

**NATIONAL PROGRAM FOR RESEARCH CENTERS OF EXCELLENCE
(FONDAP)**

FIRST PERIOD EVALUATION REPORT

This form is intended to facilitate your work as a referee and standardize the evaluation reports. Each topic should be evaluated with concepts ranging from "Excellent" to "Does Not Qualify". Please indicate your qualification for each criterion in a scale between 0 to 5 points (half points are also allowed). Each qualification must be properly supported with relevant comments.

Grading scale:

0 = Does Not Qualify	The proposal fails to meet/address the criterion under analysis or cannot be evaluated due to missing or incomplete information.
1 = Poor	The proposal does not properly meet/address the aspects of the criterion or there are serious inherent deficiencies.
2 = Fair	The proposal broadly meets/addresses the aspects of the criterion, but there are important deficiencies.
3 = Good	The proposal properly meets/addresses the aspects of the criterion, although some improvements are required.
4 = Very Good	The proposal meets/addresses the aspects of the criterion very well, although some improvements are still possible.
5 = Outstanding	The proposal successfully meets/addresses all the aspects of the criterion. Any shortcomings are minor.

If the Center report does not contain information on the given topic, please indicate so in your evaluation.

Your final overall comments and recommendations are an important part of the review process.


I. PROJECT INFORMATION**CENTER'S NAME:**

CENTRO DE INVESTIGACIÓN: DINÁMICA DE ECOSISTEMAS MARINOS DE ALTAS LATITUDES (IDEAL) RESEARCH CENTER: DYNAMICS OF HIGH LATITUDE MARINE ECOSYSTEMS (IDEAL)

DIRECTOR:

Dr. HUMBERTO E. GONZALEZ ESTAY

II. EVALUATION PANEL

REFEREE NAME	ORGANIZATION/ INSTITUTION	E - MAIL	SIGNATURE
Reviewer 1			

III. CENTER ACHIEVEMENTS

1. Scientific achievements and their impacts to local, national and international community.

i. Comments

Overall, the Center's impacts on the advancement of science is evident and these impacts are evident in the international science arenas. Specific examples include the publication of special technical reports that provide valued information pertinent to local and national marine sciences and conservation issues. The special Progress in Oceanography volume is an examples of the Center's scientific contributions in the Antarctic and Subantarctic Marine Ecosystems. The participation of IDEAL personnel in key international meetings (e.g the COP25 meeting in Madrid) provide further evidence of the research programs contributing valued scientific knowledge on the international stage.

The individual RPs contributions are commendable. The targeted outcomes regarding productivity measures were all met and/or exceeded when reported upon in the integration of efforts. That said, it appeared as if not all RPs were as impactful as others in regards to science publication and development of human resources. However, it is common in these types of Center's that that tasks are different enough that not all research programs can produce as rapidly as others. Notably, the infrastructure built by some of the RPs appears as if it could have greater value in the future as the baseline information and time-series of insightful information becomes available (e.g. mooring information and data). (score 4.5)

ii. Evaluation



Outstanding



Very Good



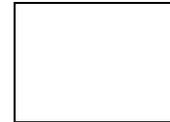
Good



Regular



Poor



Not Qualify

Score/Grading Scale: Score = 4.5

2. Educational achievements and impact. Pay attention to integration of research and educational activities, and also in training advanced human resources, participation in PhD Programs.

i. Comments

The training of the number of undergraduates, graduates and post-doctoral researchers by the Center is commendable and appropriate for the scope of the activities undertaken by the five research programs. Specifically, the staffing and students engaged in each of the research activities seems appropriate. RP5 appears to have a very large scope in research, policy communications and outreach. Of all the RPs this RP appears as if it has great potential for expansion in human resource development and training (overall score 4.0)

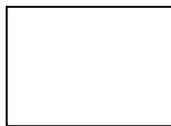
ii. Evaluation



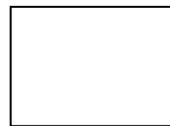
Outstanding



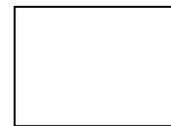
Very Good



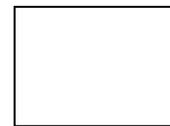
Good



Regular



Poor



Not Qualify

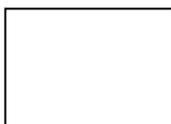
Score/Grading Scale: Score = 4.5

3. National and international collaboration achievements. Pay attention to activities that contributed to national and international networking

i. Comments

The Center has been engaged and collaborating with a reputable cadre of international researchers in research programs as well as in education and outreach activities. The levels of collaboration in the different RPs have varied- with collaborations on oceanographic cruises being cited the most in the report. Additional extended visits by three scientists were reported for 2019-2020. Given the number of participants supported by the Center, it seems possible to improve in the strength of collaborations as well as the number/diversity of collaborators in all of the research programs. The executive report mentioned the engagement of the international scientific council as examples of additional collaborations. No doubt the engagement of the science council is a valued interaction. However, this activity seems more advisory rather than collaborative in nature. However, these activities do contribute to the international networking.

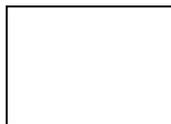
ii. Evaluation



Outstanding



Very Good



Good



Regular



Poor



Not Qualify

Score/Grading Scale: Score = 4.0

4. Outreach Achievements. Pay special attention to those activities that tied the Center with the external community such as elementary or high schools, institutions, companies, among others.

i. Comments

The Center has engaged in range of outreach activities that have reached many people throughout Chile and the world. These activities include books, community events, reporting in the news as well as technical reporting and presentations that has reached fishing communities and resource managers throughout the region. Direct ties to elementary and high schools are less evident in the reporting- but the range of quality outreach products appears to be appropriate for the topics covered in the research programs and the national and international interests in these areas.

ii. Evaluation



Outstanding



Very Good



Good



Regular



Poor



Not Qualify

Score/Grading Scale: Score = 4.0

5. Contribution to public policies. Pay special attention to the impact of the FONDAP Center in terms of contribution to public policies and to the development of other targeted groups.

i. Comments

The Center contributed greatly to international policies regarding science activities and resource management policies in both the Antarctic and Sub Antarctic science. The work of RP5 is highly commendable and valued in the arena of resource management and policies in context of changing practices as well as climate change. Thus, the center appears to have been very active and impactful for helping provide information and services that shape public policies that impact many people of Chile as well as the world.

ii. Evaluation



Outstanding



Very Good



Good



Regular



Poor



Not Qualify

Score/Grading Scale: Score = 5.0

IV. RESPONSE TO SUGGESTIONS FROM PREVIOUS EVALUATIONS

Please comment and evaluate the response to the suggestions and observations provided by the panel of experts in previous evaluation reports.

i. Comments

The Center appears to have been very proactive in evaluating advice given during previous evaluations and moving in directions that make sense for better linking socio-economics to natural resource sciences. The Center appears to have made good use of insights from reviews as well as advisory panels in formulating changes in a timely manner and in a way that is healthy for the various participants as well as stakeholders.

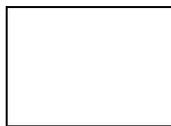
ii. Evaluation



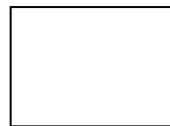
Outstanding



Very Good



Good



Regular



Poor



Not Qualify

Score/Grading Scale: Score = 4.5



V. OTHER RELEVANT ASPECTS

If the Center report does not contain information on other relevant aspects, please indicate so in your evaluation.

i. Comments



VI. CENTER PROJECTIONS

Please comment about the center projections after the 5 - year FONDAP grant. If the Center report does not contain information on the Center projections, please indicate so in your evaluation.

i. Comments

The Center has been good at taking action on advice from several sources. The merging of RP1 and 3 is a logical step and is one that is likely to serve the Center well into the future. The Center's merging/integration of results across RPs has been taking place and it is commendable that the Center has been able to integrate research results with socio-economic issues. The Center seems well poised to continue this work into the future and provide information and services of value to many.

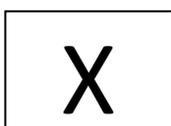
VII. INSTITUTIONAL COMMITMENTS

Please comment about the facilities available to the Center, the commitment of the administration of the leading and partner institutions to the Center, and the commitment of the partner institutions to achieve the Center goals.

i. Comments

The facilities available to the center and the commitments from partner institutions appear to be adequate and capable of fostering the advancement of the Center's research and educational goals into the future.

ii. Evaluation



Outstanding



Very Good



Good



Regular



Poor



Not Qualify

Score/Grading Scale: Score = 4.5

VII. ADVISORY COMMITTEE

Please comment about the commitment of the advisory committee, and its contribution to the Center development.

i. Comments

The international advisory committee was committed to providing quality review/advise each year of the program. The engagement of this committee is evident in the range of advice that were reported upon for each of the year's findings. The engagement of this group appears to be functioning well in providing outside perspectives that appear to have been valued in prioritizing efforts- especially in regards to developing issues of King Crab fisheries and the development of aquaculture. Additionally, the national advisory committee appears to be a great combination of people that can bring healthy institutional perspectives to bear on the issues that the Center encounters.

ii. Evaluation



Outstanding



Very Good



Good



Regular



Poor



Not Qualify

Score/Grading Scale: Score = 4.5

IX. FINAL OVERALL COMMENTS AND RECOMMENDATIONS

Please provide a final overall and recommendations for the Center. Include here aspects that were not covered in the previous sections, which you consider significant for the Center.

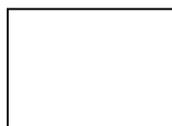
i. Comments

The Center is engaged in activities that are highly valued at local, national and international scales. There is ample evidence that the Center's participants are committed and capable in advancing science that has benefit to socio-economic issues of the region. Moreover, the directions and activities undertaken by the Center appear to be prioritized through processes that engage appropriate stakeholders and impartial views that allows for taking actions on complicated operations and issues. The recommendation is that the Center make progress as planned in the projections- leaving room for the Center to be somewhat flexible such that it can take action on emerging issues.

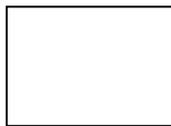
ii. Evaluation



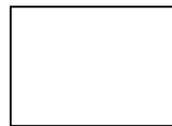
Outstanding



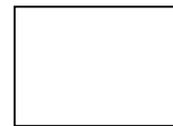
Very Good



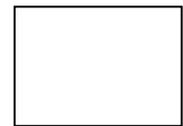
Good



Regular



Poor



Not Qualify

Score/Grading Scale: Score = 5.0


I. PROJECT INFORMATION**CENTER'S NAME: IDEAL****DIRECTOR:** Dr. HUMBERTO E. GONZALEZ ESTAY**II. EVALUATION PANEL**

REFEREE NAME	ORGANIZATION/ INSTITUTION	E - MAIL	SIGNATURE
REVIEWER 2			

III. CENTER ACHIEVEMENTS

1. Scientific achievements and their impacts to local, national and international community.

i. Comments

The progresses made since the creation of the IDEAL center are absolutely striking. They highlight how efforts have been developed wisely and efficiently on critical organizational and scientific issues, so that an initial collection of independent research activities now appear as a world class integrative program addressing all aspects of environmental sciences in the Antarctic and Sub-Antarctic/Magallanes/Patagonian connected regions. The initial plan was divided into 5 research programs (RP1, Marine productivity in a changing ocean; RP2, Physiological capabilities of marine species; RP3, Comparative structure and function of plankton; RP4, Comparative structure and function of benthos; RP5, Marine socio-ecological systems, ecosystem services, and human wellbeing). Very rapidly, this plan has gained in focus, in clarity (with an intense effort in RP2) and level of integration (within RPs, between RPs, and in the overall scientific plan, which now can be considered as a comprehensive roadmap to study this region of Chile from ecosystems/environment to human activities/society). The strategy of the managing team to integrate research questions, promote common study systems (including moors and buoys), establish seasonal and inter-annual long-term surveys and take benefit of modeling approaches have been critical in the present success of this program. The enthusiastic commitment of RP leader and teams has also probably be essential to the scientific productivity.

The IDEAL center has thus provided critical analytic and synthetic results on the impact of climate change and anthropogenic activities on the environment (marked by the magnitude of glaciers/ice melting, freshwater release in oceans, temperature increase, variations in various nutrients, etc., and the evolution of human activities) and the biological species, populations and communities who live in these habitats. The clarified definition of species on which efforts should be focused, has allowed important ecophysiological advances on biological marker species of habitats and/or relevant species for human activities/fisheries (including microalgae, macroalgae, krill/shrimps, mollusks, king crabs, fish). The initial objective on large scale 'omics' analyses of populations/communities, which was questioned on its feasibility at the beginning of the IDEAL program, has also been intelligently rescaled in such a way that large scale gene expression studies could be performed realistically.

Major findings are well detailed in the report (oceanography of near-shore ecosystems; role of freshwater input on biogeochemical processes; pattern, trophic role and physiological rates of key species; Sub-Antarctic/Antarctic connectivity; Biogeography and genetic divergence; Ecophysiology; Structure and function of the benthos; role of illegal human fishing activities in social-ecological systems; salmon farming; and last but not least, territorial uses, marine conservation and indigenous rights). The scientific productivity based on bibliometric criteria has exceeded the goals both in terms of number and impact.

- The *achieved vs. expected numbers of publications per annum*, were 41/33, 41/34, 59/36, 64/38 and 99/38, for years 1, 2, 3 and 4.5 respectively. This indicator reaches therefore twice the expected value in the last year.
- The *number of ISI publications in the top 10%* similarly increased from an achieved vs expected value of 22/14 in year 1 to 51/18 in the last year.
- The *average impact of publications* also increased from an achieved vs expected value of 2.46/2.31 in year 1 to 3.96/2.70 in the last year.

Thus, even if the second half of year 4.5 might be affected by the current sanitary crisis, the objectives are already largely exceeded.

This evolution illustrates the deep positive mutation that the creation of the IDEAL center has triggered in the local scientific community. Not only these scientific outputs reflect the scientific progresses achieved by IDEAL members in their own research lines, but they also illustrate their involvement in high-level international projects, as selected collaborators.

In addition, the profile of journals in which IDEAL members publish their work has evolved, still with important publications in specialized areas such as phycology, fish biology, marine science, etc., which should be sustained, but also with an increase presence in journals of higher impacts and larger audience, such as *Chemosphere*, *Cryosphere*, *J. Biogeogr.*, *Sci. Tot. Environ. Chemosphere*, *Mol. Ecol.*, multiple papers in *Scientific Reports* and highly visible breakthroughs in *Nature Climate Change* (2018), *Nature Communication* (2019) and *Nature Sustainability* (2020).

The past year is also striking in its dynamics, which shows a remarkable acceleration in the gain in quantity and quality of the scientific production of the IDEAL program.

For all these reasons, the evaluation for the scientific achievements is considered OUTSTANDING.

ii. Evaluation



Outstanding



Very Good



Good



Regular



Poor



Not Qualify

2. Educational achievements and impact. Pay attention to integration of research and educational activities, and also in training advanced human resources, participation in PhD Programs.

i. Comments

The IDEAL center has really made a remarkable effort in all possible areas in education,

- from the development of pedagogic activities for local schools in the IDEAL center building in Punta Arenas,
- to the training of national and international undergraduate and graduate (23 MSc and 23 PhD) students, mainly in the programs offered by Universidad Austral de Chile and Universidad de Concepción, and post-docs.

The efforts on undergraduate/Master/PhD training was extremely clear during the mid-term visit, and it is also evidenced by the publication of articles including PhD students (26 articles at year 4.5) and post-docs. It is always possible to criticize some details in the courses, which could be addressed after an on-site visit with in depth analysis of undergraduate or graduate programs, but this is not in the hands of the IDEAL center, who rely on the excellent

programs by two major universities in the south of Chile, and this reflects the constant and necessary evolution of university training.

The creation of the IDEAL center has therefore allowed a blend between Chilean students and young scientists from all over the world, promoting something, which is also difficult to report with indicators: the networking of past and present students and post-docs in the future international scientific community. The managing team of the IDEAL center is not only committed to train students, as detailed in the report, they are also aware of the long-term investment in the dissemination of trained scientists, which is clearly considered as a positive aspect in the report, regarding the follow-up of post-doctoral alumni. I do not know if this could be a recommendation, but the creation of an IDEAL Alumni network might be a step further in the increased integration of the center in the international community in longer term. It is also too early to evaluate how past PhD student succeed once they have completed their degree within the context of the IDEAL center, but this will only be visible after a second 5-year period.

The publication of books and collections of chapters dedicated to Antarctic and Subantarctic regions on all aspects of environment and social sciences are also complementary activities, since they provide a reference material to support education in other universities.

Eventually, the extremely important efforts toward the public, with the dissemination of science to the largest possible local audience, is also considered as part of the educational mission.

For all these reasons, the global score for the Educational achievements and impact is OUTSTANDING.

ii. Evaluation

5

Outstanding

Very Good

Good

Regular

Poor

Not Qualify

3. National and international collaboration achievements. Pay attention to activities that contributed to national and international networking

i. Comments

The insertion in national and international networks can be evidenced by structuring decisions, such as the integration of international contract scientists (post-docs), visits by international collaborators, Memorandum of Understanding agreements (MOUs) with key partners, insertion in international programs, etc., as well as actual collaborative works leading to scientific results and publications. In all these aspects, the IDEAL center has succeeded.

National collaborations stemmed from the initial IDEAL project, when replying to the CONICYT call, and are based on MOUs signed with Universidad de Magallanes (UMAG), Instituto de Fomento Pesquero (IFOP), and effective collaborations with collaboration with



institutions and projects operating in the Magellan region: Instituto Antártico Chileno (INACH); Ministry of Environment, Ministry of Science, Technology, Knowledge and Innovation, COPAS-Sur Austral and INCAR (Universidad de Concepción); Center FONDAP-CR2 and Anillo Antártico on Genomics Antarctic Biodiversity (Universidad de Chile), Anthropological Museum Martín Gusinde, and NGOs such as the Wildlife Conservation Society (WCS), Citizen Platform for Energy Transition of Magallanes, Kauyekén Foundation.

Insertion in the national landscape is also evidenced by the training of students from other regions, via the undergraduate and graduate programs of Universidad Austral de Chile and Universidad de Concepción.

The support letter by Dr Gustavo A. Ferrera, from the Ministry of Sciences, Technology and Innovation, not only highlight the strong support from CADIC-CONICET, it also illustrates the strong national visibility of the IDEAL center.

It seems that the initial IDEAL program was well inserted in National networks based on publications in year 1. Over the time, the importance of international collaborations in published works increased regularly.

International cooperation is based on MOUs signed with partners such as Alfred Wegener Institute (AWI, Germany), Centro Austral de Investigaciones Científicas (CADIC, Argentina), Korea Polar Research Institute (KOPRI, Korea), while others are yet to be formalised, such as Leibniz-Institute and Trier University (Germany), Japan Agency for Marine-Earth Science and Technology (JAMSTEC, Japan), SCRIPPS-Institution of Oceanography (USA), Ghent University (Belgium) and Stazione Zoologica Anton Dohrn (Italy). Collaborations were also strengthened with CNRS-Banyuls sur Mer and Roscoff (France); Lamont Doherty Earth Observatory, Scripps Institute of Oceanography, Colgate and Montana Universities (USA), Bristol University and British Antarctic Survey (BAS, UK), National University of Ireland Galway (Ireland), Australian National University and Australian Antarctic Division (Australia), University Milano-Bicocca (Italy), and University of Tartu (Estonia).

IDEAL Center scientists joined international expeditions, e.g. RV "Polarstern" (AWI, Germany), RV "Mirai" (JAMSTEC, Japan), RV "Kronprins Haakon" (Norway), RV "Araon" (KOPRI, Korea), RRS James Clark Ross (BAS, UK) in association with NERC ICEBERGS & ORCHESTRA projects. IDEAL is also a scientific-partner in projects funded by the BMBF, in Germany, via the program "DynAMo" - Beagle Channel Observatory, and an Horizon 2020 Program of the European Union "CoastCarb".

It must be noted that the IDEAL was involved in BINACIONAL, a Chile-Argentina Marine Sciences Collaboration, to promote a systematic and collaborative approach to collecting information on the state and variability of the Beagle Channel and Antarctic seas.

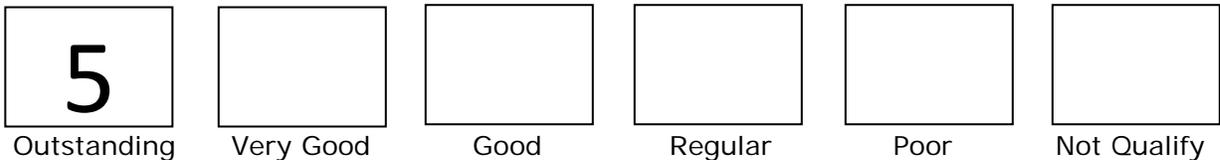
Foreign post-docs could contribute to the program. Key scientists from international institutions also visited the IDEAL center for long periods, including Eileen Hofmann (Old Dominion University-USA; 2019-2020), SangHoon Lee (KOPRI-Korea, 2019-2020), and Doris Abele (AWI-Germany, 2020).

Support letters by Pr. Hans-O. Pörtner, head of the AWI Integrative Ecophysiology, Germany; Pr. Jahn Petter Johnsen, Norwegian College of Fishery Sciences, Norway; Dr Federico P. Brandini, Oceanographic Inst. of Sao Paulo Univ., Brasil, also evidence the consideration of the IDEAL center as a key international player.

Eventually, the strongest indicator of this increasing presence of IDEAL in the international landscape is the achieved vs. expected number of joint publications with international institutions or research centers, per annum, which has progressed from 20/18 to 55/24, exceeding prediction by a factor 2.

For all these reasons, the IDEAL Center has emerged as a key excellence center in the national and international landscape, and the 5-year evaluation is therefore OUTSTANDING.

ii. Evaluation



4. Outreach Achievements. Pay special attention to those activities that tied the Center with the external community such as elementary or high schools, institutions, companies, among others.

i. Comments

The Outreach strategy has always been a clear asset of the IDEAL program. It has regularly been evaluated high in past evaluations performed in the course of the program, considered as difficult to connect with the environmental science research lines. The managing team has succeeded to clarify this mission, and strengthen its integration in the overall program.

The list of actions to disseminate science to elementary and high schools, large audience, etc, is simply extremely impressive. The supporting pedagogic materials, books, large audience publications, active participation to media broadcasts, press release, animation of social media, involvement of IDEAL scientists, is really impressive. It could be considered as running in many directions, but a strategic line has been clarified over the time. In this aspect, specific digital services were designed to facilitate interactions with the public ("Dondelaviste?", "STARM", "Sea level simulator" and "Global warming in Antarctica").

I will not list all these actions given in the report, but the fact a delegation from IDEAL participated in roundtables, talks and workshops during the UN Climate Change Conference (COP25) in Madrid in 2019 is actually an example of the relevance of this center in the social and societal discussions in the current context of Climate Change and necessary actions policy makers should promote. The IDEAL center was invited to join the Scientific Committee of COP25 and the director was appointed as coordinator of the cryosphere/Antarctic panel and joined two scientific advisory boards, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), and the Scientific Advisory Committee of the Ministry of Science, Technology, Knowledge and Innovation. These international responsibilities might strengthen the incidence on decision-making.

For all these reasons, the commitment of the IDEAL Center to reach such outreach achievements is considered OUTSTANDING.

ii. Evaluation

5					
Outstanding	Very Good	Good	Regular	Poor	Not Qualify

5. Contribution to public policies. Pay special attention to the impact of the FONDAP Center in terms of contribution to public policies and to the development of other targeted groups.

i. Comments

The contribution to public policies is probably one of the most difficult task for an Excellence Research Center, as it depends on the willingness of external bodies to participate and consider possible advises. It depends therefore

- on the capacity for such external bodies to define properly a question, and request formerly an advice;
- on the capacity of the Excellence Center to provide arguments or elements to help deciding.

The recent sanitary crisis has illustrated the difficulty of this task. One the one hand the pace of science is slow, with uncertainties and necessary reorientation of directions based on science advancement, whereas on the other hand, policy makers need clear-cut visions to assume short to mid term decisions. Thus, a contribution to public policies cannot be evaluated uniquely on the activity of the Research Center per se.

On this aspect, the IDEAL center clarified which actions could be realistic and efficient, and this is one of the major achievements we can consider today, with an investment on ocean climate change; fisheries management; aquaculture management; iv) nature conservation; and territorial claims. All these actions are now mature, absolutely relevant, and integrated in the complete program. The strongest interactions is with public decision makers. In such interactions, the success of the efficient discussion and advice with a partner does not depend solely on the IDEAL center, but also on the willingness of the partner to consider the benefits of this interaction. We can consider that the IDEAL center is really committed to this mission. The reputation gained by the IDEAL center, recognized by their implication in the COP25 and with support from the Ministry of Research should help strengthening this role further in the future.

Since it is extremely difficult to address this criterion without knowing the willingness of external bodies to interrogate or respond to an advisory Research center, it is only possible to evaluate the commitment of the IDEAL center based on documented activities. An on-site visit would definitely help clarify this point. This criterion is therefore evaluated as OUTSTANDING.

ii. Evaluation

4.5					
Outstanding	Very Good	Good	Regular	Poor	Not Qualify

IV. RESPONSE TO SUGGESTIONS FROM PREVIOUS EVALUATIONS

Please comment and evaluate the response to the suggestions and observations provided by the panel of experts in previous evaluation reports.

i. Comments

The capacity of the managing team to apprehend the comments, consider them seriously, reformulate them and try to translate them into correcting actions makes the evaluation of the IDEAL extremely stimulating. It seems it has also helped the managing team to stimulate the strong mutation of all existing members in the initial program, who have really put important efforts in reevaluating their research objects and key species, increase the level on integration, raising their ambitions (year 1); continue integration efforts and clarify and reinforce international collaborations (year 2) and contextualize emerging research themes (year 3).

The report summarizes the answers provided to the evaluation panel and to the advisory board, often converging, and efforts to respond have always been serious and realistic. It is not easy to accept an external advice, and such advice should also be evaluated to check its actual relevance. Given the constant willingness of the IDEAL Center to consider these comments, and the present success, this criterion is evaluated as OUTSTANDING.

ii. Evaluation

5

Outstanding

Very Good

Good

Regular

Poor

Not Qualify

V. OTHER RELEVANT ASPECTS

If the Center report does not contain information on other relevant aspects, please indicate so in your evaluation.

i. Comments

What has been achieved, which could not be reachable without the creation of the IDEAL Center? Reminiscent to this initial question, the creation of the IDEAL center has highlighted difficult and time-consuming challenges during the first phase, including the integration among the RPs and between RPs and some of the local scientific institutions, the integration between the natural and social sciences, and the data acquisition from coastal and oceanic regions required to feed ecological, oceanographic and climate models. All these have been extensively discussed in the previous sections.

The managing team reports other achievements, which are also key assets for the future of the center:

- the development of large scale studies;
- the setting of equipped experimental research facilities including the research center in Punta Arenas and mooring systems for long term surveys in the Magallanes region;

- a clearer view of the limited data from public sectors, which helps defining objectives for the future;
- a clearer vision of the necessity to strengthen multidisciplinary and emerging skills;
- a clearer view of the limited capacities for knowledge exchange.

These analytical aspects provided in addition by the managing team illustrate their maturity and capacity to step back and identify critical issues for future improvements. I think these issues are extremely well identified and should serve to define objectives.

These other comments highlight therefore additional strength and potential for future activities, and are therefore evaluated as OUTSTANDING.

ii. Evaluation (this part was missing in the template: I added it).

5					
Outstanding	Very Good	Good	Regular	Poor	Not Qualify

VI. CENTER PROJECTIONS

Please comment about the center projections after the 5 - year FONDAP grant. If the Center report does not contain information on the Center projections, please indicate so in your evaluation.

i. Comments

The program designed in this report capitalizes on past experience, in particular aiming at pursuing disciplinary integrative efforts, which have been key in raising significantly the scientific productivity and level, and address with more maturity and strength the role in science policy bridging.

The proposed structure updates the program in three core themes:

- Global change and connectivity between the Antarctic and Sub-Antarctic systems;
- Social-scientific interface and governance
- Emerging issues in a changing ocean.

These major themes are clear and relevant.

They will be transversal themes under which 4 RPs will be interconnected. These 4 RPs are designed based on lessons learned from the organization of the initial program in 5 RPs, with the right decision to merge previous RPs 1 and 2. The creation of the center five years ago was faced with the necessity to break with an obsolete disciplinary approach: the work has been done and the redesign is now based on a multi-disciplinary projection to address environmental questions with multi-scale and multi-disciplinary approaches. The new proposed RPs are:

- RP1 Plankton ecology and ocean productivity;
- RP2 Ecophysiology of aquatic organisms;
- RP3 Ecology of benthos;
- RP4 Socio-ecological and policy-science interfaces.

It will be needed to refine the content of each RP in more detail. At this stage we need to assume that the continuation will be performed with the same level of commitment, ambition, concern for integrative and multidisciplinary strategies, involvement into international networks. The comments provided in the previous section (other relevant aspects) show that the managing team is conscious of challenges to implement in the second term:

- the necessity to strengthen multidisciplinary and emerging skills;
- the continuation of large scale studies;
- the consolidation and development of equipped experimental research facilities including the research center in Punta Arenas and mooring systems for long term surveys in the Magallanes region;
- addressing the limited data from public sectors and the limited capacities for knowledge exchange.

Taking all this together, and independently of a more detailed analysis of the objectives per RPs, the proposed design for a projection of the IDEAL is evaluated extremely convincing and OUTSTANDING.

ii. Evaluation (this part was missing in the template: I added it).

5

Outstanding

Very Good

Good

Regular

Poor

Not Qualify

VII. INSTITUTIONAL COMMITMENTS

Please comment about the facilities available to the Center, the commitment of the administration of the leading and partner institutions to the Center, and the commitment of the partner institutions to achieve the Center goals.

i. Comments

It seems the IDEAL center has always been well supported by its institutional partners and by CONICYT. The outreach activities also evidence an impressive list of actions at the regional level, who could not be achievable without a support from local authorities.

In addition, as an international adviser, I am not fully familiar with the evolution of CONICYT. From my understanding, the support letter by Dr Gustavo A. Ferrera, from the Ministry of Sciences, Technology and Innovation, highlights the strong support from CADIC-CONICET.

Based on these elements, the institutional commitments are evaluated as OUTSTANDING.

ii. Evaluation

5

Outstanding

Very Good

Good

Regular

Poor

Not Qualify

VII. ADVISORY COMMITTEE

Please comment about the commitment of the advisory committee, and its contribution to the Center development.

i. Comments

The members of the Advisory Committee are reference scientists with international recognition and know very well the scientific activities performed in the IDEAL center.

It is clear that the Advisory committee has regularly and seriously analyzed the activities and progresses of the IDEAL center. They have often expressed critics shared with the evaluation committee. Their advises have also helped on the selection of actions such as developing moors, and on the insertion of the IDEAL center in the international network. They have been key in the positive evolution of this Center.

For all these reasons the Advisory Committee is evaluated as OUTSTANDING.

ii. Evaluation

5					
Outstanding	Very Good	Good	Regular	Poor	Not Qualify

IX. FINAL OVERALL COMMENTS AND RECOMMENDATIONS

Please provide a final overall and recommendations for the Center. Include here aspects that were not covered in the previous sections, which you consider significant for the Center.

i. Comments

The 5-year report is extremely clear and impressive.

The IDEAL center has achieved a deep mutation, and I think all members are aware of this. The five past years have helped maturing the program, gaining in coherence, integration, ambition, with objectives exceeding expectation. The center is now mature, with clearer views on challenges, objectives, strengths. Scientific production has increased in quantity and quality, being now of world calls, and inserted in international networks. IDEAL members are dynamic and enthusiastic in ensuring their missions in education, outreach to public, advice to policy makers and stakeholders. Their vision is now indispensable to understand the links between climate change effects in the Antarctic and Sub-Antarctic systems, anthropic activities, the evolution of environments and ecosystems, etc.

As a summary of all the previous comments, the global evaluation is clearly OUTSTANDING.

The plan proposed for the future is convincing in the main lines.

My recommendations are minor. They mainly focus on maintaining this level of requirement in integrating scientific lines, further clarify the major objectives in each RPs, identify the missing disciplines requested for the multidisciplinary strategies identified as challenging in this report.

ii. Evaluation

5					
Outstanding	Very Good	Good	Regular	Poor	Not Qualify

**NATIONAL PROGRAM FOR RESEARCH CENTERS OF EXCELLENCE
(FONDAP)**

FIRST PERIOD EVALUATION REPORT

This form is intended to facilitate your work as a referee and standardize the evaluation reports. Each topic should be evaluated with concepts ranging from "Excellent" to "Does Not Qualify". Please indicate your qualification for each criterion in a scale between 0 to 5 points (half points are also allowed). Each qualification must be properly supported with relevant comments.

Grading scale:

0 = Does Not Qualify	The proposal fails to meet/address the criterion under analysis or cannot be evaluated due to missing or incomplete information.
1 = Poor	The proposal does not properly meet/address the aspects of the criterion or there are serious inherent deficiencies.
2 = Fair	The proposal broadly meets/addresses the aspects of the criterion, but there are important deficiencies.
3 = Good	The proposal properly meets/addresses the aspects of the criterion, although some improvements are required.
4 = Very Good	The proposal meets/addresses the aspects of the criterion very well, although some improvements are still possible.
5 = Outstanding	The proposal successfully meets/addresses all the aspects of the criterion. Any shortcomings are minor.

If the Center report does not contain information on the given topic, please indicate so in your evaluation.

Your final overall comments and recommendations are an important part of the review process.


I. PROJECT INFORMATION

CENTER'S NAME: DYNAMICS OF HIGH LATITUDE MARINE
ECOSYSTEMS (IDEAL)

DIRECTOR: Dr. HUMBERTO E. GONZALEZ ESTAY

II. EVALUATION PANEL

REFEREE NAME	ORGANIZATION/ INSTITUTION	E - MAIL	SIGNATURE
Reviewer 3			

III. CENTER ACHIEVEMENTS

1. Scientific achievements and their impacts to local, national and international community.

i. Comments

Chile is in a unique position globally in being the only country to have a continuous coastline that stretches from tropical to sub-polar latitudes. It is also the country that has the nearest continental land to Antarctica. IDEAL is the first attempt that I am aware of that has been designed specifically to use and exploit the benefits of this singular set of geographical circumstances. The programme devised for IDEAL not only exploited this geographical opportunity, but it was innovative in trying to do high quality environmental, ecological, biodiversity and functional research comparisons from polar to southern temperate sites. It was further innovative in its ambition to link across diverse disciplines and use detailed research outputs to both inform socio-economic and other societal needs, but then to integrate the disciplines to inform future research. In all these aspects IDEAL needs to be commended for its ambition, vision, and progressive approach. In its first 5 years of its programme of science it has been excellent in all major aspects of the designated areas and themes of its research. In many areas it has been outstanding, especially given the starting position that was based on very high ideals and aims. There are now opportunities to build on this body of work to make the centre achieve some of its initial aims to a greater extent and to make it world leading in some ways. In more detail for specific aspects:

Science outputs and impact:

There are 5 PIs, 19 Associated established researchers and 8 other science staff in the IDEAL centre. Across the 5 years of the programme this group has produced 304 publications in ISI internationally recognized journals. This compares with 179 expected publications at the start. Furthermore publication numbers have increased significantly year on year such that in the final year nearly 3 times as many papers were published as expected. An increase in numbers of papers produced across a 5 years programme is normal, especially one like IDEAL that was so novel in its conception and was not based on a previously functioning group of researchers, as most such centres or programmes are. However, the increase is larger than I would have expected and shows the commitment to publish and make findings available to the science community and also that the research has progressively born more fruit with time. Journal impact factors have also risen across the 5 year period showing the competitiveness of research done is increasing with time, which is good. Finally papers written as collaborations between RPs increased over the 5 year programme. However, the collaborative papers stayed the same as a proportion of total papers and so the increase was a function of the increase in total paper production. It would have been good to see the proportion of collaborative papers increase towards the end of the 5 year period to show integrative aspects were becoming a larger part of the centres work. Overall the productivity has been excellent

Science quality:

IDEAL has 5 research programmes (RP): Marine Productivity in a Changing Ocean; Physiological Capabilities of Marine Species; Comparative Structure and Function of Plankton; Comparative Structure and Function of Benthos; Marine Socio-Ecological Systems, Ecosystem Services, and Human Wellbeing. In each of these programme areas IDEAL has produced high quality science, some with international leadership. These include: a)



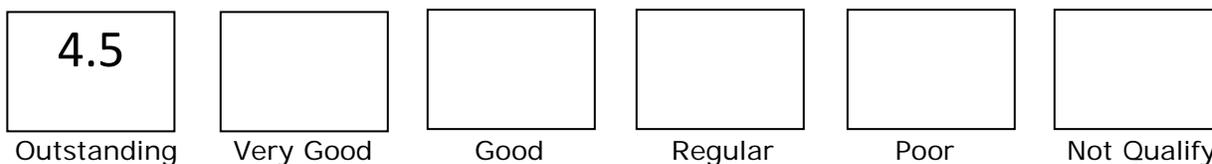
research on impacts of freshening in fiordic systems, and the contrast between ANT and SANT regions; b) the importance of giant kelps as ecosystem engineers; c) variations in carbon flux due to seasonal changes in biology; d) variations in river input due to droughts and predictions of future changes in riverine input; e) that genetic separation on ANT and SANT marine species occurred long after the physical separation of the continents; f) low thermal tolerances of Antarctic marine species; g) identifying juvenile mussels as non-indigenous invaders in Antarctica; h) an emphasis on coastal processes is excellent as is the start to assess links between coastal and offshore systems; i) building platforms (moorings etc) to initiate long-term monitoring in key sites; j) tracing organic material advection and using POC and krill absorption efficiencies to estimate faecal pellet production; k) Identifying the role of iron released from glaciers in stimulating phytoplankton blooms; l) linking kelp beds to king crab nurseries and the effects of sedimentation on kelp distributions; m) that algal rafts may be important in assisting non-native species travel to Antarctica; n) benefits and negative impacts of salmon farming in different contexts; o) impacts of changes in fisheries and aquaculture on artisanal and indigenous practices and needs; p) relating soft seabed dynamics and capacity to remediate pollutants.

Overall there have been several excellent achievements in science quality and productivity for a centre of this type and scale. There are things that could have been improved but the outputs are significantly better than could have been expected at the start

The initial scientific plan included three phases: i) the generation of the framework and organization of activities such as cruises, observation systems, field and laboratory studies, and international networking; ii) the development of excellence in natural and social sciences; and iii) the channelling of results into societal benefits including “integrated” knowledge transfer and information of value to decision-makers. This plan was followed generally well or very well. Phase 1 was completed rapidly and the research activities put into place and executed well. There are now some very good facilities in the centre, and cruises etc were completed well and efficiently. Phase 2 likewise did well and has shown its value later on in the 5 year programme, it has much promise for the future now that expertise has been developed in the complementary areas. However, the future programme would benefit from more effort in linking the natural and social sciences, and possibly even creating one or two positions specifically working across the disciplines, and being based 50% in two discipline groups, one in natural sciences and one in social sciences to make the cross transfer stronger. Phase 3 has also been carried out well. This aspect of the programme is one of the most novel approaches taken and was the hardest to achieve results. It therefore started more slowly than the others, but the value of this approach has been well demonstrated and promises to produce excellent outcomes for Chile not achieved by other countries. I particularly liked the drive to integrate and link closely research that is traditionally viewed as more applied with the blue skies or knowledge focussed outputs. The integration of science across the programme needs more emphasis in future and it needs to be done on an interactive dialogue basis

Overall this programme and centre has performed at the very good or outstanding level across its range of RPs and has attempted to tackle some very challenging problems in novel ways. The overall score is 4.5

ii. Evaluation



2. Educational achievements and impact. Pay attention to integration of research and educational activities, and also in training advanced human resources, participation in PhD Programs.

i. Comments

There are two main elements to the work carried out by IDEAL in this area. These are an active involvement in training early career researchers and their efforts to use modern methods as well as standard ways of knowledge exchange. In the first area the centre's efforts are primarily directed and supported through several universities, but primarily the Universidad Austral de Chile, Universidad de Concepcion, the Universidad de Magallanes, Universidad de la Santisima Concepcion and the Universidad de Los Lagos. 19 undergraduate students, 23 masters students, and 23 PhD students were involved in IDEAL research activities over the 5 years. These are generally good numbers, especially for PhD students, but given the links to 5 universities and the total number of staff in IDEAL it should be possible to host more than 4 undergraduate projects per year. One in each RP per year should be possible, which would give 25 undergraduates. It would also have been good to have a small description in the report of the level of involvement, or examples of, the types of projects conducted by undergraduates. Are they involved in active centre research or adding value with projects not part of the core IDEAL remit, but aligned.

I liked the extra support that IDEAL gave (from UACH) to its Phd students in terms of funding to attend congress and workshops, for research consumables and field activities. I further liked the efforts put in to provide access to foreign centres of excellence for PhD students to obtain training and also spend periods conducting research. Making contacts of this type and arranging visits can be time consuming and onerous and the level of support here for early career researchers is excellent. Overall, the level of student activity and support is very good.

There was significant activity by IDEAL members to gain impact via social media, standard press outlets and websites. Efforts here were very good. The website is well constructed and I find it generally easy to get information I want from it. This is combined with daily updated content on Facebook, Twitter and YouTube, where IDEAL has over 7000 followers is an excellent effort. For a relatively small centre the efforts here, as well as producing press releases and engaging actively with the press, radio and TV media was done to a high standard. Especially impressive was the outreach to foreign media such as the financial times and the BBC, and the articles in National Geographic deserve a special mention. This is all very well done

ii. Evaluation

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outstanding	Very Good	Good	Regular	Poor	Not Qualify

3. National and international collaboration achievements. Pay attention to activities that contributed to national and international networking

i. Comments

IDEAL has done really well here. Collaborations, both within Chile and internationally have been one of the centre's strengths. The student projects and masters and PhD students are all collaborations with universities, as are the placements with foreign centres and universities. It is also clear that IDEAL has formed strong formal links with both national bodies shown by the agreement with the University of the Magellanes and the MOU with the Instituto de Fomento Pesquero. The MOU with IFOP is especially important because it has facilitated research central to the long-term aims of IDEAL and also to its future success in providing infrastructure and support for long-term monitoring which is key to understanding both the progress of and impacts of change. Making this link provides a strong base on which to build in the future from monthly environmental measures. It also provides support for a range of research activities across several aspects of IDEAL's portfolio.

The report also listed 12 or so collaborators focused on the Magellanic region, which is right and appropriate and a good number to be working with, and the Magellanic focus is also good. However, it would have been good to see more direct evidence of collaboration with Chilean centres and universities on the Antarctic side of IDEALs research, but maybe this information is dispersed elsewhere in the report.

International collaborations have clearly been pursued strongly by the IDEAL leadership, and this has been a strength, as noted above for the training of early career scientists. MOUs with around 10 well recognized international bodies is testament to this effort, especially leading centres in polar research such as AWI, CADIC and KOPRI. The strong collaborative links with others such as the Lamont Doherty lab, the British Antarctic Survey and Roscoff amongst several others shows the importance placed on international collaboration. This has helped the centre build an international reputation and to become recognized globally as a progressively more influential and important contributor to understanding Antarctic and subAntarctic environments and ecosystems and their societal value/impacts. Special mention here is needed for the work IDEAL staff have put into the Beagle Channel observatory, into glacier melt impacts through CoastCarb, and into programmes such as SOOS. Chile's profiles and input internationally in this area has risen very strongly in the last 5 years because of IDEAL, and the centre has been impressive in this respect.

ii. Evaluation

Outstanding

Very Good

Good

Regular

Poor

Not Qualify

4. Outreach Achievements. Pay special attention to those activities that tied the Center with the external community such as elementary or high schools, institutions, companies, among others.

i. Comments

The report outlines a significant and well structured approach to outreach, especially to schools. There is evidence of a clear and well thought out plan from the early stages of the 5 year programme that is commendable. The programme consisted of regional, national and international aspects that have all been productive. Some of this success has been noted in the previous section as outputs like the contribution to e.g. National Geographic and other international outlets overlap the two sections.

The centre has distinct advantages over most other organisations in being situated in a region with global significance for identifying climate change impacts and having a science focus with similarly high levels of importance, notably Patagonia and Antarctica. IDEAL has exploited this advantage well by making research outcomes and science results widely available to both scientific and non-science audiences, and the non-science audiences have been from a wide range of sectors of society. The centre has made fiordic environments and Antarctic/subAntarctic change and change impacts widely acknowledged subjects in Chile and more widely. That material from IDEAL was circulated in 15 countries and reached 46 million people is an excellent achievement. Further impressive recognition was that the centre director was appointed as coordinator of the "Cryosphere-Antarctic" scientific advisory group that was part of the COP25 National Scientific Committee in 2019.

Efforts with schools have been productive and of special note was the Antarctic schools fair which IDEAL helped organized for the last 4 years. There was also a series of informal talks and several books aimed at the non-scientist, one of which was aimed specifically at primary school children. It might have been possible to do more, such as more science talks in schools or to school groups, but what has been done is very good.

The website and social media achievements noted in the previous section are also relevant here as they contribute to both sections. As noted in the previous section these were excellent achievements

ii. Evaluation

Outstanding

4

Very Good

Good

Regular

Poor

Not Qualify



5. Contribution to public policies. Pay special attention to the impact of the FONDAP Center in terms of contribution to public policies and to the development of other targeted groups.

i. Comments

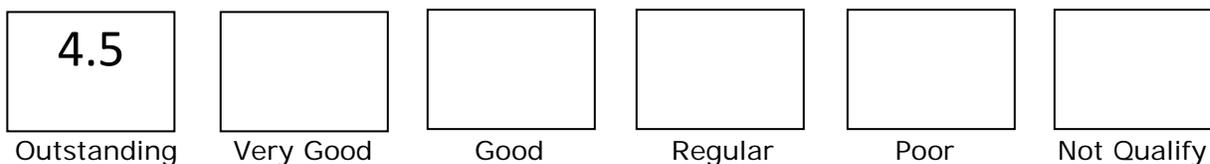
IDEAL has been really impressive in this section of its work. A major reason for this was to have a programme on Marine Socio-Ecological Systems, Ecosystem Services, and Human Wellbeing, RP5 that specifically addressed social aspects and links between environment, ecology, ecosystem services and societal factors such as industry, tourism, conservation and indigenous impacts and needs. Including this as strongly as it did was fundamental to the success in this part of the centres work. I particularly liked the work linking direct interviews with ethnography research and GIS systems in RP5. The integration of more pure science with applied science and societal requirement needs to be emphasized even more strongly in any future work.

The centre should be commended for its clear thinking in how to address this area of its work. There was a clear and well laid out plan and approach with 6 aspects from identifying the decision making space they wanted to influence, through aspects such as understanding processes, identifying stakeholders and identifying stakeholder needs to reorganizing research and efforts to better meet those needs. This was an excellent approach.

Obvious direct benefits from the regional to national have been gained from the centre's work on environmental change effects on e.g. artisanal fisheries and related industry. Linking this to impacts on indigenous peoples from the changes in larger fisheries and industry and making the drivers of those impacts clear is a very nice piece of work and of value across larger sectors of societal interest. The second example of research into the environmental and societal impacts of aquaculture, especially salmon farming is also impressive. The ability now to identify better or optimal sites for future aquaculture ventures is a highly significant step forwards and to the centre's credit. The past history section of research has further elucidated the sources of current pressures and impacts on communities and environments and given improved understanding of, and therefore ability to address, those issues. All of this has fed into better abilities to implement relevant conservation measures, better balancing of exploitation and ecosystem services and resilience, and it has also fed information that should lead into better governance, although it is not clear from the report if better governance measures has as yet been implemented.

Direct advice to policymakers came from 3 reports, one on ecosystem services and marine protected areas, a second on coastal ecosystem services on the Magellanic region and Antarctica and a third on global change impacts on the Magallanes and Chilean Antarctic regions. The third was extensive and in 6 chapters and provided a large volume of relevant information. It is hard to see how the Chilean government could obtain the information it needs to make good decisions on environments, conservation, industry, society, communities and services in a changing environments in the regions covered by IDEAL without high quality science across those sectors. The centre is clearly providing relevant information for policy makers not available through other avenues. It is providing great value in this context. It should be noted that the reports for policymakers were provided in 2019, 3 years into the programme for IDEAL. This is consistent with a new centre being constructed and the time needed to do research, obtain information and synthesise it into the outputs that are needed by government and other stakeholders. In future such reports should be more regularly produced, and across more aspects of IDEAL's portfolio

ii. Evaluation



IV. RESPONSE TO SUGGESTIONS FROM PREVIOUS EVALUATIONS

Please comment and evaluate the response to the suggestions and observations provided by the panel of experts in previous evaluation reports.

i. Comments

An excellent approach was implemented from the start of the programme for obtaining regular input from the panel of experts and then responding to that input and then reformulating activities appropriately. At the start advice and input was taken from a very strong team of international leaders in relevant science areas. There were then annual meetings of a subsection of these experts with input from other globally recognized scientists.

There was advice at the start from this group that IDEAL should emphasise what the centre brings or provides that is not possible without it. There are clear areas where the centre has done that, some noted in the previous section. There was also early advice that the centre should implement a problem-oriented approach, which it did, and this was excellent.

There are some good examples of where advice from the expert panel was obtained and acted upon to change direction of the work done. In early meetings of the advisory panel advice was given to align research programmes under overarching themes to give more commonality of approach and better outcomes. This was clearly taken on board from the layout of the final report with its cross cutting themes. There was also advice that more interdisciplinary hypotheses should be erected and addressed and again there is evidence that this was acted on. The changes made here were good, but this part of the centre's work needs even more emphasis and integration in future, as there would be greater benefits from more integration and interdisciplinary approaches in future. It might be good to have scientists working in more than one team with time allocated specifically to promulgate and drive research between teams. This could be especially beneficial for improving research into benthic-pelagic links and interactions; on coastal to offshore processes and dependencies; on data gathering and use in models and on linking environment-biodiversity-society linkages and dependencies.

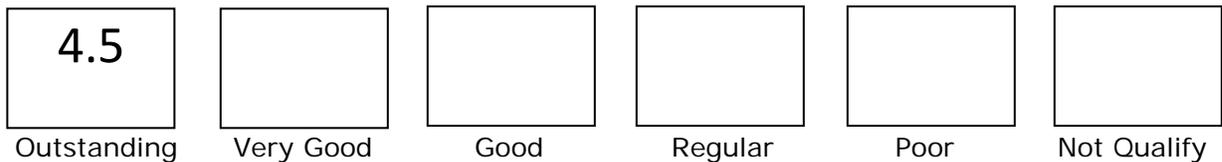
Further examples of where IDEAL responded well to advice were in the reorganization of RP2 where a new framework was devised and implemented which improved impact and integration with the other RPs, and where the panel thought more international collaboration would be beneficial. There was also advice in year 3 that better engagement with end users

would be beneficial. The outcomes of that response were noted in the previous section and were done well, and great flexibility was demonstrated in the actions taken in the responses.

Some advice still needs to be acted on fully, including the need for better engagement on emergent topics, especially on cryosphere impacts on coastal processes and contaminants. These requirements should be addressed in future IDEAL research

Overall the input from the expert panel was designed and implemented well and responses were generally excellent.

ii. Evaluation



V. OTHER RELEVANT ASPECTS

If the Center report does not contain information on other relevant aspects, please indicate so in your evaluation.

i. Comments

Given the initial remit for the centre and the constraints at the start in terms of available resources and personnel there is little extra that could be done of relevance. To do better would require larger infrastructure, especially in Antarctica where a high quality aquarium and experimental facility would be of great benefit and also in Patagonia where a significantly larger array of moorings and other monitoring equipment would allow more spatial resolution, and a focus and rapid data accumulation on societally relevant issues such as those from intensified aquaculture and coastal fishing.

Points that should be noted here are that IDEAL developed new research areas and closed some previous avenues. Science paper productivity and quality markedly improved and there was an emphasis on new interdisciplinary research. All of these were successful to a good extent, but could be even better in future and need emphasis in the next phase.

The team noted 3 areas that they identify as in need of attention: (a) integration among the RPs and between RPs and some of the local scientific institutions, (b) integration between the natural and social sciences, and (c) data acquisition from coastal and oceanic regions required to feed ecological, oceanographic and climate models.

The team also noted 6 areas where there are constraints that need addressing or where future efforts need to be focussed. These are:

1. Large-scale studies where there is an imperative to test impacts at the regional and wider level of interactions among a wide range of fluctuating environmental



variables. There is an over-reliance on international collaborations to provide the necessary data in this area. An emphasis on coastal/oceanic interactions is seen as imperative

2. A lack of experimental research facilities is limiting in some areas, as noted above, especially in Antarctica and for monitoring of environments.
3. Data from public sources is limited and difficult to obtain and a need to integrate local indigenous knowledge with direct environmental and ecological data gathering is seen as priority
4. Improved multidisciplinary training for early career researchers is identified as a priority and as currently limiting abilities to address wide scale problems from the environment and for environment/societal interactions. The plan is to encourage universities to provide wider discipline oriented courses. This includes an emphasis on new technologies such as genomics, metagenomics and bioinformatics, and also on the inclusion of social scientists in marine projects from inception to completion.
5. They highlight the limited capacity there is for knowledge exchange and the problems of discipline based reporting of progress. IDEAL plans to dedicate a researcher specifically to work on this problem

I fully endorse these points that the IDEAL team have identified. I especially think that linking coastal and offshore processes is important, as is the lack of facilities and the need to make data and advice much more accessible and available across wider societal sectors. Improving use and access of novel and emerging technologies will need closer links to recognised international groups working in this area of science in high latitude systems, at least initially.

VI. CENTER PROJECTIONS

Please comment about the center projections after the 5 - year FONDAP grant. If the Center report does not contain information on the Center projections, please indicate so in your evaluation.

i. Comments

The plans laid out in the report for future projections are well conceived and in some areas exciting. The overall aim is to deepen knowledge of high latitude systems and environments, to inform and improve governance of environments, societal systems and their interactions and hence solve or provide better advice on local and regional issues. The model proposed is a socio-ecological one that is novel in its conception and direction. It is to the fore internationally in the way it aims to integrate across boundaries to provide better outcomes.

There is a need to better integrate research programmes and continue the integration already initiated but at a stronger level. This is especially so for linking social and natural science research and linking both of these with long-term data.

The actions proposed are: improved discussions across IDEAL with open debate and anonymous questionnaires; and frank open interactions with the advisory and review panels.

These aims and plans are excellent, but also need augmenting with better interaction and integration of feedback from stakeholders. This process has been initiated and implemented well to date but needs further efforts.

I liked the aim of merging RP1 and RP3 and thought that could bring strong new synergies and efficiency of management. I also liked the aim to create a new group working on modelling and transference to improve co-ordination and integration. This latter group should be managed across different research programmes so that it is comprised with researchers working in different disciplines and different research environments.

I like the future research themes of: Global change and connectivity in the Antarctic and subAntarctic, on the socio-scientific interface and governance; and on emerging issues in a changing ocean. These are timely and current in focus.

Overall IDEAL has accomplished much and has moved Chile into a world recognized position in high latitude environmental and climate change research. It has performed well and has a large body of work. It will not be easy to maintain the activities to date and to build on them the way they hope, but the plans are good and if achieved would be of great value regionally, nationally and to a very wide range of stakeholders.

VII. INSTITUTIONAL COMMITMENTS

Please comment about the facilities available to the Center, the commitment of the administration of the leading and partner institutions to the Center, and the commitment of the partner institutions to achieve the Center goals.

i. Comments

IDEAL gets extensive support from the Universidad Austral de Chile (UACH) in both financial and infrastructure terms. The main aspect of this is by paying salaries of PIs and contributing to the running costs for research and funds to attend meetings. It provides the HQ in Punta Arenas and offices in Valdivia. It further supports PhD scholarships. UACH is committed to phase 2 of this project.

There are strong commitments to early career researchers and tries to include them in many aspects of IDEAL's remit including the integration programme.

The senior leaders of IDEAL worked well and hard to design an excellent strategy from the start and to then drive it through to producing very good to excellent outcomes. This involved skill and effort with both national partners and international partners. The leadership especially worked effectively with international partners to obtain the necessary data. They further did well with national partners, especially on regional specific issues such as aquaculture, environmental degradation and conservation, indigenous issues and information exchange with stakeholders. The leadership has performed well and been well supported by the administration.

There have been issues and difficulties with facilities that have required much effort from the IDEAL team to obtain good data and the necessary outcomes. UACH has provided excellent base support for the centre, but for IDEAL to improve again, and to provide solutions for the pressing societal issues that exist alongside becoming a key global player in high latitude environmental science in the context of change it needs to improve facilities in some key areas. These are especially aquarium and experimental facilities in Antarctica and a greater network of environmental monitoring equipment such as moorings. Improved modelling capabilities would also enhance IDEAL's research and outcomes. The capacity to work year round and gather more data and do experimental work across both Antarctic and subantarctic systems is also necessary to get a holistic understanding of the processes involved. Many key elements of environmental change and its impacts are in winter.

Overall the leadership and basic support have been excellent. The links to partners have been pursued well. The main area that needs improvement is in facilities for gathering data.

ii. Evaluation

	4				
Outstanding	Very Good	Good	Regular	Poor	Not Qualify

VII. ADVISORY COMMITTEE

Please comment about the commitment of the advisory committee, and its contribution to the Center development.

i. Comments

There were two advisory committees, one national the other international. The national committee comprised a range of key administrators, decision makers and influencers from regional and national governance and funding bodies. The strong outcomes from IDEAL in terms of identification and progress with regional societal issues and conflicts between industry, environment and socio-ecological problems shows that this advisory committee was active, supportive and successful in helping IDEAL to such a positive position. This committee should be commended and recognized for their support and work.

The composition of the international committee comprised 6 world recognized leaders in high latitude environmental, biodiversity and coastal sciences from Germany, Norway, Korea, Argentina and Brasil. They covered a wide range of the science areas set out in the original aims of the science programme for IDEAL. Their specialities were pelagic ecosystems, adaptations and physiology, fisheries and aquaculture, and phytoplankton dynamics.

I was surprised to see that there were annual meetings of subsets of the international committee, as in my experience initiatives of the size of IDEAL have initial meetings followed by a mid-term meeting and a final meeting. I think having annual meetings was highly beneficial and made the centre more flexible and reactive to necessary changes and responses to issues. IDEAL should be applauded for this approach and how well it worked. As another view of this yearly meeting with advisors it does require a very strong commitment from the international members of the advisory committee and the management team of IDEAL. In this respect the committee gave an outstanding level of support. From reading the year by year changes of science targets and direction it is clear that the annual meetings were conducted in an open and frank, but also positive way, where improvement was at the top of the agenda.

This committee worked well and gave excellent scientific advice to the centre. The interactions clearly worked very well. The expertise on the panel was strongly in ocean sciences and pelagic ecosystems and productivity with outstanding adaptations and aquaculture. Given the drive for a socio-ecological approach in the future it might be good to look for an expert in social-environmental or social-ecological or conservation in high latitude systems to complement the new direction.

ii. Evaluation

5					
Outstanding	Very Good	Good	Regular	Poor	Not Qualify

IX. FINAL OVERALL COMMENTS AND RECOMMENDATIONS

Please provide a final overall and recommendations for the Center. Include here aspects that were not covered in the previous sections, which you consider significant for the Center.

i. Comments

IDEAL has performed exceptionally well in its first 5 years of existence. The mechanisms and vision entrained at the start were outstanding and have produced much better results and outcomes than I had expected when I saw it being brought into existence 6 years ago. Of special note are the quality and volume of science; the skilled way that advice has been used and acted upon; the breadth of activity and the moves towards integration; the inclusion and recognition of societal, especially indigenous needs and the progressive increase in recognition of the value of the work done in a socio-economic direction; the increasing understanding of how strongly interlinked coastal and offshore systems and Antarctic and subAntarctic systems are.

There are areas where IDEAL could consider for future research that were not in the main focus in the first phase. The main amongst these is possibly doing more year round research to identify seasonal aspects of climate change impacts and how seasonal factors affect regional important processes such as ecosystem support for fisheries and aquaculture.

I have 8 recommendations for consideration for future IDEAL research. It is clear, however, that resources are a constraint in terms of facilities and people and I would not expect all of the items below to be acted upon, but for one or two to be synthesized into phase 2 of IDEAL's research.

Recommendations

1. Improved infrastructure, especially in terms of aquarium and experimental facilities in Antarctica
2. Improved networks of environmental monitoring/sampling equipment, including moorings, especially across the Antarctic/subAntarctic gradient. More targeted cruises informed by previous research to evaluate connectivity in finer scale
3. More winter and year round focused research to show key aspects of environmental change that are winter based. Added to this research to identify more species in Chile capable of living full life cycles at low temperature and hence potential non-native invaders of Antarctica.
4. Stronger research on benthic/water column processes identifying the sources and sinks are for carbon, nutrients, particulates etc. This should further be linked and aligned to the long-term monitoring data collected so that changes in communities, ecosystems and then into fisheries and societal value habitats can be identified and causes elucidated.
5. Better modelling support and capacity, especially with the aim of building improved models on connectivity, from Antarctica to the subAntarctic, from coastal to offshore and from pelagic to benthic systems. There should be a long-term aim of linking all three of these with a regional environment-ecosystem model.
6. To attempt to address wider scale science questions and to synthesise research across the research programmes better.
7. To improve interactions among the various parts of IDEALs research. This could possibly be done by employing staff for proportions of their time in different programmes to ensure they understand in detail more than 1 RP, that they work towards cross programme initiatives and are genuinely multidisciplinary in their work.
8. To continue to improve interactions with stakeholders using the processes already entrained of dialogue and reformulation of research in line with stakeholder needs. In this context it might be worth considering asking key stakeholders if they have



mid level staff that could be seconded to work in IDEAL for 2-3 month periods so they can obtain improved understanding of what IDEAL can do for them and to inform IDEAL better of stakeholder needs.

ii. Evaluation

