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Hybrid adaptation scientific investigations and mentoring system in geopolygons conditions

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Abstract: In this work, the view of a series of practical research-and-educational activities and mentorship within the institute Research Station RAS in Bishkek (RS RAS) are presented. STEM learning on-site, specifically related to the Earth sciences, is important. RS RAS in Bishkek is studying geodynamics, stressed and deformed state and deep structure of Tien Shan, seismotectonic, geoenvironmental and engineering-geological aspects. All field activities have been continued and have been made by special groups of maximum 3 persons. At the RS RAS a mentorship program within the organization for mentees is introduced. However, COVID-19 quarantine forced us to make mostly online seminars for organization staff and provide online educational training for the students of American University of Central Asia (AUCA) and Kyrgyz Russian Slavic University (KRSU). Under the support of the Rossotrudnichestvo the agreement on scientific and technical cooperation between the Kyrgyz National University named after Jusup Balasagyn and the RS RAS was signed on September 30th, 2020. I admit that the new remote technologies should be included in future development because the accessible geophysical equipment degrades rather quickly and especially because of daily use and temperature changes.

Keywords: geopolygon; field training; mentorship; on-site education; online training

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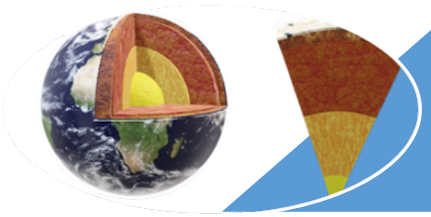
Outline

Traditional model



Geopolygon conditions

Mobile technologies

Results and Conclusions

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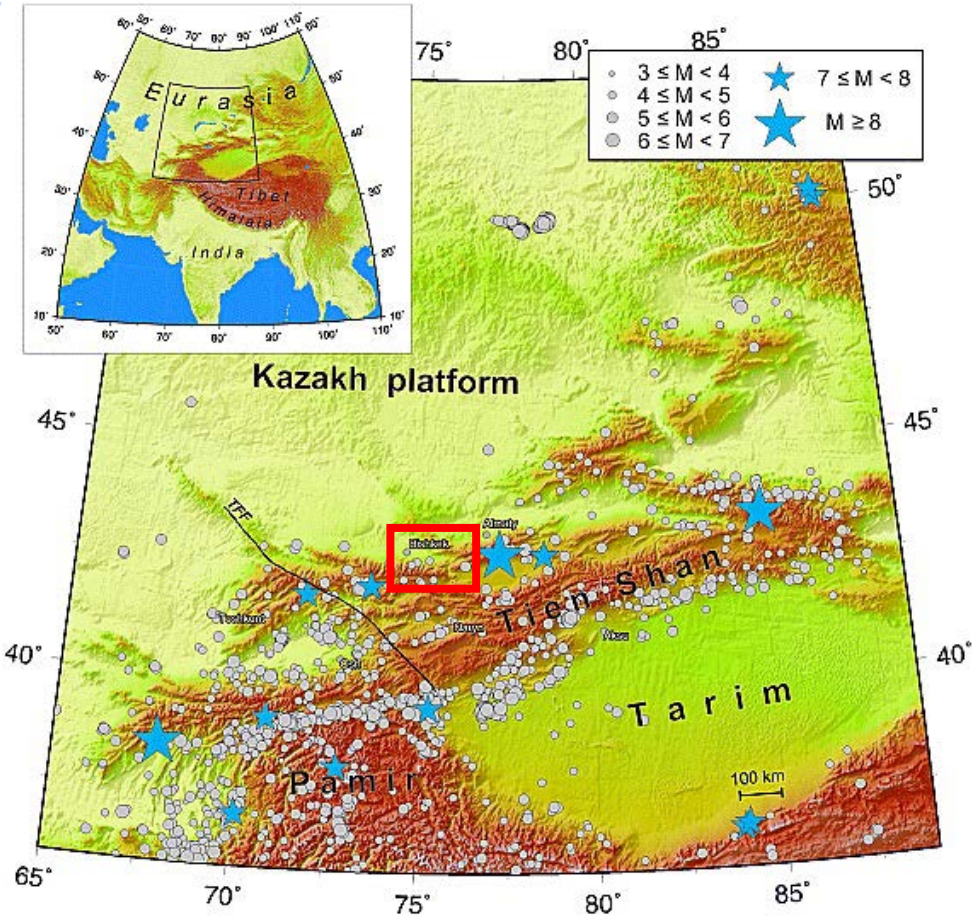
Research Station RAS in Bishkek (RS RAS)

RS RAS (http://www.gdirc.ru/en) is an academic institution and is a part of Bishkek Geodynamic Proving Ground of the International Research Center (IRC BGPG) with the Multiple-Access Geosciences System (MAGS) (http://ckp-rf.ru/ckp/500801/ is studying geodynamics, stressed and deformed state and deep structure of Tien Shan, seismotectonic, geoenvironmental and engineering-geological aspects.



Tectonics, Volume: 29, Issue: 6, Zubovich et al., 2010, DOI: 10.1029/2010TC002772

Map of the central Tien Shan and surroundings showing topography, shallow-focus seismicity, selected cities, and the trace of the Talas-Ferghana fault (TFF). The red box iondicates Bishkek Geodynamic Proving Ground within the Tien Shan.

Some of the employees are involved in the educational process with the basic universities in Kyrgyzstan, situated in Bishkek city: Kyrgyz-Russian Slavic University (KRSU), American University of Central Asia (AUCA) and Kyrgyz National University named after Jusup Balasagyn (KNU)

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STEM learning on-site: traditional model for outdoors

(photo credit © RS RAS)

For the internships and trainings RS RAS uses the geopolygons - test sites, under the historical view of a series of practical research-and-educational activities.

- Geomorphological complexes
- Matching geomorphological features with the on topographic maps of different scales
- The connection of geomorphological complexes with hydrogeological structures in the river canyons in BGRG
- Processes of physical weathering;
- Exogenous processes (erosion, landslides, suffusion, the surface activity of water springs
- Physical properties of minerals, their structural structures and forms of occurrence in nature
- An individual report preparation

STEM training on-site: traditional model for indoors

(photo credit © RS RAS)

At the KRSU faculties, the following disciplines are in the program:

- Geophysics
- Mining geophysics
- Basics of mining and oil and gas business
- Construction geotechnology
- Measurements in a physical experiment
- Hydrogeology
- Programming languages and methods, Object-oriented programming, System software, Computer graphics

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Geopolygon

Field demonstration of the quadcopter shot by the Global Positioning System laboratory RS RAS

Equipment exhibition for the magnetotelluric investigations.

The activity was made during the conference for young scientists, PhD and graduate students in 2018

The activity was made during the conference for young scientists, PhD and graduate students in 2018

(photo credit © RS RAS)

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COVID-19: hybrid adaptation in geopolygons conditions

- It means the joint approach to work (provide scientific investigations and mentorship) either online in web space or offline in natural outcrops.
- All data storage from on-site stationary monitoring points of BGPG has been still 50/50 offline/online. All field activities have been continued and have been made by special groups of a maximum of 3 persons.
- This adaptation follows the GEO major goals [Pedersen et al., 2009]:
  1. Use Internet tools that are intuitive, that are relevant to "real" life
  2. Make this new technology accessible to an ever wider community
  3. Use the technology to promote project-based experimentation, field measurements, and data interpretation
  4. Create and support an environment wherein mentee and mentors can communicaty without barriers in a different form (as video, filming, creation, programming, etc.)

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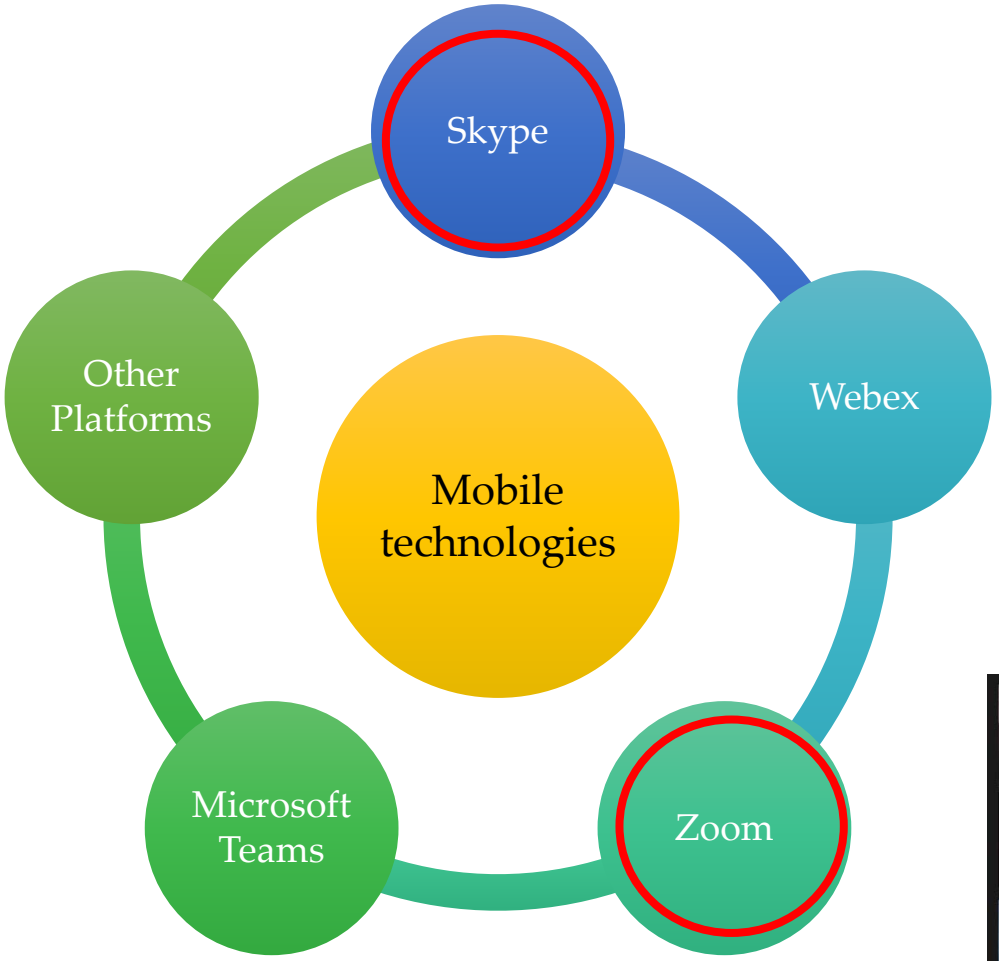
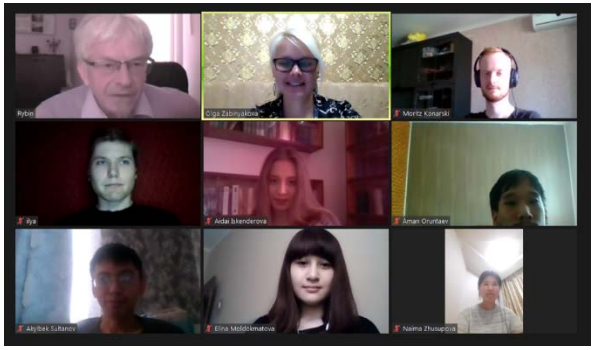
Mobile technologies: online



The webinars could be now documented – they are recorded, so the questions and specific difficulties can effect of the future training programs on the core participants, as well on the total research group. However, some troubles occurred due to a lack of computing power and memory, free Skype version and unstable internet connection.



Zoom app screenshot
(photo credit © RS RAS)

The first meeting RS RAS staff with the students of the American University of Central Asia

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Mentoring system

The mentor's role of “being a guide” involved providing specific guidance on things that they have already experienced to the mentees. Also the field where the mentees are unfamiliar with and when individuals are tasked with a developing goal to train geological-and-mining or computational tests on the verified tested area.

Results and Discussion

Internal webinar of the Laboratory of deep magnetotelluric investigations (LDMI) consolidated around 10 participants via Skype. Since January 2020 we produce 34 webinars about equipment for electromagnetic (EM) methods, EM theory, geological-and-geophysical interpretation, geoelectric anomalies and noise correction, features of digital processing and direct modeling for the impedance calculation.

Under the support of the Rossotrudnichestvo the Kyrgyz National University named after Jusup Balasagyn (KNU) and the Research Station RAS in Bishkek signed the agreement on September 30th, 2020. (photo credit © KNU)

Conclusions

The hybrid adaptation as the online and offline approach was launched successfully. The educational trainings were passed with new tools and in different conditions under the creativity and enthusiasm of tutors, faced the modified way.

However, the stress rate of webinars preparation and studying in remote conditions pose some other difficulties: resolving technical difficulties beforehand (e.g. inadequate access to resources such as computers, webcams, reliable internet, and learning spaces free of distractions), self-management and self-control, developing digital literacy and netiquette.

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