

**Evaluation of research and professional activity  
of research-oriented institutes of the Czech Academy of Sciences for the  
period 2015–2019**

**Final Report**

**Name of the Institute: Institute of Geology of the CAS, v. v. i.**

**Evaluated teams and their leaders:**

1. Department of Geological Processes (Martin Svojtka)
2. Department of Paleobiology and Paleoecology (Ladislav Slavík)
3. Department of Environmental Geology and Geochemistry (Jan Rohovec)
4. Department of Analytical Methods, Geotechnics and Paleomagnetism (Roman Skála)

## Part A: Evaluation of the institute

### Strengths:

Big institute but clearly structured; very wide specifications covering ± the whole field of geology including geomorphology, geoarchaeology, palaeontology, stratigraphy, paleo-tectonics, Quaternary Science; significant national and international (global) cooperation; interdepartmental cooperation; many and increasing high quality outputs; good laboratory equipment (including many dating facilities, but no luminescence dating); „traditional“ research themes with high expertise; promising age structure; financial profit from applied/commercial sector

### Weaknesses:

Under-financed support of science; applied and commercial aspects not enough competitive; too many specifications; many overlaps between institutes in terms of research and infrastructure.

### Opportunities:

If necessary focussing on core competences with outstanding expertise; minimizing overlaps with other institutes; establishment of competence centres; good cooperation with many earth science institutions in ČR; focussing the strategy plan, eventually by reorganizing teams; continuing the very noticeable AV21 activities

### Threats:

Undersaturated financing; too low salaries to be competitive; personnel stability due to unbalanced age structures; increasing bureaucracy

## Main criterion: 1. Quality of results (H1.1-H1.5)

H1.1	Quality of selected outputs of Phase I
	Quite productive, with many high impact (IF) journal publications, raising the institute's international profile. In the 2009-2014 report, it was difficult to quantitatively assess IF values of individual publications. Nevertheless, we acknowledge that some "paleontologically-oriented" journals traditionally have relative low IF numbers, owing to their specialized content. Other teams have a broader scientific readership and, therefore, have higher impact (although specific numbers are unavailable).
H1.2	Contribution of workers on the outputs reached
	Generally, all researchers have at least participated in a publication effort.
H1.3	Quality of all outputs and results
	High to very high. See individual departments.
H1.4	The most valuable discoveries and findings in the fields, their importance for the field
	See departments 1-4; excellent presence in high IF journals (e.g., two <i>Nature</i> publications).
H1.5	Contribution of the participation of the authors in large collaborations
	One very large number of authors in a publication, allegedly with every person contributing (Zoom meeting question).

## Main criterion: 2. Societal relevance (H2.1-H2.5)

<b>H2.1</b>	<b>Societal relevance of outputs and results pursuant to CAS and institute mission</b>
High (in particular contributions to AV21), dependent on the departments/teams.	
<b>H2.2</b>	<b>System functionality for knowledge transfer into practise, its usefulness for society. The impact of the institute's activity on proper practice in society in the area of social sciences and humanities</b>
Geology <i>per se</i> includes knowledge transfer into practise, also from basic research (e.g., anthropogene pollution, raw materials, safe deposition); well visible from involvement in AV21; research into possible repositories of radioactive waste material.	
<b>H2.3</b>	<b>Relation to practice</b>
Because of most work is basic research, this can only be of marginal relevance. Nevertheless, attempts were made (see AV21).	
<b>H2.4</b>	<b>Participation in AV21 strategy</b>
Very noticeable activities so far, relevant for society.	
<b>H2.5</b>	<b>Cooperation with regions of the Czech Republic</b>
Of minor importance due to mainly basic research; results rather relevant for the whole ČR; number of books on Czech landscapes, support of museums.	

## Further criterion: 1. Position in international and national context (D1.1-D1.3)

<b>D1.1</b>	<b>Comparison of the teams and the institute with similar international and national institutes</b>
At the cutting edge in topics of (more or less traditional) core competencies.	
<b>D1.2</b>	<b>Scope and quality of international and national cooperation and the role of the institute in such cooperation; engagement in broad international cooperation</b>
Very broad cooperation nationally and internationally.	
<b>D1.3</b>	<b>Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)</b>
Rather good, showing appreciable activity.	

## Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

<b>D2.1</b>	<b>Direction in line with the perspective of the planned research directions</b>
Yes; All in all, the strategy plan could be more focused, eventually including reorganization of teams. This needs assessment of all institutes.	
<b>D2.2</b>	<b>Assessment of the previous research objectives and their achievement</b>
Good to very good	

<b>D2.3</b>	<b>Assessment of implementation of recommendations from past evaluation</b>
Apparently yes, but the text is not always precise.	
<b>D2.4</b>	<b>Success in receiving grants</b>
High	
<b>D2.5</b>	<b>Adequacy of instrumental equipment</b>
Very good	
<b>D2.6</b>	<b>Effectiveness of management</b>
Largely unknown, but appears to be good.	
<b>D2.7</b>	<b>Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth</b>
Age structure appears promising for the next 5-10 years if researches can be hold. Director clearly mentions the problems with underfinancing (wages!) Strategy is a sign of good will.	
<b>D2.8</b>	<b>Creating work-life balance conditions, assessment of approach towards possible gender issues</b>
See D2.7. Improvement noted, but overall, still <i>low number of women</i> researchers.	
<b>D2.9</b>	<b>Relation of the institute with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.</b>
N/A	

### Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

<b>D3.1</b>	<b>Scope of cooperation with universities on national and international level</b>
Intensive, good efforts to make liaisons with national and international universities is to be commended.	
<b>D3.2</b>	<b>Effectiveness of joint research centres</b>
N/A	
<b>D3.3</b>	<b>Success rate in supervision of PhD students</b>
Difficult because of lack of students in geology, relatively good.	
<b>D3.4</b>	<b>Participation of PhD students in the outputs</b>
Reasonably good, considering the dearth of such students.	
<b>D3.5</b>	<b>Participation of the institute in master or bachelor studies</b>
Strong	
<b>D3.6</b>	<b>Assessment of cooperation intensity with universities in the form of teaching</b>
Strong	

#### Further criterion: 4. Outreach activities (D4.1-D4.3)

<b>D4.1</b>	<b>Sufficiency of media strategy and activities in the area of research popularisation</b>
See individual departments; partly to very good (e.g., several books).	
<b>D4.2</b>	<b>Publishing activities and its quality</b>
Good in general; See departments/teams.	
<b>D4.3</b>	<b>Participation in professional organisations in the area of research and development</b>
See teams	

#### Other comments of the commission:

In general: We feel that the Institute of Geology faces a dilemma: The genuine task of an academy institute should be basic research. Due to funding shortness the IG has to solicit applied geoscience projects to enhance the financial situation. However, in doing so the IG is subject to significant competition from private companies. An alternative which may be discussed, could be to focus on strengthening basic research, eventually even with fewer(?) but better paid personal. This could raise possibilities to hire enthusiastic and world-class scientists. We realize that this will be a contentious issue.

## Part B: Evaluation of teams

### 1. Department of Geological Processes

#### Strengths:

Very good equipment; „petrochronology“; broad cooperation domestically and abroad; high outputs with IF, very good (2.0) rating in Phase I; successful personal policy; awards; teaching in universities; connection to applied research

#### Weaknesses:

Poorly developed potential with IRSM thermochronometry; hiring post-docs from abroad failed. The first evaluation recommended higher inclusion of women researchers, but their number low overall (but better).

#### Opportunities:

Geochronology and petrochronology, CA-ID-TIMS; dust data bank; volcano-plutonic systems, critical metals; geoarchaeology

#### Threats:

Underfinancing and losing excellent young researchers

#### Main criterion: 1. Quality of results (H1.1-H1.5)

<b>H1.1</b>	<b>Quality of selected outputs of Phase I</b>
Average to high. Reference is made to Part A, H1.1. Considering that the team's diversity addressed a broad spectrum of geologic topics, it has managed respectable involvement with the international community.	
<b>H1.2</b>	<b>Contribution of workers on the outputs reached</b>
High	
<b>H1.3</b>	<b>Quality of all outputs and results</b>
Phase II: Impressively high. Of 99.5* listed IF (Impact factor journal publications), 8 are in a high IF (>5), 20 in low IF (<2), 9 in a Czech (i.e. regional) journal, with 63 in an acceptable IF (2-4). Given 15 researchers, this averages ~7 per researcher over the 5 year period, with an average of 1.4 per year. *One publication is also listed in the publications of another department (dual listing), so counts as a 50 % publication in listings.	
<b>H1.4</b>	<b>The most valuable discoveries and findings in the fields, their importance for the field</b>
Flat subduction; calderas, trans-crustal magma movement; tectonic phases and paleostress Central Europe; J/C boundary; dust (also AV21); (Sub.) Milankovich cyclicity Devonian; past climate change; underthrusting of microplates; Cenozoic volcanism, partial melting, metasomatism; GSSP Silurian; weathering, sandstones, „Arcades“; deep repositories	
<b>H1.5</b>	<b>Contribution of the participation of the authors in large collaborations</b>
IGCP 596 <i>Climate change and biodiversity patterns in the Mid Paleozoic</i>	

## Main criterion: 2. Societal relevance (H2.1-H2.5)

<b>H2.1</b>	<b>Societal relevance of outputs and results pursuant to CAS and institute mission</b>
Not directly but via analytical equipment available cooperatively.	
<b>H2.2</b>	<b>System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities</b>
See H2.1	
<b>H2.3</b>	<b>Relation to practice</b>
Not specific	
<b>H2.4</b>	<b>Participation in AV21 strategy</b>
Very engaged participation in various topics	
<b>H2.5</b>	<b>Cooperation with regions of the Czech Republic</b>
Not specified	

## Further criterion: 1. Position in international and national context (D1.1-D1.3)

<b>D1.1</b>	<b>Comparison of the team with similar international and national institutes</b>
Difficult to state because of great heterogeneity of team. In general the team is largely at the cutting edge, nationally and internationally.	
<b>D1.2</b>	<b>Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation</b>
Extensive network (17 countries); several visits and internships from abroad; some fellowships of Team 1 postdocs abroad (e.g. Fulbright scholarship)	
<b>D1.3</b>	<b>Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)</b>
Involved in 10 international conferences and workshops; 10 invited lectures (5 abroad); 6 national awards.	

## Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

<b>D2.1</b>	<b>Direction in line with the perspective of the planned research directions</b>
Yes; very ambitious research plan. Very impressive.	
<b>D2.2</b>	<b>Assessment of the previous research objectives and their achievement</b>
Increasing international collaboration; inclusion of young-career scientists; ore forming processes; brittle deformation kinematics; succession of Alpine tectonic phases; Prague synform; global dust data base; geoarchaeology (environmental). All in all very successful.	

<b>D2.3</b>	<b>Assessment of implementation of recommendations from past evaluation</b>
Discussion of overlaps, defended by the team, reasons stated	
<b>D2.4</b>	<b>Success in receiving grants</b>
Good, even if not complete (as normal)	
<b>D2.5</b>	<b>Adequacy of instrumental equipment</b>
Very good	
<b>D2.6</b>	<b>Effectiveness of management</b>
Good	
<b>D2.7</b>	<b>Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth</b>
Several good ideas, good age structure for near future (see also institute)	
<b>D2.8</b>	<b>Creating work-life balance conditions, assessment of approach towards possible gender issues</b>
Engaged HR policy, as suggested by first evaluation, although number of women researchers is low overall (one in department)..	
<b>D2.9</b>	<b>Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.</b>
Not given	

### Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

<b>D3.1</b>	<b>Scope of cooperation with universities on national and international level</b>
Strong on national level; Mexico subordinate	
<b>D3.2</b>	<b>Effectiveness of joint research centres</b>
? Australian Research Centre	
<b>D3.3</b>	<b>Success rate in supervision of PhD students</b>
PhD to be improved	
<b>D3.4</b>	<b>Participation of PhD students in the outputs</b>
Good	
<b>D3.5</b>	<b>Participation of the team in master or bachelor studies</b>
Good for MSc and BSc	
<b>D3.6</b>	<b>Assessment of cooperation intensity with universities in the form of teaching</b>
Very busy	



#### Further criterion: 4. Outreach activities (D4.1-D4.3)

<b>D4.1</b>	<b>Sufficiency of media strategy and activities in the area of research popularisation</b>
Considerable presence in TV, others moderate except for lectures	
<b>D4.2</b>	<b>Publishing activities and its quality</b>
Not exciting	
<b>D4.3</b>	<b>Participation in professional organisations in the area of research and development</b>
Quite active	

Other comments of the commission:

## 2. Department of Paleobiology and Paleoecology

### Strengths:

Multidirectional and multi-proxy; covering all major traditional paleontological research fields; numerous collaborations inland and abroad; many outputs; successful funding applications (but mainly nationally); interesting promising age structure; flexibility (traditional tasks and new emerging ones); attractive for young academics; high popularity

### Weaknesses:

Team spirit to be strengthened; retirements of experienced researchers, temporary decline of 1st author IF papers expected, generation exchange; predominantly local and regional research aspects make targeting high impact journals difficult; major research areas focusing on fossiliferous formations and systems present in Czech Republic only and no specific international program is developed; no participation in large collaborations; poor internet presence; no obvious synergies between groups within department; no overarching goal of department recognizable.

### Opportunities:

International visibility and involvement in organisations/programs; increasing synergies between teams; diversity of research topics could be used to create more internationally significant cooperation; testing and application of new methods; longer perspective due to replacement of retired researches by young ones;

### Threats:

Shortage of funding; loss of young scientists by low salaries; diversity and local/regional research aspects may foster further fragmentation of team's research perspectives

### Main criterion: 1. Quality of results (H1.1-H1.5)

<b>H1.1</b>	<b>Quality of selected outputs of Phase I</b>
Moderate to good. Reference is made to Part A, H1.1, wherein paleontological subjects commonly are published in good journals, but with low impact (because of individual topics' limited international readership).	
<b>H1.2</b>	<b>Contribution of workers on the outputs reached</b>
High. Note that many paleontological journals, while prestigious, have a low IF.	
<b>H1.3</b>	<b>Quality of all outputs and results</b>
Good. Of 99.5* listed IF (Impact factor journal publications), 5 are in a high IF (>5), including one in <i>Nature Plants</i> (IF 13), 47 in low IF (<2), 14 in a Czech (i.e. regional) journal, with 34 in an acceptable IF (2-4). Given 18 researchers, this averages 5.5 per researcher over the 5 year period, with an average of 1.1 per year. *One publication is also listed in the publications of another department (dual listing), so counts as a 50% publication in listings.	
<b>H1.4</b>	<b>The most valuable discoveries and findings in the fields, their importance for the field</b>
(Bio-)Stratigraphy Peri-Gondwana, GSSPs, conodonts, graptolites and trilobites; auxiliary correlation tools (physio-chemical); Milankovitch cycles in Palaeozoic; UNESCO IGCPs; oldest vascular land plants 432 Ma; oldest spores, importance of islands; plant evolution in Central Europe; mass extinctions; Neogene Eurasian mammals, Cretaceous and Neogene	

frogs, marine and non-marine fish taxa; Jurassic/Cretaceous GSSP, Late Cretaceous plants and marine transgression, macrofauna and migration, environment; PETM. (Comment: essential also for genetic geomorphology).	
<b>H1.5</b>	<b>Contribution of the participation of the authors in large collaborations</b>
Good.	

## Main criterion: 2. Societal relevance (H2.1-H2.5)

<b>H2.1</b>	<b>Societal relevance of outputs and results pursuant to CAS and institute mission</b>
Basic research, no direct relevance, but meets strong interest of the public (see outreaches)	
<b>H2.2</b>	<b>System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities</b>
Basic research, no direct relevance, but meets strong interest of the public (see outreach)	
<b>H2.3</b>	<b>Relation to practice</b>
Basic research, no direct relevance, but meets strong interest of the public (see outreach)	
<b>H2.4</b>	<b>Participation in AV21 strategy</b>
Booklet by Mikulaš (2018, in Czech)	
<b>H2.5</b>	<b>Cooperation with regions of the Czech Republic</b>
Not specified; number of lectures in regions	

## Further criterion: 1. Position in international and national context (D1.1-D1.3)

<b>D1.1</b>	<b>Comparison of the team with similar international and national institutes</b>
Good international and national visibility and importance, but not at leading edge.	
<b>D1.2</b>	<b>Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation</b>
Although the team is small it maintains an impressive network of national and international cooperation, some of them since long time (e.g., Chin. Ac. Sci); members are strongly involved in international organizations and networks such as IGCP programs in responsible functions	
<b>D1.3</b>	<b>Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)</b>
5 international conferences and workshops, many invited lectures worldwide; 9 national and international awards	

## Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

<b>D2.1</b>	<b>Direction in line with the perspective of the planned research directions</b>
Yes	
<b>D2.2</b>	<b>Assessment of the previous research objectives and their achievement</b>
Good, almost completed	
<b>D2.3</b>	<b>Assessment of implementation of recommendations from past evaluation</b>
Gender: 7 new female scientists employed, plus male ones; replacement strategy of retiring scientists; modernizing methods: focus on eustatic oscillation, sequence stratigraphy, orbital forcing.	
<b>D2.4</b>	<b>Success in receiving grants</b>
Several long-term projects launched (7 from Cz. Sci. Found. CSF, plus 6 others from CAS, Charles Univ., Nat. Sci. Centre Poland); 5 CSF projects running. Very successful nationally	
<b>D2.5</b>	<b>Adequacy of instrumental equipment</b>
Not specified; instrumental equipment of the Institute can apparently be used by all teams/departments (see Activity Plan and Information on the activity of the institute, 3.1); instruments from other institutions used in collaborations. „Sufficient“	
<b>D2.6</b>	<b>Effectiveness of management</b>
Successful HR policy	
<b>D2.7</b>	<b>Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth</b>
Age structure looks promising for the next two periods. Career and qualification growth should be taken very serious to keep best scientists; retired very experienced scientists should be kept with part time contracts to ensure training and guidance of young scientists.	
<b>D2.8</b>	<b>Creating work-life balance conditions, assessment of approach towards possible gender issues</b>
Not specified; relatively good gender balance, with 4 women listed as researchers.	
<b>D2.9</b>	<b>Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.</b>
No information	

## Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

<b>D3.1</b>	<b>Scope of cooperation with universities on national and international level</b>
Good, very busy	
<b>D3.2</b>	<b>Effectiveness of joint research centres</b>
None given	

<b>D3.3</b>	<b>Success rate in supervision of PhD students</b>
Very good (but only 2)	
<b>D3.4</b>	<b>Participation of PhD students in the outputs</b>
Apparently low so far	
<b>D3.5</b>	<b>Participation of the team in master or bachelor studies</b>
Given the high number of course in which members of the department are involved, participation is better for PhD students, but it is still low.	
<b>D3.6</b>	<b>Assessment of cooperation intensity with universities in the form of teaching</b>
Strong with Charles University, no others (probably few appropriate University institutes available in CR)	

#### Further criterion: 4. Outreach activities (D4.1-D4.3)

<b>D4.1</b>	<b>Sufficiency of media strategy and activities in the area of research popularisation</b>
Very good. Ca. 80 events, several media used to include radio, many lectures for public, 3 books, 1 book chapter. But poor internet presence.	
<b>D4.2</b>	<b>Publishing activities and its quality</b>
Many newspaper and magazine articles	
<b>D4.3</b>	<b>Participation in professional organisations in the area of research and development</b>
Very good.	

Other comments of the commission:

### 3. Department of Environmental Geology and Geochemistry

#### Strengths:

Leading edge research: weathering of granular rocks; mercury cycle; geo-mycology. Many books and book chapters, high IF publications. Funding success on the national level past and future. Applied research. Devoted to popular science (310 outputs)

#### Weaknesses:

Recruitment of students and young scientists; no BSc studies, few MSc and PhD. Age structure critical for long term sustainability. Funding only from local resources.

#### Opportunities:

Applications for international grant support could provide financial base for young scientists and PhD students. The team should adapt a policy of being „the chance“ for young people to get expertise and develop skills and qualifications on an international level, as well as recognition.

#### Threats:

Replacement of retired scientists. Competition with better paying companies or institutions. Partial overlap with activities at the Institute of Rock Mechanics (but also opportunity for larger synergy).

#### Main criterion: 1. Quality of results (H1.1-H1.5)

<b>H1.1</b>	<b>Quality of selected outputs of Phase I</b>
Impressive Reference is made to Part A, H1.1.	
<b>H1.2</b>	<b>Contribution of workers on the outputs reached</b>
Very good for evaluated outputs.	
<b>H1.3</b>	<b>Quality of all outputs and results</b>
Phase II: Of 86.5* listed IF (Impact factor journal publications), 14 are in a high IF (>5), including one in Nature Communications (IF = 12!), 15 in low IF (<2), 4 in a Czech (i.e. regional) journal, with 61 in an acceptable IF (2-4). Given 8 researchers, this averages ~11 per researcher over the 5 year period, with an average of 2.2 per year. <u>This is an impressive record!</u> *One publication is also listed in the publications of another department (dual listing), so counts as a 50% publication in listings.	
<b>H1.4</b>	<b>The most valuable discoveries and findings in the fields, their importance for the field</b>
Sandstone weathering and forms, „Arcades“, discontinuities and rock stress distributions, weathering of monuments, innovative fluorescence, DNA of biologically initiated rock crust; salt weathering and numerical modelling (Petra). Stable isotope geochemistry and dating in karst; salt karst; cave speleothem of cryogenic origin (depth and dating of permafrost); water mixing. Tektite geochemistry, melting, vaporization and condensation; new conceptual model, process of Moldavite formation. Toxic elements, accumulation by living organisms; sample processing before mercury analysis; distribution and speciation; historical mercury contamination; applied geochemistry topics (e.g. gaseous mercury); effects of bark beetle infestation; arsenic rich mine dump; geo-mycology, transporter genes; dam reservoirs. Monitoring of environmental fluxes, network of collaborations. Atmospheric deposition monitoring. High-level radioactivity wastes, certified methodology,	

verified technology; fluorescent tracers, fractures. Innovation of analytical methods: high precision Cd data (at the forefront).	
<b>H1.5</b>	<b>Contribution of the participation of the authors in large collaborations</b>
N/A	

## Main criterion: 2. Societal relevance (H2.1-H2.5)

<b>H2.1</b>	<b>Societal relevance of outputs and results pursuant to CAS and institute mission</b>
Under several aspects: geochemistry most relevant for contamination and monitoring; weathering results for landscape (e.g., National Parks) and cultural heritage; atmospheric deposition.	
<b>H2.2</b>	<b>System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities</b>
In particular pollution and contamination and ongoing monitoring study, studies into possible radioactive waste deposits.	
<b>H2.3</b>	<b>Relation to practice</b>
See H.2.1-2.2.	
<b>H2.4</b>	<b>Participation in AV21 strategy</b>
Very strong, commendable.	
<b>H2.5</b>	<b>Cooperation with regions of the Czech Republic</b>
Well developed in many aspects.	

## Further criterion: 1. Position in international and national context (D1.1-D1.3)

<b>D1.1</b>	<b>Comparison of the team with similar international and national institutes</b>
At the leading edge.	
<b>D1.2</b>	<b>Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation</b>
Phase II: Of 87 listed IF (Impact factor journal publications), 19 are in a high IF (>5), 12 in low IF (<2), 5 in a Czech (i.e. regional) journal, with 63 in an acceptable IF (2-4). Given 15 researchers, this averages ~10 per researcher over the 5 year period, with an average of 1.9 per year. <u>Impressively high</u> . Good cooperation within the institute and beyond (ČAS, universities, state authorities), also broad international cooperation, but not with a significant number of publications so far.	

<b>D1.3</b>	<b>Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)</b>
International visibility on boards and organizations to be increased. Not in accordance with scientific international reputation.	

## Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

<b>D2.1</b>	<b>Direction in line with the perspective of the planned research directions</b>
Well planned development in existing research areas, with new topics opening (migration of pollutants in floodplain sediments; dye tracers; new equipment for Hg sampling).	
<b>D2.2</b>	<b>Assessment of the previous research objectives and their achievement</b>
Successfully achieved. Socially important results in basic research and applied research.	
<b>D2.3</b>	<b>Assessment of implementation of recommendations from past evaluation</b>
Recommendations were considered thoroughly, most of them successfully implemented. Problem of decreasing number of geology students (not caused by CAS teams).	
<b>D2.4</b>	<b>Success in receiving grants</b>
Successful from various agencies (GAČR, TAČR, MPO, and others including private); well secured on national level. Opportunities for international (European) grants.	
<b>D2.5</b>	<b>Adequacy of instrumental equipment</b>
Very good, partly shared with other teams. Particularly good for mercury analyses.	
<b>D2.6</b>	<b>Effectiveness of management</b>
Good because of great success of the team; new outstanding scientist employed; see also D2.7.	
<b>D2.7</b>	<b>Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth</b>
Problematic: economic resources of the Institute, competitiveness with private sector; personnel situation stabilized but age structure <30 and 40-60 years with gaps.	
<b>D2.8</b>	<b>Creating work-life balance conditions, assessment of approach towards possible gender issues</b>
Adequate. Three women researchers (out of a total of eight)	
<b>D2.9</b>	<b>Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.</b>
N/A	



### Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

<b>D3.1</b>	<b>Scope of cooperation with universities on national and international level</b>
Quite numerous, mainly by Čilek, Prague and Vancouver.	
<b>D3.2</b>	<b>Effectiveness of joint research centres</b>
N/A	
<b>D3.3</b>	<b>Success rate in supervision of PhD students</b>
Good	
<b>D3.4</b>	<b>Participation of PhD students in the outputs</b>
Satisfactory, but with possible improvements. The PhD students participate in grants and contribute to publications, however, rarely as first/corresponding authors.	
<b>D3.5</b>	<b>Participation of the team in master or bachelor studies</b>
Adequate (5 people teaching)	
<b>D3.6</b>	<b>Assessment of cooperation intensity with universities in the form of teaching</b>
Good with Charles Univ.	

### Further criterion: 4. Outreach activities (D4.1-D4.3)

<b>D4.1</b>	<b>Sufficiency of media strategy and activities in the area of research popularisation</b>
Very good, impressive list, by far most by Čilek, followed by Borovicka.	
<b>D4.2</b>	<b>Publishing activities and its quality</b>
Considerable number of popular books etc. (in Czech), very good quality.	
<b>D4.3</b>	<b>Participation in professional organisations in the area of research and development</b>
Number of editorial boards and Committees, only Filippi in board of international journal.	

### Other comments of the commission:

N/A

## 4. Department of Analytical Methods, Geotechnics and Paleomagnetism

### Strengths:

Many research areas and a variety of functions are in this department. Each has an established reputation nationally and internationally. The three major research areas in the institute, each have research areas that cooperate with other departments, and often have their own project initiatives. Paleomagnetism is unique to this Department within in Geology Institute and others in the ČAV in Prague and nationally. A team investigates extra-terrestrial materials and their shock collision products. The biomineralization project is unique and should yield significant information that will assist anthropological studies.

### Weaknesses:

The anisotropy and rock fracturing projects have overlap with other ČAV institutes. Rather well balanced age structure but only few young scientists.

### Opportunities:

The diversity of approaches assures continuity within the teams and Institute overall.

### Threats:

The groups need to acknowledge and plan more cooperation with other ČAV institutes across the country.

### Main criterion: 1. Quality of results (H1.1-H1.5)

<b>H1.1</b>	<b>Quality of selected outputs of Phase I</b>
Very good. Reference is made to Part A, H1.1.	
<b>H1.2</b>	<b>Contribution of workers on the outputs reached</b>
Slightly more papers with corresponding than non-corresponding author from department. Some papers are presented with only authors from the group. In general, there are many publications whose first author is a researcher from the group.	
<b>H1.3</b>	<b>Quality of all outputs and results</b>
Phase II: The number of high impact journal articles is impressive. Also, mid-level IF journal publications is very good. This team has been well above average in the per-researcher contributions over the five-year period. Of 99.5* listed IF (Impact factor journal publications), 7 are in a high IF (>5), 22 in low IF (<2), 10 in a Czech (i.e. regional) journal, with 61 in an acceptable IF (2-4). Given 11 researchers, this averages 9 per researcher over the 5 year period, with an average of 1.8 per year. This is an impressive record! *One publication is also listed in the publications of another department (dual listing), so counts as a 50% publication in listings. One publication is also listed in the publications of another department (dual listing).	
<b>H1.4</b>	<b>The most valuable discoveries and findings in the fields, their importance for the field</b>
Considering that there are three diverse groups under the umbrella, „Analytical Methods, Geotechnics and Paleomagnetism,” the overall group’s publications address research in these areas. As such, topics vary, including cave erosion and sediments, metal pollutants, salt in lakes, granitic plutons, magnetostratigraphy of Siberian sediments, fuel cell catalyses, P and S wave transmission through ultramafic rocks, as a sample of the broad spectrum of department publications.	

<b>H1.5</b>	<b>Contribution of the participation of the authors in large collaborations</b>
Of the several multi-author publications, participation of the department's researchers is adequate.	

## Main criterion: 2. Societal relevance (H2.1-H2.5)

<b>H2.1</b>	<b>Societal relevance of outputs and results pursuant to CAS and institute mission</b>
The spectrum of contributions by this department is broad. While many topics are pure science, there are some applied results that will benefit society. Among the latter are metal (As) pollutants, survival rates from Tunguska impact, a Ni-Sb-Ag-Au economic metal association at Kutná Hora, and arsenic mobility in sulfide-rich mining wastes.	
<b>H2.2</b>	<b>System functionality for knowledge transfer into practise, its usefulness for society. The impact of the team's activity on proper practice in society in the area of social sciences and humanities</b>
Probably the highest impacts of the department members apply to metal pollution related to mining. This can seriously affect groundwater in current and future population areas. Another study on natural modification of CO <sub>2</sub> sequestration is of high value. It can be a significant effect on residents' sense of security.	
<b>H2.3</b>	<b>Relation to practice</b>
By far, the largest percentage of output by the teams is pure science with many topics. This has utility for other institutes, whose impacts tend to be more applied science.	
<b>H2.4</b>	<b>Participation in AV21 strategy</b>
Metal pollutants and CO <sub>2</sub> sequestration are serious problems and need careful study. The department's contributions are directly relevant.	
<b>H2.5</b>	<b>Cooperation with regions of the Czech Republic</b>
The evaluators see a reasonable exchange of ideas and research with intra-country teams.	

## Further criterion: 1. Position in international and national context (D1.1-D1.3)

<b>D1.1</b>	<b>Comparison of the team with similar international and national institutes</b>
The expertise spectrum within department of analytical Methods, geotechnics and paleomagnetism group compares favorably with parallel groups outside the country. Most countries are addressing the same issues and consequences of inadequate study are well known.	
<b>D1.2</b>	<b>Scope and quality of international and national cooperation and the role of the team in such cooperation; engagement in broad international cooperation</b>
Collaboration with groups from Norway, Spain, UK, Australia, Sweden, Japan, Finland, Russia, Germany, Colombia, Saudi Arabia, Sudan, Ukraine, Slovenia, USA, and Iceland.	

<b>D1.3</b>	<b>Participation of the workers in scientific community activities (organizing of conferences and workshops, invited lectures, awards)</b>
Organized the Berriasian Working Group Meeting, 2018 and a field excursion associated with the Goldschmidt conference, 2015. P Bosák was honored with two awards, one from the Polish Speleological Society, and the second from the Polish Minister of the Environment. A student, Š Křížovžá, received the “Outstanding Student Poster Award” at the European Planetary Science Congress in Berlin.	

## Further criterion: 2. Vitality, sustainability and strategy (D2.1-D2.9)

<b>D2.1</b>	<b>Direction in line with the perspective of the planned research directions</b>
Steady growth of outputs is apparent. The forensic geology function in the group has significant applied value.	
<b>D2.2</b>	<b>Assessment of the previous research objectives and their achievement</b>
All teams have set a high goal for refereed research productivity. Compared to teams in other institutes, they have performed admirably (See H1.1).	
<b>D2.3</b>	<b>Assessment of implementation of recommendations from past evaluation</b>
All departments were considered to be highly effective in their productivity in the first evaluation. Present presentation of research continues to show excellent progress. A goal was to be more interactive within individual teams and the Department as well as other ČAV institutes. This has occurred. At least 10 employees were, or still are, involved in a close cooperation with other institutes of the Academy of Sciences in two programs of the Strategy AV21: "Natural hazards" and "Diversity of life and health of ecosystems."	
<b>D2.4</b>	<b>Success in receiving grants</b>
Mostly Academy of Sciences and national Grant Agency support. We recommend pursuit of EC and other external support.	
<b>D2.5</b>	<b>Adequacy of instrumental equipment</b>
SEM TESCAN Vega 3XMU; Powder X-ray, Bruker D8 X-ray diffraction; saw+grinder, Struers; Microspectrometer, Transform spectrometer, electron probe microanalyzer, JEOL JXA 8230 Electron Probe Microanalyzer. Ultrasonic anisotropy ~400MPa, uniaxial loading frame, Ergotech triaxial cell, Strozatech hydrofracturing unit (15 cm cube), Pressure intensifier MTS. Pmag = 2G755 4K rock superconducting magnetometer, MAVACS Magnetic vacuum.	
<b>D2.6</b>	<b>Effectiveness of management</b>
Unclear, yet we sense a good and supportive management structure, owing to the various teams' productivity.	
<b>D2.7</b>	<b>Assessment of professional structure, development strategy and the strategy of keeping best scientists, age structure, career and qualification growth</b>
Nice distribution of age groups in all the teams, with highest percentage in 35-50 age group. The quality and skills of the researchers is very high, and we hope they can be retained.	

<b>D2.8</b>	<b>Creating work-life balance conditions, assessment of approach towards possible gender issues</b>
One woman is listed with the researchers, yet she not only is primarily listed in the roster of researchers in the Institute of Rock Mechanics (Department of Seismotectonics), but she is currently working in Germany. As with the previous evaluation, we urge more gender balance among researchers. There has been an increase in number of women technicians.	
<b>D2.9</b>	<b>Relation of the team with regard to the integration, development and sustainability of the research centre funded by the National Programme of Sustainability II.</b>
Group is very functional.	

### Further criterion: 3. Cooperation with universities and participation in education (D3.1-D3.6)

<b>D3.1</b>	<b>Scope of cooperation with universities on national and international level</b>
Several lectures at Charles University, and lectures at the University of Helsinki, Finland.	
<b>D3.2</b>	<b>Effectiveness of joint research centres</b>
Members of the Department acknowledge the value of working with other Institutes and have undertaken collaborations. Also provides services for other departments.	
<b>D3.3</b>	<b>Success rate in supervision of PhD students</b>
Two PhD dissertations defended in the evaluation period.	
<b>D3.4</b>	<b>Participation of PhD students in the outputs</b>
Five PhD students were a significant part of the Department's outputs.	
<b>D3.5</b>	<b>Participation of the team in master or bachelor studies</b>
Several bachelor and MS level lectures by researchers listed at Charles University, as well as five MS level lectures at the University of Helsinki.	
<b>D3.6</b>	<b>Assessment of cooperation intensity with universities in the form of teaching</b>
See D3.5	

### Further criterion: 4. Outreach activities (D4.1-D4.3)

<b>D4.1</b>	<b>Sufficiency of media strategy and activities in the area of research popularisation</b>
Team members have made a good effort to disseminate results of the Institute's wide-reaching functions to the public. The applicability of some research gives insight into extra-terrestrial bodies, which always attracts public interest. The re-creations of a cave, mine and related systems has been effective in primary schools. There have been significant public lectures and media exposure (newspaper, radio, television and reading materials).	

<b>D4.2</b>	<b>Publishing activities and its quality</b>
See H1.1 and D2.3.	
<b>D4.3</b>	<b>Participation in professional organisations in the area of research and development</b>
Four Department members are active Needs improvement. Admittedly, during COVID pandemic, such activities were curtailed, but pre pandemic information is scant.	

**Other comments of the commission:**

**Final report was elaborated by:**

**Commission 4 - Earth and environmental sciences**

**Evaluated teams No.: 1, 2, 3, 4**

**Commission Chair: Prof. (pens.) Dr. Franz Fiedler**

Commission Deputy Chair: Jakub Velímský

Commission Members:

Jesus Ibanez

Peter Isaacson

Jürgen Kriwet

Thomas Leisner

Willy Maenhaut

Roland Oberhänsli

Michael Rycroft

Ludwig Zoeller