	29/9/2015	200.0	286.0	55.0
Petroupoli	Greece	Collège Modèle de "Zosimaia Scholis"	38.036	23.674	29/9/2015	119.0	149.0	51.4
Petroupoli	Greece	Collège Modèle de "Zosimaia Scholis"	38.036	23.674	30/9/2015	119.0	150.0	51.6
Pastida	Greece	Primary School of Pastida	36.385	28.138	30/9/2015	166.0	159.0	43.8
Lardos	Croatia	Primary School of Lardos	36.093	28.012	30/9/2015	120.0	136.0	48.6
Parintins	Brazil	Núcleo de Ensino e Pesquisa em Astronomia	-2.628	-56.736	30/9/2015	17.5	0.5	1.6



Special event: World Space Week



October



October measures (Asia, Africa, America, Europe)

4 continents, 8 countries, 21 schools, 41 measurements



Fondazione Mondo Digitale
Rome ITALY



oš kneza Branimira
Brštanovo CROATIA



NEPA Parintins BRAZIL



Holy Mother Public School
Yamunanagar INDIA



SVPS Jagadhri
Yamunanagar INDIA

Flag	City	Country	School	Latitude (°) +N/-S	Longitude (°) +E/-W
	Aigio	Greece	1st Gimnasium of Aigio	38.252	22.079
	Ioannina	Greece	Experimental College	39.666	20.845
	Kozani	Greece	Junior High School of Krokos	40.265	21.815
	Lardos	Greece	Primary School of Lardos	36.093	28.012
	Messinia	Greece	1st Kindergarten of Pylos	36.911	21.694
	Pastida	Greece	Primary School of Pastida	36.385	28.138
	Petroupoli	Greece	4o Junior High School	38.036	23.674
	Donji Muć	Croatia	oš kneza Branimira	43.694	16.462
	Brštanovo	Croatia	Osnovna škola kneza Branimira	43.658	16.415
	Neoric	Croatia	OŠ Neorić - Sutina	43.686	16.520
	Pont St Martin	Italy	Istituzione Scolastica Monte Rosa A	45.601	7.795
	Rome	Italy	Fondazione Mondo Digitale	41.855	12.550
	Lafrançaise	France	Collège Antonin Perbosc	44.127	1.237
	Yamunanagar HMPS	India	Holy Mother Public School	30.145	77.268
	Yamunanagar GSSS	India	Govt. Senior Secondary School Alahar	30.033	77.200
	Yamunanagar SVPS	India	S.V.N.Public School Jagadhri	30.133	77.283
	Dholpur	India	GSSS Tagawali	26.708	77.908
	Chiayi City	Taiwan	Chia Hwa Senior High School	23.483	120.477
	Sfax	Tunisia	écoles de Sakiét Eddayer	34.789	10.780
	Parintins	Brazil	Núcleo de Ensino e Pesquisa em Astronomia	-2.6278	-56.736
	Uberlandia	Brazil	Centro de Convenções	-18.923	-48.259



Special event: Panhellenic congress



Geogebra workshop

November



Project presentation



November measures (Asia, Africa, Europe)

3 continents, 5 countries, 12 schools, 26 measurements

OŠ Prežihovega Voranca
Jesenice SLOVENIA



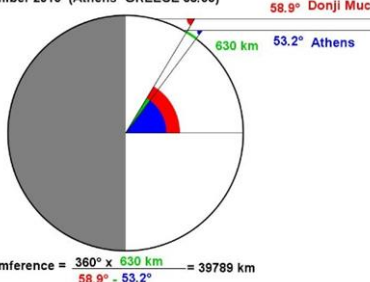
3rd High School of Aspropyrgos
Eleusis GREECE



November

Flag	City	Country	School	Latitude (°) +N/-S	Longitude (°) +E/-W
	Brštanovo	Croatia	Osnovna škola kneza Branimira	43.658	16.415
	Donji Muć	Croatia	oš kneza Branimira	43.694	16.462
	Neoric	Croatia	OŠ Neorić - Sutina	43.686	16.520
	Pont St Martin	Italy	I.S. Monte Rosa A	45.601	7.795
	Aigio	Greece	1st Gimnasium of Aigio	38.252	22.079
	Athens	Greece	Experimental College Agion Anargyron	38.027	23.726
	Eleusis	Greece	3rd High School of Aspropyrgos	38.042	23.539
	Kozani	Greece	Junior High School of Krokos	40.265	21.815
	Pastida	Greece	Primary School of Pastida	36.385	28.138
	Petroupoli	Greece	4o Junior High School	38.036	23.674
	Jesenice	Slovenia	OŠ Prežihovega Voranca	46.433	14.050
	Tunis	Tunisia	Ecole primaire 16 Rue de Russie	36.795	10.177

4 November 2015 (Donji Muć-CROATIA 43.69)
4 November 2015 (Athens- GREECE 38.03)



1st Junior High School Agioi Anargyroi
Athens GREECE



Experimental College Agion Anargyron
Athens GREECE



Astronomical event: December Solstice

4 continents, 13 countries, 31 schools, 81 measurements

Marwari Vidyalaya HS
Mumbai INDIA



Buonarroti primary school
Marina di Carrara ITALY



Experimental College
Ioannina, GREECE



C V Raman Science Club
Yamunanagar INDIA



CENOM Rio de Janeiro BRAZIL



Trần Khai Nguyên High school
Hô Chi Minh City VIETNAM



Gh. Popescu School
Margineni ROMANIA



3rd Junior HS of Korydallos
Piraeus GREECE



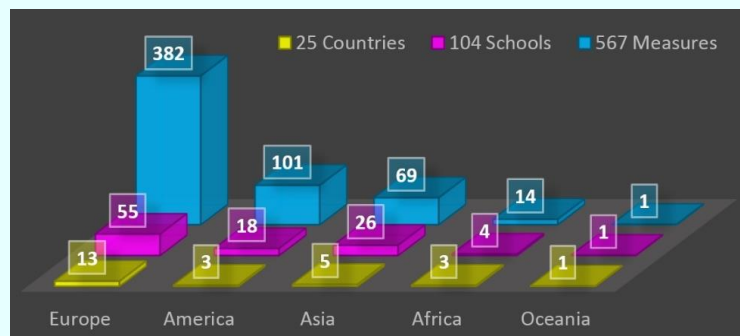
Flag	City	Country	School	Latitude (°) +N/-S	Longitude (°) +E/-W
	Anisacate	Argentina	Fundación Caminos de Anisacate	-31.717	-64.400
	Niterói	Brazil	Grupo 64 Lourival Andrade	-22.885	-43.121
	Rio de Janeiro	Brazil	Centro Educacional Nosso Mundo	-22.890	-43.317
	São João de Meriti	Brazil	31 Marechal Rondon	-22.800	-43.367
	Shenzhen	China	麓園小學南校區	22.549	114.092
	Brštanovo	Croatia	Osnovna škola kneza Branimira	43.658	16.415
	Donji Muć	Croatia	oŠ kneza Branimira	43.694	16.462
	Neoric	Croatia	OŠ Neorić - Sutina	43.686	16.520
	Lafrançaise	France	Collège Antonin Perbosc	44.127	1.237
	Aigio	Greece	1st Gimnasium of Aigio	38.252	22.079
	Athens	Greece	Experimental College Agion Anargyron	38.027	23.726
	Chania	Greece	Primary School DDMN	35.485	24.082
	Ioannina	Greece	Experimental College	39.666	20.845
	Pastida	Greece	Primary School of Pastida	36.385	28.138
	Petroupoli	Greece	4o Junior High School	38.036	23.674
	Piraeus	Greece	2nd Junior High School of Korydallos	37.977	23.655
	Mumbai	India	Marwari Vidyalaya High School	18.957	72.818
	Yamunanagar	India	Govt. Senior Secondary School Alahar	30.033	77.200
	Yamunanagar	India	S.V.N.Public School Jagadhri	30.145	77.297
	Yamunanagar	India	C V Raman Science Club	30.117	77.250
	Yamunanagar	India	Holy Mother Public School	30.145	77.268
	Yamunanagar	India	GSSS Yamunanagar	30.120	77.290
	Yamunanagar	India	NCP Jagadhri	30.173	77.278
	Marina di Carrara	Italy	M Buonarroti primary school	44.045	10.031
	Pont St Martin	Italy	Istituzione Scolastica Monte Rosa A	45.601	7.795
	Kuantan	Malaysia	SMK St Thomas	3.817	103.333
	Busteni	Romania	Colegiul Ion Kalinderu	45.416	25.535
	Mărgineni	Romania	Gh. Popescu School	44.533	24.554
	Kaohsiung	Taiwan	鳳西國中 FXM	22.621	120.354
	Tunis	Tunisia	Ecole primaire 16 Rue de Russie	36.795	10.177
	Hồ Chí Minh City	Vietnam	Trần Khai Nguyên High School	10.759	106.669

December

Eratosthenes 2015

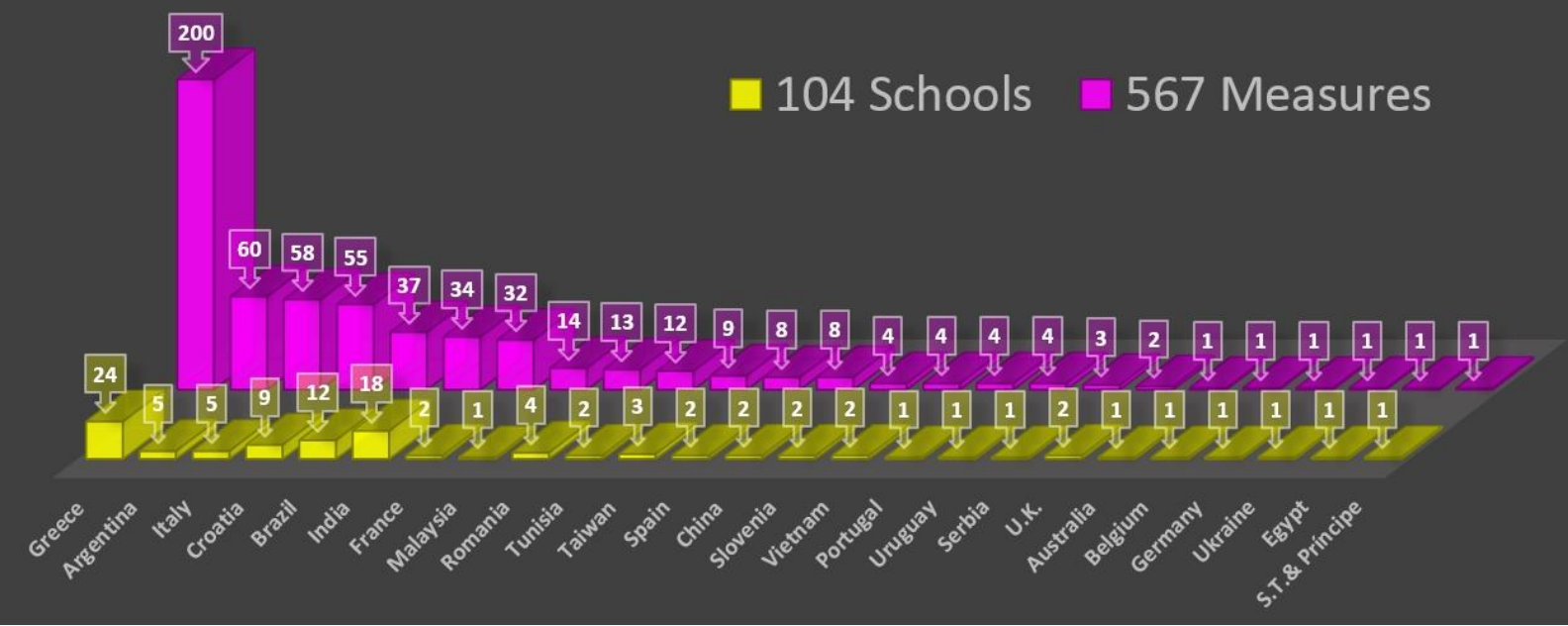
Continent	Measures	Schools	Countries
Europe	382	55	13
America	101	18	3
Asia	69	26	5
Africa	14	4	3
Oceania	1	1	1

2015 Statistics



Country	Measures	Schools
Greece	200	24
Argentina	60	5
Italy	58	5
Croatia	55	9
Brazil	37	12
India	34	18
France	32	2
Malaysia	14	1
Romania	13	4
Tunisia	12	2
Taiwan	9	3
Spain	8	2
China	8	2
Slovenia	4	2
Vietnam	4	2
Portugal	4	1
Uruguay	4	1
Serbia	3	1
U.K.	2	2
Australia	1	1
Belgium	1	1
Germany	1	1
Ukraine	1	1
Egypt	1	1
S.T.& Príncipe	1	1

City	Country	School	Measures
Anisacate	Argentina	Fundación Caminos de Anisacate	55
Petroupolis	Greece	4o Junior High School	51
Pont St Martin	Italy	Collège	48
Lafrançaise	France	Collège Antonin Perbosc	26
Donji Muć	Croatia	oš kneza Branimira	24
Aigio	Greece	1st Gimnasium of Aigio	23
Ioannina	Greece	Experimental College	23
Athens	Greece	Experimental College Agion Anargyron	19
Rio de Janeiro	Brazil	Centro Educacional Nosso Mundo	16
Brštanovo	Croatia	Osnovna škola kneza Branimira	15
Kuantan	Malaysia	SMK St Thomas	14
Lardos	Greece	Primary School of Lardos	13
Kozani	Greece	Junior High School of Krokos	12
Tunis	Tunisia	Ecole primaire 16 Rue de Russie	10
Neoric	Croatia	OŠ Neorić - Sutina	9
Pastida	Greece	Primary School of Pastida	9
Shenzhen	China	荔園小學南校區	7
Athens	Greece	3rd Junior High School of Ilion	7
Úbeda	Spain	Colegio Salesiano Santo Domingo Savio	7
Saint Félix	France	Ecole Primaire	6
Kaohsiung	Taiwan	鳳西國中 FXM	6
Parintins	Brazil	Núcleo Ensino Pesquisa Astronomia	5
Athens	Greece	1st JHS of Agioi Anargyroi	5
Athens	Greece	4th Junior High School of Chalandri	5
Băicoi	Romania	Liceul Tehnologic "Constantin Cantacuzino"	5



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