IAU	**International Day of Light: The Parallel Earth and the Seasons 2020**	naSe

Parallel Earth to Watch the Season

Introduction

The movement of terrestrial translation is the origin of the stations, but this is not easy to observe. There is a simple strategy that allows you to view the Earth from outside and lit area every day and every hour. Let's use a parallel Earth for it. That is, an illuminated globe in the same way that Earth by the same source that is the Sun.

If a spotlight illuminates two spheres produces on them the same areas of light and shadow, so if we orient correctly the globe will be the same area on the globe that is our planet and we can look at it as if we were an astronaut located more far from what is the ISS.

We will use as a globe of the usual, except that we will remove the foot and will place on a glass well oriented in order to observe the seasons in different countries where the experiment take place. From March 20th to September 23rd all the teams of students who decided to participate email a photographic observations on the terrestrial sphere and understand what the season is.

The Parallel Earth

The typical position of the Earth seen from outside that is used to explain the movement of terrestrial translation and the origin of the stations is not easy to observe (figure 1) from our city. In fact it seems quite impossible since we are glued to the Earth and only an astronaut from his space ship could see the Earth from outside.

But there is a simple strategy that allows you to view the Earth from outside and lit area every day and every hour. Let's use a parallel Earth for it. That is, an illuminated globe in the same way that Earth by the same source that is the Sun.

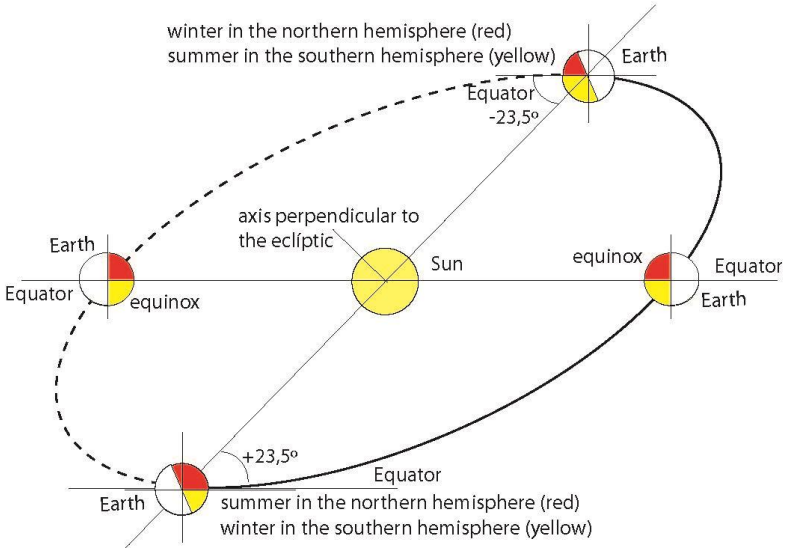

Fig. 1: Earth translation movement around the Sun

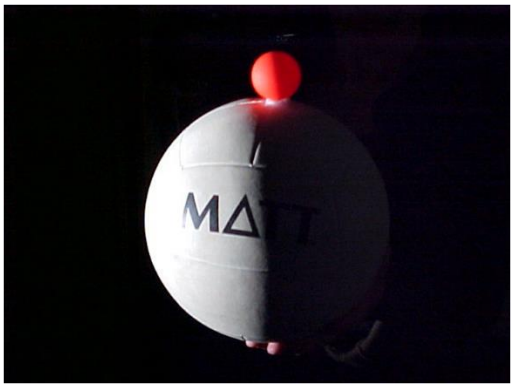

Fig. 2: A spotlight illuminates two spheres in the same way and produces the same areas of light and shadow

If a spotlight illuminates two spheres produces on them the same areas of light and shadow (figure 2), so if we orient correctly the globe will be the same area on the globe that is our planet and we can look at it as if we were an astronaut located more far from what is the ISS.

We will use as a globe of the usual, except that we will remove the foot and will place on a glass, with the axis of rotation of the globe in the same direction as it really has the Earth (we help of a compass to indicate us north-south). We also know that the position of our city should be at the top of the globe, because, anywhere in the world where we live, if we straight move in any direction for many km long, it is clear that whenever we will finally come down on the surface of the globe. So our position is always the top.

Consequently, we will use a compass that tells us the north-south direction to guide the axis of the globe and our city will place the highest position (figure 3a). To verify that the globe is properly positioned can leave a pencil on the city in balance, if the pencil is above it will not fall, but if the pencil falls must be corrected slightly until stable position. We can illustrate this position by placing a doll to represent us (figure 3b).

With bits of "clay" we can make the sun / shade line and see what it will slowly moving across the surface of the globe as they pass the hours and it arrive at a time when it will be night. We can put small pieces of sticks as a gnomon and see how the shadows are and how they move throughout the day and you visualize effects of rotational motion on Earth (figure 3b).

Fig. 3a: The globe, with the usual support, does not serve as a model. The globe should be placed outside, on a glass and oriented, with the place from where we observe at the top to be a perfect model. Fig. 3b: We can put a doll indicating our position and bits of clay to indicate the line of light / shadow area. With the passing of the hours this light / shadow line will go away. Also you can put some pieces of chopsticks to study their shadows.

The Seasons

But the most interesting is to visualize the translation movement; this is how the sun / shade line is situated throughout the year. Thus it can be seen that in summer (figure 4a), winter (figure 4b) and equinox (figure 4c) as could check in the initial model with four land area (figure 1)

Fig. 4a: In the northern hemisphere, the north pole is in the sunny area therefore means it's summer for this hemisphere and we are observing the phenomenon of the midnight sun. In the southern hemisphere, the south pole is in the shade and winter. Fig. 4b: The north pole is within the area of the night, so in the northern hemisphere's winter. In the southern hemisphere, the south pole illuminated and therefore is

summer for them. Fig. 4c: The line separating the day and night passes both poles, that is, the first day of spring or the first day of autumn.

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