



# SUN SHADOWS

## SHARE THE SHADOWS

Pupils and teachers all over the world join forces to measure the shadows of a 1m long stick at noon! You don't need much to participate, just some sun and a stick!

The Sun Shadows project is a easy-to-do class project - free and open to all ages between 10 and 18 yrs. It is organised by the common efforts of Museo Nazionale dell'Antartide (Italy), International Polar Foundation (Belgium) and Maciste Ice WebGIS system (Italy), all being convinced that the joined activity of gathering, and subsequent study, of simple data at school and in polar regions, is the best way to introduce students that these remote regions are important to all people on Earth.

### Objectives

The purpose of the project is to create and increase student understanding about the fact that the amount of solar energy incoming to the earth system vary according to two main variables: the latitude and time of the year. This is one of the key concept usefull to understand the climatic features of polar regions as well as their role in the earth's climate system.

### Methods

In short, the project is made of the following parts

- ✦ Students will be able to compare their results with established latitudinal benchmarks to evaluate how small differences in latitude affect climate.

- ✧ They will be able to explain how the changes in the shadows length demonstrate the Earth's progress in its annual orbit.
- ✧ Students will work with real measurements, what makes science or mathematic classes more concrete and interesting
- ✧ Pupils and students will learn how to position themselves on Earth, using the historical method to combine with modern GPS positioning
- ✧ Students will communicate their findings and understanding to a larger audience using the web, and other ICT instruments.

The project and part of dataset and material produced has been made using and adapting, after permission of the authors, the resources of the following early projects

1. "Sun Shadow Project" (2009;  
[http://web.me.com/lhuffman/Project\\_Circle/Sun\\_Shadows\\_2009-10.html](http://web.me.com/lhuffman/Project_Circle/Sun_Shadows_2009-10.html))
2. "Sun Shadows project" (2002;  
<http://mrsmith.htmlplanet.com/sunactivity.htm>)

Among the original documents made by the organizers of the projects (MNA and IPF) there is a ready-to-do activity, only in italian, and published on a dedicated italian website of the project (<http://www.mna.it/SPES/SSP>), that is made of a student and a teacher' sheet. It guide students to select a small and specific dataset of measures of the online archive and to carry on some simple analisys and observations that help them to understand the effect of time of the year and latitude on the lenght of the shadow [http://www.mna.it/SPES/download/SSP\\_Activity.pdf](http://www.mna.it/SPES/download/SSP_Activity.pdf). Moreover the teacher's documents give some relevant and additional information to help the educator to guide properly the students in this inquired based activity.

## Instructions

**Which values you need for each measurement?** Each participant need to provide the following values for each measurement:

- 1. Authors of the measurement (Name or School or Institutions)**
- 2. City where the measurement has been taken** (you only need to provide the name of the closest town and his country)
- 3. Country where the measurement has been taken**
- 4. email box of the authors.** Indicate the email of the referent of the project that will be contacted and, eventually, involved in further activities
- 5. Latitude of the place** (in °, ' and ") You can provide the value of the closest town (or village) to the place of measurement, or use a GPS or use Google Earth to define it more accurately
- 6. Longitude of the place** (in °, ' and ") You can provide the value of the closest town (or village) to the place of measurement, or use a GPS or use Google Earth to define it more accurately
- 7. Date and Local (civil) time** defined at the exact moment of the measurement and taken with a watch setted on the relative **Time Zone** of the place (indicated as **UTC/GMT Greenwich Mean Time zone**). For instance all the Central Europe has the time zone UTC+1.
- 8. Daily Saving Time DST (0 for NO 1, 2 3 ecc for YES)** Indicate the presence of the Daily Saving Time in the place where the measure has been made. To verify the presence of DST check this resource <http://worldtimezone.net/daylight.html>
- 9. Length of the shadow** (in cm and mm) Measure the length of the shadow as accurately as possible and taken from the base of the gnomon to the edge of its shadow
- 10. Solar noon.** If possible would be better to make the measure at the Solar Noon. To know the exact time and hour of the Solar Noon of the chosen place, go here <http://www.solar-noon.com/> You have to give the geographic coordinates and the website will show the local (civil) time were th Sun will be at the highest point (culmination) for the given place and day of the year. The website need the

coordinates in decimal form not sexagesimal. To convert the values you can go here (bottom page) <http://zonalandeducation.com/mmts/trigonometryRealms/degMinSec/degMinSec.htm>

11. **Other measures and notes** (further measures with the astrolabe, for instance, or general infos like weather conditions, problems during the measures or other)

## 12. Import google placemark file

The first 9 values are compulsory

**ALL THE DATA MUST BE FILLED IN THE SUNSHADOW PROJECT WEBSITE**

<http://www.ice.macisteweb.com/sun-shadows-data/sun-shadows-data/ShadowData/sun-shadows-data>

The project is now translated in 4 languages: english, french, italian and netherlands

The team of scientist of Maciste Ice that made up the website and the archive has observed a significant increase of accesses and interest in **this** activity. As consequence of this fact is interested in developing soon, also in cooperation with partners, an App for mobile devices that could help to collect data and estimate the expected value of shadows based on geographical position and time of the year.