

## ELLF C<sup>3</sup> STEM

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### Abstract

This proposed Estonia- Latvia- Lithuania- Finland (ELLF) Climate Change CubeSat (C<sup>3</sup>) STEM project is a citizen-science engagement at all age and skill levels, to actively educate the public about climate science. Make-a-thons, Hack-a-thons, and Science-a-thons are some of the methods we will utilize to untangle key complex climate science parameters to address the links between Earth's brightness and its temperature. We present the basic principles of the ELLF project to seek future collaborators and to demonstrate that its concepts can be implemented in other international locations.

### 1. Introduction

ELLF C<sup>3</sup> STEM is a proposed [1] 2-MEuro Baltic Sea Region Space STEM project that fosters a deep and broad cooperation between Estonia, Latvia, Lithuania and Finland, (ELLF) and society members beyond, to seek answers to the most pressing Climate Change questions of today, while building stronger practical STEM skillsets in the Baltic Sea Region that use inspirational 'Space' as a driver. In these four countries and throughout Europe, the public: 'Elves' will be invited to learn climate science, by contributing important field climate observations and measurements to ELLF's space-based measurements.

The ELLF 3U CubeSat is a student-built, first-time, integrated EE-LV-LT-FI territory-constructed, CubeSat to acquire of the Earth's Radiation Budget: clouds -general and noctilucent. Engaged community members will observe clouds, build hardware (Raspberry Pis with brightness sensors) and software (Smartphone apps of Earthshine) to collect Earth's brightness and climate measurements in their local communities to grow their climate science awareness in the search for the link between the global processes affecting atmospheric warming and Earth's brightness variations.

Here is a practical, openly-developed, and community-science project with STEM and economic drivers addressing the Millenials greatest concern: Climate Change. With Climate Change experienced more keenly in high-latitude countries,

ELLF can support the rest of Europe in growing climate science aware, gender-inclusive, high-value STEM skillsets. ELLF provides additional support to Eastern Europe for strengthening the links between Research, Education, and Industry. The ELLF Consortium with its >50% female leads will provide its multidisciplinary education by integrating across four countries its deep skillsets: meteorology, CubeSat education, CubeSat space communication, community STEM competitions, human-centered astronomy education, Earth-observing data analysis, interactive science education, and integration of STEM skillsets across borders.

### 2. Ten ELLF Partners

- \* Finnish Meteorological Institute (Managers / Climate Education) --FI
- \* Tartu Observatory / (now part of University of Tartu) (CubeSat education) --EE
- \* Est-Sat / EstCube (CubeSat builder) --EE
- \* NewTime (IT company) --EE
- \* Garage 48 (for Smartphone Earthshine app Hack-a-thon, Launch Event) --EE
- \* Baltics in Space (Deputy Project Manager) --LV
- \* Institute of Environmental Solutions (for ELLF Ambassadors and Science-a-thons) --LV
- \* Ventspils International Radio Astronomical Center with Univ Lat Satellite Laser Ranging (16 m ground station and satellite tracking with prism) --LV
- \* Zinoo (Raspberry Pi Make-a-thons, "Misson Control" for the public) --LV
- \* Moletai Ethnocosmological Museum (ELLF Ambassador lead) --LT

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### References

- [1] Horizon 2020 Pillar: Science with and for Society. Call: H2020-SwafS-2018-2020. H2020 Topic: Supporting the development of Territorial Responsible Research and Innovation. SwafS-14-2018-2019