



Comisión Nacional de Investigación
Científica y Tecnológica - CONICYT

FONDAP CENTERS OF EXCELLENCE IN RESEARCH PROGRAM

EVALUATION REPORT

I. PROJECT INFORMATION

NAME OF THE CENTER Andrean Geothermal Center of Excellence (CEGA)	CODE 15 09 0013
DIRECTOR OF THE CENTER Prof. Dr. Diego Morata	
SPONSORING INSTITUTION Universidad de Chile	
PERIOD REPORTED From: 01-January-2011 To: 31-December-2011	

II. EVALUATION PANEL

REVIEWER'S NAME	ORGANIZATION/ INSTITUTION	E-MAIL	SIGNATURE
Reviewer 1			



III. ANNUAL PROGRESS EVALUATION REPORT

A. RESULTS ATTAINED RELATED TO CENTER AIMS OR GOALS

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).	n/a					
Outcomes achieved in relation to the proposal objectives and goals.		xx				
Quality of achieved outcomes in relation to the proposal objectives and goals.	xx					
Integration between research lines of the Center.	xx					
Development and strengthening of international networks.	xx					
Outreach to society.		xx				
Dissemination and exploitation of results.	xx					
Responsiveness to or incorporation of suggestions by the advisory committee.		xx				

A. RESULTS ATTAINED PER RESEARCH LINES (Please fill up as many forms as programs exist within the Center).

Research Line: Magmatic Systems
Principal Investigator: Dr. Miguel Angel Parada

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).	n/a					
Outcomes achieved in relation to the proposal objectives and goals.	xx					
Quality of achieved outcomes in relation to the proposal objectives and goals.	xx					
Integration between research lines of the Center.		xx				
Dissemination and exploitation of results.		xx				



Research Line: Structure, Tectonics and Geophysics
Principal Investigator: Dr. Cesar Arriagada

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).	n/a					
Outcomes achieved in relation to the proposal objectives and goals.		xx				
Quality of achieved outcomes in relation to the proposal objectives and goals.		xx				
Integration between research lines of the Center.		xx				
Dissemination and exploitation of results.				xx		

Research Line: Reservoir Architecture and Geofluid Dynamics
Principal Investigator: Dr. Jacobus Le-Roux

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).	n/a					
Outcomes achieved in relation to the proposal objectives and goals.		xx				
Quality of achieved outcomes in relation to the proposal objectives and goals.		xx				
Integration between research lines of the Center.		xx				
Dissemination and exploitation of results.				xx		



Research Line: Heat-water-rock Interactions
Principal Investigator: Dr. Diego Morata

Item	Outstanding	Very Good	Good	Partial/Regular	Insufficient/Deficient
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).	n/a				
Outcomes achieved in relation to the proposal objectives and goals.		xx			
Quality of achieved outcomes in relation to the proposal objectives and goals.		xx			
Integration between research lines of the Center.		xx			
Dissemination and exploitation of results.				xx	

Research Line: Fluid Geochemistry
Principal Investigator: Dr. Martin Reich

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).	n/a					
Outcomes achieved in relation to the proposal objectives and goals.	xx					
Quality of achieved outcomes in relation to the proposal objectives and goals.	xx					
Integration between research lines of the Center.		xx				
Dissemination and exploitation of results.				xx		



Research Line: Surficial Processes and Environmental Impact
Principal Investigator: Dr. Gabriel Vargas

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).	n/a					
Outcomes achieved in relation to the proposal objectives and goals.	xx					
Quality of achieved outcomes in relation to the proposal objectives and goals.	xx					
Integration between research lines of the Center.	xx					
Dissemination and exploitation of results.			xx			

B. GENERAL COMMENTS

Please provide an overall qualitative review of the Annual Progress of the Center goals and outcomes. Include any comments that you consider significant, highlighting the main strengths and/or weaknesses.

The Center, to its credit, has involved many faculty and students in the various projects – thus, accomplishing much in the first year. The Center appears to be off to a good start, and research appears to be well formulated and executed, and the results are encouraging. I am especially pleased to see work in low-temperature geothermal systems being proposed and investigated. This should lead to getting some geothermal use on-line in the near future. I am also pleased with the international cooperation that has been undertaken. I realize that preparing and submitting publications for the initial phases of the research work is difficult, due to lack of data, however, I would hope to see more results published in the future.

C. BENCHMARKING

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Performance of the Center in relation to internationally recognized centers in the field.	xx					

Please elaborate:



"CEGA has made significant contacts and cooperative research with a number of institutions, both domestic and international. International collaborative geothermal research was promoted with IESE New Zealand, GZB Germany, ISOR Iceland, GNS New Zealand, Lawrence Berkeley National Laboratory, USA, and EEUU Jackson School. In addition a number of industry contacts were made. These organizations are among the leaders in geothermal R&D, and thus they should make significant contributions and guidance to CEGA. These contacts are a major accomplishment for the first year of operation."

D. COMMENTS TO THE CENTER DIRECTOR:

Keep up the good work – I am very impressed with the work to date, the involvement of numerous faculty and students. I would hope to see more publications of the research work in the future. The international cooperation and advisory committee is also progressing well, as these people can provide directions for the program.

E. RECOMMENDATIONS TO THE FONDAP PROGRAM DIRECTOR:

You should be proud of the initial accomplishments that the Center has achieved. I hope to see more in the future.

F. ADDITIONAL INFORMATION REQUIRED FOR THE EVALUATION OF THE ANNUAL PROGRESS REPORT

If you decide to leave the evaluation pending and require additional information from the Center, please indicate the documentation or explanations required to complete your evaluation. In case there are additional requirements that the Center's director has to fulfill, please explain them as clearly as possible so s/he can address them.

If you decide to reject this report (or significant portions of it) please indicate as clearly as possible the requirements that should be conveyed to the Center's director.



IV. EVALUATION CONCEPTS

1. **Approved:** The objectives and goals are fully accomplished and all the relevant issues are properly covered in the report.
2. **Approved with minor observations:** The objectives and goals are accomplished, however, some comments and suggestions need to be addressed.
3. **Pending:** Additional information is required to fully evaluate the report.
4. **Rejected:** The objectives and goals have not been accomplished and/or the outcomes are deficient.

V. RECOMMENDATION

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
APPROVED	APPROVED WITH MINOR OBSERVATIONS	PENDING	REJECTED

REVIEWER'S NAME: Reviewer 1

DATE: _16 / _02_ / _2012_





Comisión Nacional de Investigación Científica y Tecnológica - CONICYT

FONDAP CENTERS OF EXCELLENCE IN RESEARCH PROGRAM

EVALUATION REPORT

IV. PROJECT INFORMATION

NAME OF THE CENTER Andean Geothermal Center of Excellence	CODE 15 09 0013
DIRECTOR OF THE CENTER Dr. Diego Morata	
SPONSORING INSTITUTION	
PERIOD REPORTED From:01 January 2011 To: 31 December 2011	

V. EVALUATION PANEL

REVIEWER'S NAME	ORGANIZATION/ INSTITUTION	E-MAIL	SIGNATURE
Reviewer 2			



VI. ANNUAL PROGRESS EVALUATION REPORT

A. RESULTS ATTAINED RELATED TO CENTER AIMS OR GOALS

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).		X				
Outcomes achieved in relation to the proposal objectives and goals.		X				
Quality of achieved outcomes in relation to the proposal objectives and goals.		X				
Integration between research lines of the Center.		X				
Development and strengthening of international networks.	X					
Outreach to society.	X					
Dissemination and exploitation of results.		X				
Responsiveness to or incorporation of suggestions by the advisory committee.		X				

B. RESULTS ATTAINED PER RESEARCH LINES (Please fill up as many forms as programs exist within the Center).

Research Line: Magmatic Systems
Principal Investigator: Dr. Miguel Angel Parada

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).						
Outcomes achieved in relation to the proposal objectives and goals.			X			
Quality of achieved outcomes in relation to the proposal objectives and goals.			X			
Integration between research lines of the Center.		X				
Dissemination and exploitation of results.	X					

This research line presents an eclectic group of projects that seem to fall into a number of topical areas. Some of the projects have little apparent relevance to geothermal problems and applications. Significant efforts have been made to publish the research results in international journals, and in this respect this research line stands out.



Research Line: Structure, Tectonics and Geophysics
Principal Investigator: Dr. Cesar Arriagada

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).						
Outcomes achieved in relation to the proposal objectives and goals.			X			
Quality of achieved outcomes in relation to the proposal objectives and goals.			X			
Integration between research lines of the Center.		X				
Dissemination and exploitation of results.			NA			

Interesting projects with most still being in the planning stages. Studies of the Southern Volcanic Zone are particularly interesting and relevant. The proposed MT investigations of individual geothermal fields will be especially useful. Additional MT surveys in the Southern Volcanic Zone would complement the ongoing work. Too early to review outcomes and quality of the work.

Research Line: Reservoir architecture and geofluid dynamics
Principal Investigator: Dr. Jacobus Le-Roux

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).						
Outcomes achieved in relation to the proposal objectives and goals.			X			
Quality of achieved outcomes in relation to the proposal objectives and goals.			X			
Integration between research lines of the Center.		X				
Dissemination and exploitation of results.			NA			

Good, well focused studies in the initial stages of activity. Too early to review outcomes and quality of the work.



Research Line: Heat-water-rock interactions
Principal Investigator: Dr. Diego Morata

Item	Outstanding	Very Good	Good	Partial/Regular	Insufficient/Deficient
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).					
Outcomes achieved in relation to the proposal objectives and goals.			X		
Quality of achieved outcomes in relation to the proposal objectives and goals.			X		
Integration between research lines of the Center.		X			
Dissemination and exploitation of results.			NA		

This research line presents an interesting mix of projects. The relevance of studies of fossil systems is not clear but will yield interesting geologic information. The application of X-ray tomography to volume changes is an interesting topic and may have broader applications. Investigations of active systems are well directed. Too early to review outcomes and quality of the work.

Research Line: Fluid Geochemistry
Principal Investigator: Dr. Martin Reich

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).						
Outcomes achieved in relation to the proposal objectives and goals.	X					
Quality of achieved outcomes in relation to the proposal objectives and goals.		X				
Integration between research lines of the Center.		X				
Dissemination and exploitation of results.			NA			

This research line stands out for several reasons. The projects will provide important information on Chilean geothermal systems, excellent progress has been made in establishing new geochemical laboratory facilities, very good progress has been made on the field studies, and collaborations with international experts have been established. Too early to review outcomes and quality of the work.



Research Line: Surficial processes and environmental impact
Principal Investigator: Dr. Gabriel Vargas

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Responsiveness to or incorporation of suggestions from last evaluation report (If applicable).						
Outcomes achieved in relation to the proposal objectives and goals.			X			
Quality of achieved outcomes in relation to the proposal objectives and goals.			X			
Integration between research lines of the Center.		X				
Dissemination and exploitation of results.			NA			

This is an important line of research and several good projects have been proposed, although their relevance to geothermal development is not clear. Nor is the incorporation of the low enthalpy systems in this research line clear, although the project is certainly desirable.

C. GENERAL COMMENTS

Please provide an overall qualitative review of the Annual Progress of the Center goals and outcomes. Include any comments that you consider significant, highlighting the main strengths and/or weaknesses.

In my opinion, the Center has made excellent progress toward developing a world-class geothermal institute. The Center has developed an active and generally well focused program, brought very capable faculty and staff on board, has developed collaborations with recognized geothermal experts and institutes, has purchased and installed analytical equipment ahead of schedule and has established an excellent outreach program. Overall a remarkable accomplishment.

A major weakness of the original proposal was the limited experience of many of the team members in geothermal systems. A number of collaborations with institutes and researchers worldwide have been established. Collaborative investigations with IESE New Zealand and Lawrence Berkeley Laboratory, California are likely to prove particularly valuable. The FONDAP program office should continue to encourage and support collaborations with other groups, attendance by faculty, staff and students at short courses and geothermal conferences and extended visits and workshops by outside experts. Extended workshops on reservoir engineering and power plants could be particularly interesting topics.

There is little indication in the summary suggesting interaction with other South and Central American geothermal organizations. Several of these organizations, particularly those in Mexico, Costa Rica and El Salvador have considerable exploration and development experience in geologic environments similar to those in Chile. Many are excellent speakers.



A number of the projects currently underway will have an immediate, practical benefit. The research line on Fluid Chemistry is particularly well defined and of obvious utility. Many of the other research lines appear less focused and cross topical boundaries (which are fine) or the research projects have less obvious geothermal relevance. It would be good to understand, in the next summary, how these projects fit into the overall program and relate to geothermal development, but at this point I do not take issue with them. I do hope to see more site specific geothermal projects, however. For example, soil gas and geophysical surveys of specific geothermal prospects could be very useful in the evaluation of these localities and make excellent MS projects.

I have rated collaboration among the research lines as very good. This rating is based on the fact that many of the researchers participate on multiple research teams. The researchers should provide, in the next annual summary, a discussion of how the investigations and results from different research lines have been integrated.

D. BENCHMARKING

Item	Outstanding	Very Good	Good	Regular	Poor	Not Qualify
Performance of the Center in relation to internationally recognized centers in the field.		X				

Please elaborate:

At this point, I would rate the performance as very good because of the progress the Center has made. The potential is certainly present to develop an internationally recognized center. As this is the first year of the Center’s program, there are as yet few substantive scientific results (e.g. publications in peer-reviewed journals; MS and Ph.D degrees awarded). The Center’s performance with respect to other centers will become apparent after year 2.

E. COMMENTS TO THE CENTER DIRECTOR: See general comments.

F. RECOMMENDATIONS TO THE FONDAP PROGRAM DIRECTOR

G. ADDITIONAL INFORMATION REQUIRED FOR THE EVALUATION OF THE ANNUAL PROGRESS REPORT

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VI. RECOMMENDATION

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
APPROVED	APPROVED WITH MINOR OBSERVATIONS	PENDING	REJECTED

REVIEWER'S NAME: Reviewer 2

DATE: ____/____/____

