Teaching of geographical space relations for cartography – 
*Academic Outdoor Station in Poznan (Poland).*

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**Abstract:**

The identification of geographical phenomena and relations between them are most frequently visualized, 
analyzed and interpreted indoor by the display screen. The difficulties with capturing basic spatial relations 
significant in the process of teaching cartography become the main problem. The objective of teachers from 
the Department of Cartography and Geomatics was to enrich typical classes carried out in computer rooms by 
adding the outdoor academic classes that would encourage students to observe those relations directly in the 
field. In October 2018 the outdoor station of the area of 15x20 m by the university campus next to *Collegium Geographicum* 
was handed over to the disposal of students. The projects of the elements of the station were 
created on the basis of the lecturers experience as a part of subjects on the following courses: topographical 
cartography, survey techniques, cartographic design, virtual and augmented reality in cartography, 
geovisualization and geomatics. Sets of several constructions that can be used either separately, as tools for 
explaining specific principles or together, as instruments for teaching subsequent measurement, location and 
visualization relations occurring in cartography and geomatics, were placed on the premises of the station.

In order to study historical ways of marking borders, the erratic, a replica of the boundary stone 
from 1653 with the triangle engraved in the place in which three countries connect, was placed in the field. 
Contemporary ways of the stabilization of the border points and points of the grid reference are farther located. 
The point marked on the metal horizontal plate, on the spot in which the meridian and the parallel of latitude 
cross, inform about multiple ways of recording the exact location in space. The values of coordinates were 
calculated for that point and engraved on the board in several nation and global reference systems. Students, 
standing on other three plates with the points marked where meridians cross parallels of latitude, create basic 
elements of the grid of latitude and longitude of 0.2°.

On a single plate three directions of the north, i.e. the geographic, topographic and magnetic one, 
are visible. One of the meridians marks the line of analemmatic sundial to 12:00 a.m. and the student standing 
on the area of the specific month becomes a gnomon whose shadow indicates the hour of the local meridian. 
Two surveyor's levelling rods with two values differing by approximately 16 cm demonstrate different values 
of contour lines on topographic maps worked out in Poland. Properly oriented topographic table shows the 
same fragment of space in four ways: on the classic, north-oriented topographic map, on the orthophotomap 
at 1:10 000 scale, on the simplified visualization of a few layers from the national topographic base at enlarged 
1:2 000 scale and on the 3D printout on which the height of buildings was determined from the attribute table.

Authors of the Academic Outdoor Station in Poznan prepared for the conference guests the 
multimedia presentation with the explanations of the aforementioned constructions and other elements, i.e. the 
wall of cartographic visualizations with perspective and optical illusions presented on 2D boards, virtual and 
augmented reality table, triangular signal, and others. We hope to receive feedback from cartographers and 
hear some ideas concerning new constructions for our station