

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
On Track - Undergraduate Space Education (3)

Author: Dr. Carol Norberg
Umeå University, Sweden, carol.norberg@umu.se

THE USE OF SPACE DATA BY UNDERGRADUATE STUDENTS TO PREDICT AND ANALYSE
AURORAL DISPLAYS IN THE ARCTIC

Abstract

Umeå University in Sweden offers a distance course in Arctic Science to international undergraduates. Each year 70-80 students participate in the course which includes a field trip to Kiruna, a small town in the Arctic in an ideal location to observe auroral phenomena during the dark winter months. A central activity in the course is an auroral observation exercise. Students use real-time data on the solar wind that is gathered by satellites at the L1 Lagrangian point in order to determine the status of the space weather close to the Earth and the likelihood of disturbances to Earth's magnetic field. After a visit to the Swedish Institute of Space Physics in Kiruna to learn about the data gathered at the institute, they also use local ground-based observations of Earth's magnetic field and weather reports in order to plan outdoor observations. Students are able to access the necessary data from their mobile phones. Participants become deeply engaged in monitoring the space weather conditions in order to ascertain the chance of seeing an auroral display and acquire an understanding of the range of space-based data that is freely available to society at large. Observations of an auroral display are subsequently analysed by the students. They compare their own visual observations and photographs with data sets from space and the ground to acquire a deeper understanding of the interaction between the solar wind and the Earth's magnetosphere. The aurora exercise is carried out by small groups of students working together and written up in a report in order to promote teamwork and develop skills in academic writing. The aurora exercise has been run and developed successfully by Umeå University for over a decade and continues to evolve. At least partially cloud-free skies are needed in order to see the aurora from the ground. To maximise the chance of success an evening excursion to a location that is known to be often cloud free was introduced, increasing the frequency of observations. Use of the aurora exercise has been extended to courses for PhD students and a development course in space physics for schoolteachers. Although the tantalising experience of standing outside surrounded by snow and looking up at an active colourful auroral display is confined to the planet's auroral zones, by using all-sky camera data available on-line this activity can be adapted to a classroom at any location in the world.