

# Máme rádi Slunce

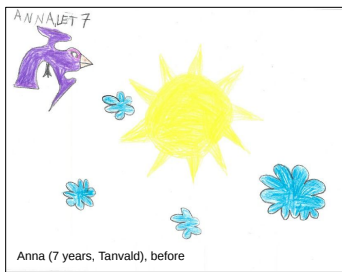
## I Love My Sun

Danka Humlová<sup>1</sup>, Zbyšek Mošna<sup>2</sup>, Jaroslav Urbár<sup>2</sup>, Eva Macušová<sup>2</sup>

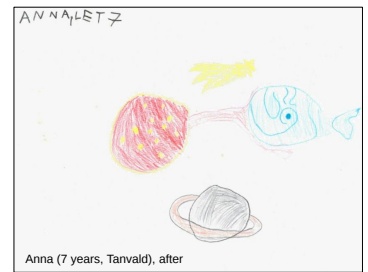
1- 2<sup>nd</sup> Faculty of Medicine, Charles University, Prague.  
2 - Institute of Atmospheric Physics, Prague, CAS, zbn@ufa.cas.cz

The importance of the Sun and its effects to Space Weather, life and technological systems is generally acknowledged among the scientific community. On the other hand, the amount of students interested in natural sciences has been decreasing in past decades. We describe activity of young Czech scientists aimed to youngest generation with the goal to experience the participants with space and solar science and encourage them to further study this field.

**Máme rádi Slunce/I Love My Sun** is educational project for 7-11 years old children (primary schools). It follows European **COST 724** project developed by the team of prof. Dr. Y. Tuluay. During the event, children first draw their idea of the Sun. After that, 20 min long presentation and discussion is performed by young scientist in the field of Space and plasma physics. After that the children draw their new idea of the Sun and the pictures are compared. Czech version of the project has been performed since September 2014 in 16 classes of Czech primary schools in Tanvald, Prague, Železnice, and Vlašim. Up to now we collected more than 200 pairs of pictures.



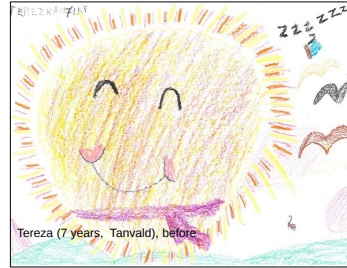
Anna (7 years, Tanvald), before



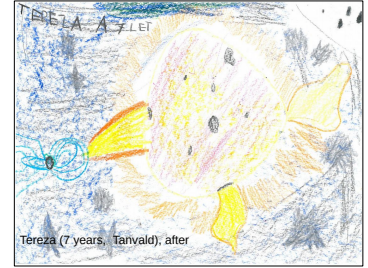
Anna (7 years, Tanvald), after

**Pictures before the lesson** reflect common idea of the Sun among children of their age (rays, Sun with face, dominant color yellow, clouds, birds, etc.).

**Pictures after** usually describe Sun-Earth relation and show other bodies as planets and moons. The Sun is usually presented as active star with sunspots forcing the Earth by means of solar wind and eruptions.



Tereza (7 years, Tanvald), before

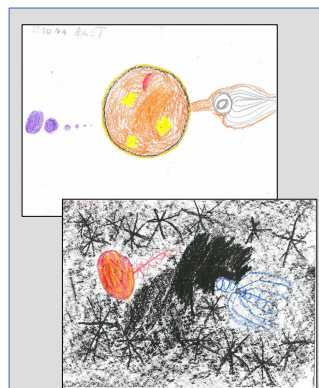


Tereza (7 years, Tanvald), after

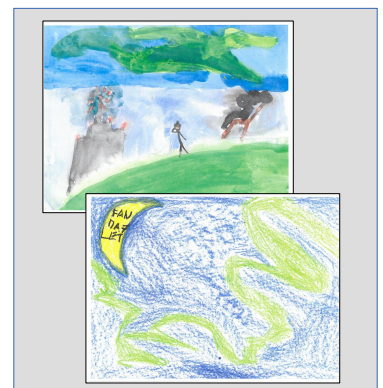
The **level** of the lesson depends on age of children and can be modified after short "warm up" discussion. The children are able to comprehend relatively advanced topics compared to their age (the Galaxy, Solar system, planets, moons and dwarf planets, importance of the Sun for life, sunspots, solar storms, plasma, solar wind, magnetosphere, polar lights) which is reflected in their pictures or during the discussion. Children use various techniques: wax, pastels, watercolors, temperas. During the visit, we open discussions and we try hard to answer all questions.



**Magnetic loops** hold solar plasma - "hot gas" in the vicinity of the solar surface. However, opening of the magnetic loops and ejection of the plasma to the interplanetary space with a velocity about 300-600 km/s can be dangerous to us. The distance between the Sun and Earth can be reached in 3-4 days.



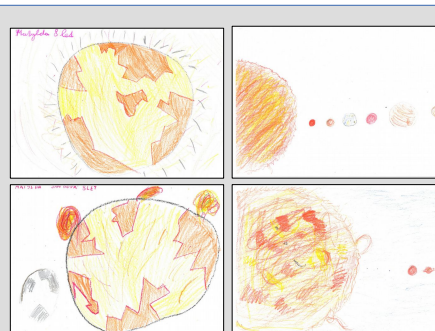
Fortunately, the Earth is protected by the **magnetosphere** which shields the Earth from the particles of solar wind. Pressure of solar wind leads to typical magnetosphere shape we know today from satellite measurements.



**Auroras (polar lights)** are sometimes visible in the Czech Republic (March 2015) but they are much more common in countries close to polar oval. They are caused by collisions of energetic particles with N<sub>2</sub>, N a O at heights above 80 km. Disturbed geomagnetic field leads to enlightening of the auroral oval and its shift toward the equator.



Some solar events can be really harmful. The Carrington event (1859) confirmed that the Sun can directly heavily influence electric systems on Earth (back then mainly telegraphs) and affects occurrence of polar lights. Similar event today would lead to fatal damage of GNSS, power plants or satellites.



**Matylda** (8 years, left panels) had already known many things about the Sun even before the theoretical part. We hope that she understood at least something new (e.g. the Sun as a source of the solar wind and CMEs). **Tereza** (11 years, right) initiated the discussion about the ability of a scientist to really understand the general theory of relativity.

### Conclusion

Our experience shows that the topic of Space Weather is highly attractive. The pupils are active during the lecture, ask questions and think about the problems. The graphic performance is usually creative and imaginative. Even relatively difficult topics which are covered at school much later (e.g. (geo)magnetic field, solar wind, magnetosphere, solar eclipse, polar lights) were well incorporated to the pictures of the young participants.

We believe that the children hands-on activity leads to deeper understanding of the topic. The project **Máme rádi Slunce/I Love My Sun** supports curiosity of young children about our "world" and increases their interest in Earth and Space Science, or in Science in general. The project will continue in future.

