

Vloga in perspektive geologije v Sloveniji
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Role and perspectives of geology in Slovenia
Introductory talk on the 1st Slovenian Geological Congress
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Geologija, kot ena od naravoslovnih ved o našem planetu, je prisotna med nami na vsakem koraku, a se tega povečini ne zavedamo dovolj.

Vse se nam zdi namreč samoumevno: da priteče voda, ko zjutraj odpremo pipo v kopalnici; za razsvetljavo ni dovolj samo žarnica, potrebujemo tudi elektriko, ki jo dobimo iz premoga, plina, urana ali iz vodnih central, ki stoje ob rečnih pregradah. Tudi avto ne pelje brez bencina. Za dolgo vožnjo v Črno, in da ste nekateri zamudili, je tudi kriva geologija, saj trojanski tunel še ni zgrajen prav zaradi zapletene geološke zgradbe in za gradnjo neugodnih kamnin. In da se stresa zemlja, da nas čedalje pogostejše ogrožajo plazovi in poplave, je tudi kriva geologija. Še za burjo na Krasu, ker so visoki hribi v ozadju, pa da imajo štajerske gorice več sonca, kot ga je na ljubljanskem "morostu". Tudi Čateške, Moravske in druge toplice, pa Podčetrtek in Zreče ne bi mogle tekmovali, kateri je bolj turistični kraj, če jim geologi ne bi navrtali tople vode. Morda se bo tem krajem že kmalu priključila tudi Črna, saj gredo prve raziskave za termalno vrtino h koncu in precej obetajo.

Čas, odkar imamo svojo novo državo, je prinesel tudi v geologiji kar nekaj novosti in sprememb. Te so vezane na nove poglede do raziskovalne dejavnosti nasploh, drugačnega gledanja na eksploatacijo mineralnih surovin, kjer prevladujejo predvsem tržno-gospodarski zakoni in pa povečana skrb za varovanje okolja. Te spremembe se odražajo tako v reorganizacijah raziskovalnih institucij, zapiranju številnih rudnikov (mednje sodijo tudi Mežica, pa Žirovski vrh in več premogovnikov), s pojavom novih firm na polju geoloških raziskav, predvsem s tematiko ekologije, hidrologije in geomehanike, nadalje prodorom novih tehnologij, skoraj neomejenimi računalniškimi zmožnostmi ter s spremenjenim pozitivnim odnosom do okolja.

Med spremembe, ki so precej zasekale v geologijo, moramo najprej omeniti ukinitve Enote za odkrivanje mineralnih surovin, v okviru katere so v preteklosti potekale, kot že ime pove, raziskave premoga, nafte in plina, kovin, urana, nekovin in vseh vrst – pitnih, termalnih in mineralnih vod. Danes vse te raziskave izvajamo v precej manjšem obsegu, nekaj v okviru programov in projektov pri Ministrstvu za šolstvo, znanost in šport, precej manj pa preko direktnih naročnikov, kot so gospodarske družbe in občine.

Usmerjeni raziskovalni programi so se najprej prelevili v projekte, v zadnjih letih pa večji del v programe, ki jih izvajamo v programskih skupinah. Drugo leto končujemo prvo petletno obdobje temeljnih raziskav. Vsi z velikimi pričakovanji čakamo na podaljšanje teh programov, na nove projekte in intenzivnejše financiranje aplikativnih raziskav preko ciljnih raziskovalnih programov, ki zaenkrat še niso zaživel v taki meri, kot smo prvotno želeli. Ob vsem tem nas čakajo še spremembe ob vključevanju v Evropsko skupnost ter nov Zakon o raziskovalni dejavnosti.

Verjetno ob vsakem kongresu želimo napraviti tudi neko inventuro za nazaj. Za minulo obdobje sicer ne moremo posebej trditi, da smo končali kakšen izjemen projekt, kot so bili v 90. letih npr. končanje OGK I, karavanški tunel ali odprtje term Zreče, da bi odprli kakšen nov rudnik oz. površinski kop. Smo pa bili zelo aktivni na številnih področjih uporabe in temeljne geologije ter v mednarodnem sodelovanju.

Aplikativne raziskave so se najbolj intenzivno odvijale na področju hidrogeologije, geologije okolja, nekovinskih surovin, inženirske geologije, posebno ob velikih gradnjah avtocestnega

omrežja in geološkega informacijskega sistema. V okviru slednjega smo tik pred dokončanjem računalniške obdelave celotne Osnovne geolške karte 1:100.000 ozemlja Slovenije, vštveši z uskladitvijo robnih pogojev posameznih listov, izdelavo več katastrov – od mineralnih surovin, vrtin in vodnih virov. Vse to poteka ob sofinanciranju MOP, predvsem Agencije za okolje in Uprave za rudarstvo ter je namenjeno predvsem za izvajanje prostorskih planov države in posameznih regij. Z zapiranjem rudnikov in preusmeritvijo geoloških raziskav na varstvo okolja bi simbolično lahko rekli, da so Barbaro, zaščitnico rudarjev, zamenjale, Živa, Zala, Julijana in druge »vodne deklice«.

V okviru temeljnih raziskav so pomembne predvsem znanstvene objave v domačih in tujih revijah, ki jih izvajamo sami ali v sodelavi s tujci in tisk nekaj geoloških kart. Tu omenjam karto Tržaško-komenske planote 1:50.000, kot prvi list, ki je bil izveden po novi metodologiji, nadalje tisk tektonske karte Slovenije 1:250.000, končuje pa se še nekaj geoloških kart v merilu 1:50.000 (Kozjansko, Krški bazen, Trboveljski bazen ...) ter Geološka karta Slovenije 1:250.000. Na žalost pa nas še vedno čaka dokončanje celovite monografije o geologiji Slovenije.

Ugotavljamo, da je nov bibliografski sistem COBISS do geologov precej krut, saj je zelo malo geoloških revij z impakt faktorjem, pa še te izhajajo večji del v Ameriki ali Angliji. Slovenija pa je vezana na ožji srednjeevropski prostor, kjer ima geološko gledano izjemno lego, saj leži na stičišču velikih geotektonskih enot Alp, Dinaridov in Panonskega bazena, oziroma na stičišču Afriške in Evroazijske plošče, kar je ključnega pomena za razumevanje globalne tektonike in regionalne geologije.

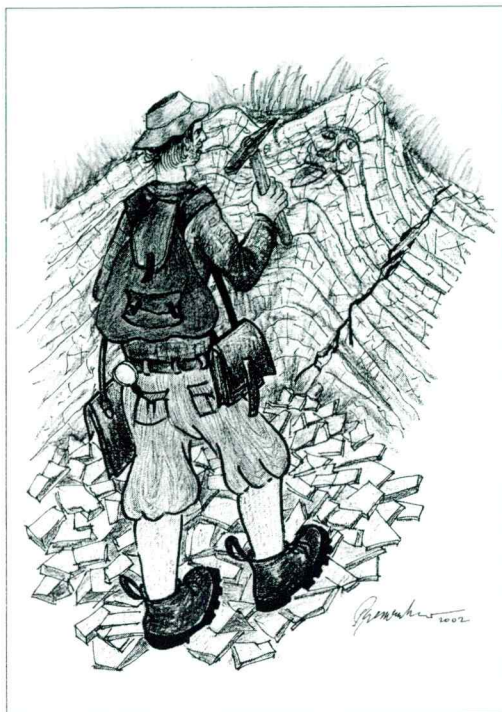
Izdelali smo tudi več knjig, leksikonov in monografij, ki zajemajo: geokemijo, nekovinske mineralne surovine, kamnolome okrasnega kamna, paleontologijo, mineralogijo, monografijo o Žirovskem vrhu, pa o našem in kitajskem Krasu. Pred tiskom je bibliografija slovenskih geologov v projektih UNESCO IGCP. Pred dnevi je izšel tudi Geotermični atlas Evrope, v katerem je Slovenija zelo lepo predstavljena, v pripravi za tisk pa sta še Geokemični in Geološki atlas Evrope, oba se tiskata v tujini. Več je tudi knjižic, brošur in plakatov s tematiko naravne dediščine in ohranjanja okolja, odmevnih razstav (ena teh je npr. razstava o dinosavrih na Slovenskem letos poleti na ljubljanskem gradu) ter objav v tisku. Prav v prejšnji številki Znanost za razvoj je bila predstavljena paleontološka dediščina iz predora pod Golovcem, preje pa vrste objav o potresih, plazuh pod Mangartom in o geotermiji. S popularizacijo geologije moramo poskrbeti za njeno večjo vlogo v družbi.

Svoje mesto in mednarodno težo smo si slovenski geologi pridobili tudi z organizacijo mednarodnih srečanj in kongresov. Med temi omenjam svetovni kongres o rudniških vodah, mednarodni kongres o uporabi računalništva v geologiji, delavnico o trajnostnem razvoju kraških območij s stališča naravnih surovin v okviru NATO, več delavnic v okviru IGCP projektov (o K/T meji v Postojni, o terciarnih plasteh v Dobrni), pogosti so tudi kongresi in delavnice s tematiko krasoslovja. Več kongresov in mednarodnih ekskurzij je v Sloveniji predvidenih tudi v prihodnjih letih – že drugo leto ponovno o računalništvu v geologiji, pa svetovni kongres o podzemnih vodah, dve ekskurziji ob priliki svetovnega geološkega kongresa, ki bo v Bologni leta 2004 (tematike so polucija z živim srebrom v Idriji in Kras).

Na tem kongresu opažamo tudi menjavo generacij. Veseli me, da je med prisotnimi tudi dosti mlajših geologov in študentov. Na polju izobraževanja ugotavljamo velik interes za študij geologije, predvsem na področjih, ki so vezana na hidrogeologijo, okolje, inženirsko geologijo in na računalniške metode, manj pa za regionalno geologijo in mineralne surovine. To je nekako v skladu s splošno predstavo o bodočem razvoju in trendih, ki se kažejo v geologiji evropskega prostora. V zadnjih desetih letih je imelo status mladega raziskovalca oz. ga nekateri še imajo, preko 20 raziskovalcev; to pomeni v poprečju 2-3 mlade raziskovalce/letno, kar približno pokriva potrebo po novih kadrih.

Med pomembne dogodke na polju geologije lahko v zadnjem obdobju štejemo tudi formiranje Geološkega zavoda Slovenije, ki je z 80 zaposlenimi največja geološka institucija v Sloveniji in ima status javnega raziskovalnega zavoda. Njegov ustanovitelj pred štirimi leti je bila Vlada R Slovenije preko resornih ministrstev: MŠZŠ, MOP in MG; Delo v okviru slednjega je koordinirano preko Uprave za rudarstvo, ki pa je z reorganizacijo vladnih resorjev lansko leto prešla iz MGD na MOP. Raziskovalno delo na zavodu poteka v petih programskih skupinah in preko projektov, nadalje za potrebe državne uprave, okrog 30 % raziskav pa je

vezano na prosto tržišče. Pri več projektih zavod nastopa skupno z drugimi raziskovalnimi institucijami, sodeluje pa tudi v učnem procesu na Univerzi.



Terensko delo geologa v preteklosti ...
Field work of a geologist in the past ...



... in prihodnosti. (avtor slik Uroš Premru)
... and in the future (by Uroš Premru).

Morda še nekaj splošnih ugotovitev ter trendov sedanje in bodoče geologije. Te so kar podobne za večino evropskih držav. Med prioritete naloge uvrščajo danes: geoinformatiko, geološko tveganje, mednarodno sodelovanje (tu bi omenil posebno VI. program), okolje in hidrogeologijo, precej pa je padlo zanimanje za raziskovanje nuklearnih surovin, nafte in premoga oz. energetskih surovin ter metalov. Posebno mesto imajo še naprej temeljne raziskave in regionalna geologija, ki bo pomembna tudi za tolmačenje tretje geološke dimenzije, to je geološke zgradbe v večjih globinah, s katerimi se bomo morali v perspektivi intenzivneje soočiti.

V slovenskem geološkem prostoru pa so za realizacijo teh ciljev potrebne še nekatere aktivnosti: večje informiranje in ozaveščanje družbe o potrebnosti geologije, dokončanje in sprejetje Geološkega zakona ter nenazadnje stabilno financiranje naše dejavnosti.

Naj zaključim svoje razmišljanje z željo, da bo vloga geologije v naši družbi v bodoče še pomembnejša, da bomo lahko odločno vplivali in prispevali k uravnoteženosti izrabe virov in naravnih danosti na eni ter ohranjanju in sanaciji okolja na drugi strani. S tem bomo tudi bistveno pripomogli, da bo naš planet, tako kot pravi pesnik Gregor Strniša v eni od svojih pesmi iz cikla Vesolje, še naprej:

Orjaška krogla iz prsti in skal,
ogenj v nji žari,
in čiste vode, čisti sneg,
kakor srebro se ji blešče.

Bojan Ogorelec

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Geology as one of natural sciences concerned with our planet is present with us on every step, although generally we are not aware of it.

All seems to us self-evident: water starts running when in the morning we turn the bathroom tab; but for switching on the light electric current is needed that we get from coal, gas, uranium, or from hydropower plants at river dams. Also the car does not run without gasoline. The reason that the drive to Črna has been so long, or that some of you came late to the opening of the Congress, is also geologic: the Trojane motorway tunnel is not completed yet owing to complicated geologic structure and rocks unfavorable to construction. The earthquakes, landslides and floods are as well associated with geology. The same applies also to the heavy bora wind in the Kras region: there are high hills in the background. Why there is more sunshine in Styrian vineyards than on the Ljubljana Moor? The Čatež, Moravci and other hot springs localities, as Podčetrtek and Zreče, could not compete for the number one tourist place without their thermal waters that were found by geologists' deep drillings. Possibly also Črna, the town where now we are staging our congress, will join these health-resorts: the results of prospecting for thermal water appear to be promising.

The new times after Slovenia's independence brought also to geology a number of changes and new promises. They are related to new views on geologic research in general, to a different attitude to mining the mineral raw materials in which prevail first of all the laws of market economy, and increasingly the requirements of environmental protection. These changes resulted into reorganization of geologic research institutions, into closing of numerous mines (among others, the Mežica and Žirovski vrh mines and a number of collieries), appearance of new companies for geologic investigations, especially concerned with ecology, hydrology and geomechanics, introduction of new technologies and almost unlimited computer capabilities, and to a new, positive attitude to the living environment.

Among the changes that deeply affected Slovenian geology, first of all the abolishment of the Unit for exploration of mineral raw materials should be mentioned in whose frame earlier the exploration for coal, oil and natural gas, metals, uranium and nonmetals, and natural waters of all kinds was conducted. Nowadays these activities are being performed in an appreciably reduced extent, some in the frame of projects of the Ministry for Education, Science and Sport, and others as the so-called Directed research projects, and much less for direct costumers, as business companies and administrative communities.

The former Oriented research programs were substituted first by projects, and lately mostly by programs that are conducted by the program groups. Next year the first five-year period of the Basic research program will be terminated. We all anxiously await the prolongation of the existing programs, the calls for new projects, and more abundant funding of the applied research through the Directed research projects that for the time being do not function as originally expected. In addition, we expect also changes associated with joining of Slovenia to the European Union and acceptance of the new Act on Research Activity.

At a Congress like this most probably a recapitulation of the past achievements of geology in Slovenia must be presented. For the past period it cannot be said that such extraordinary projects were accomplished, as were, for example at the beginning of the nineties, the termination of the Basic geologic map I, the Karavanke motorway tunnel or inauguration of the Žreče thermal station, or openings of new mines or open cast operations. All the same, in the previous period the Slovenian geologists were very active in numerous fields of basic and applied geology as well as in international collaboration.

The applied research was the most productive in hydrogeology, environmental geology, non-metallic raw materials, engineering geology, especially associated with the national motorway construction program, and in establishing the general geologic information system. In the frame of the last mentioned, the computer processing of the entire Basic geologic map 1:100,000, including the fitting of margins of neighboring sheets and establishing of a number

of registers, from that of mineral raw materials, of boreholes to that of water resources, is close to completion. All this work has been funded by the Ministry for Environment and Land Use, especially by the Environmental Agency and the Mining Authority. The results are intended to be used above all for land use planning at the national and at regional scales. After the closing of many mines and the reorientation of geologic research to the environment protection one could state symbolically that Saint Barbara, the patroness of miners, has been replaced by Živa*, Zala**, Julijana*** and other water-nymphs.

The most important in the basic research conducted by Slovenian geologists alone or in cooperation with foreign scientists are their scientific publications in national and international journals, and the elaboration of geologic maps. Let me mention the map of the Trieste-Komen plateau at the 1:50,000 scale as the first sheet elaborated according to the new methodology, printing of the tectonic map of Slovenia at 1:250,000, several sheets of geologic maps 1:50,000 that are ready for printing (Kozjansko, Krško basin, Trbovlje basin), and the geologic map of Slovenia 1:250,000 that is being prepared by Prof. Buser. Still not accomplished remains the monography on the Geology of Slovenia.

We have to admit that the accepted new COBISS bibliographic system is rather cruel to geologists owing to the very low number of geologic journals with an impact factor, and even these few journals being published mainly in the USA or UK. However, Slovenia is a part of the Middle European region. Its geologic position in this region is extraordinary, owing to its position at the contact of geotectonic units of the Alps, Dinarides and the Pannonian basin, or more generally, at the contact of the African and Eurasian plates, which is of key importance for understanding the global tectonics and the regional geology of Europe.

To continue with the achievements, in the period prior to the Congress also a number of books, dictionaries and monographies were published from the fields of geochemistry, non-metallic mineral deposits, quarries of ornamental stone, paleontology, mineralogy, Žirovski vrh mine, karst geology in Slovenia and China. Ready for print is the Bibliography of Slovenian geologists in the UNESCO IGCP projects. Several days ago the Geothermic Atlas of Europe was published with the Slovenian territory well represented in it. In preparation for print are the Geochemical and Geologic atlases of Europe, both to be printed abroad. Mentioned should be further quite a few booklets, brochures and posters on natural heritage and environment protection, several well accepted expositions (among which the exposition on Dinosaurs on the Slovenian territory organized at the Ljubljana castle) and publications in the media. In the last issue of the Science for Development the paleontologic heritage discovered during construction of the Golovec motorway tunnel was described, and before that in it a number of articles on earthquakes, Mt. Mangart landslide, and on geothermics were published. With popularization of geology we must make provision for assuring its more important part in the society.

The Slovenian geologists strengthened their position and international weight also by organizing international scientific meetings and congresses. Among the latter let me mention the World Congress on Mine Waters, International Congress on Computer Use in Geology, the NATO sponsored Workshop on Sustainable Development of Karst Areas from the Aspect of Natural Raw Materials, and several workshops in the frame of the UNESCO IGCP projects (on the K/T boundary in Postojna, on Tertiary beds in Dobrna), not to forget the frequent congresses and workshops concerned with karst. In the future, several congresses and international field trips will be organized in Slovenia – next year the Congress on Computer Methods in Geology, and the World Congress on Ground Waters, as well as two field trips of the 32nd World Geological Congress to take place in Bologna, Italy, in 2004 (concerned with mercury pollution in Idrija, and with the karst).

At our Congress an important change of generations can be observed. With pleasure I see among the participants quite a few younger geologists and students. In the field of education the interest for geology studies is high, especially for the fields associated with hydrogeology, environment, engineering geology and computer methods, but less for regional geology and

*, **, *** – female names used as trade names for bottled drinking waters

mineral deposits. This interest corresponds to the general concept of future trends in geology in Europe. In the last ten years more than 20 students had the status of the Young Research Fellow, meaning about 2-3 young researchers per year, which has covered approximately the demand for the newly employed geologists.

Another important event for geology in the last period is also the establishment of the new Geologic Survey of Slovenia. The Survey with its staff of 80 is the largest geologic institution in Slovenia, and it has the status of a Public research institution. Its founder four years ago was the government of the Republic Slovenia through its ministries: the Ministry for Education, Science and Sport, the Ministry for Environment and Land Use, and the Ministry for Economic Activities. The functioning of the Survey is coordinated through the Administration of Mining which was moved during the last year's reorganization from the Ministry for Economic Activities to the Ministry for Environment and Land Use. Research in the Survey takes place in the frame of five Research program groups and of a number of projects; the work is performed further for the needs of the state administration, and about 30 % of research is connected with the market. In a number of projects the Survey cooperates with other research institutions, and its members are included also in the education process at the Ljubljana University and other university schools.

A few more general remarks on the present and future trends in geology. They are close in concept to those in other European countries. Among the present priorities the following disciplines can be listed: geoinformatics, geohazards, international cooperation (especially the so-called Sixth Program), environment and hydrogeology, and with much less emphasis on exploration of nuclear raw materials, oil and coal, and ore deposits. A special place is still reserved to basic research and regional geology that will be important also for understanding the third geologic dimension, i.e. the geologic structure in greater depths that will become important in the future.

For realization of these goals in the Slovenian geology certain additional activities will be needed: more efficient informing of the society on the place of geology in it, the final elaboration and acceptance of the Act on Geological Activity, and, last not least, a stable funding of our activities.

Let me finish my address with the wish for an even more important role of geology in our society, the role that should make possible a stronger influence of geology on decisions for a well balanced use of natural resources on one side as well as for preserving and improving the environment on the other side. In this way we could make an essential contribution to our planet, so that it remains, as expressed by the Slovenian poet Gregor Strniša in one of his poems from the cycle *Universe*,

The giant sphere of soil and rocks
In which the fires glow,
And clear waters and pure snow
Like silver glitter.

Bojan Ogorelec