



Comisión Nacional de Investigación Científica y Tecnológica - CONICYT

<p style="text-align: center;"><b>ESTADO FINAL RESOLUCION DEL CONSEJO</b></p> <p>Observaciones: _____</p> <p>_____</p>	<p><b>FECHA</b></p> <table border="1" style="margin: auto;"> <tr> <td style="width: 20px; height: 20px;"> </td> <td style="width: 20px; height: 20px;"> </td> <td style="width: 20px; height: 20px;"> </td> </tr> </table>				<table border="1" style="margin: auto;"> <tr> <td style="width: 40px; height: 20px;"> </td> </tr> </table> <p>1. APROBADO 2. PENDIENTE 3. RECHAZADO 4. A FISCALIA</p>	

This is only for internal use of FONDAP

## EVALUATION REPORT CENTERS FOR ADVANCED RESEARCH

### I. PROJECT INFORMATION

CENTER'S NAME

**Center for Oceanographic Research in the eastern Pacific Ocean (COPAS)**

DIRECTOR: Dr. Carina Lange

### II. EVALUATION PANEL

NAME	ORGANIZATION/ INSTITUTION	E-MAIL	SIGNATURE
REVIEWER 1			

**III. PROGRAMS EVALUATION (please fill up as many forms as programs exist within the Center)**

<b>PROGRAM'S NAME: RP1</b>
CIRCULATION AND MIXING IN THE EASTERN SOUTH PACIFIC OCEAN
<b>PRINCIPAL INVESTIGATOR: Wolfgang Schneider</b>

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	x			
Quantity of the results reached regarding the objectives and goals	x			
Quality of reached outcomes related to proposal objectives and goals	x			
Degree of integration with other ongoing programs of the Center	x			
Diffusion of the results	x			

<b>PROGRAM'S NAME: RP2</b>
MICROBIAL COMMUNITIES AND WATER-COLUMN BIOGEOCHEMICAL CYCLING
<b>PRINCIPAL INVESTIGATOR: Osvaldo Ulloa</b>

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	x			
Quantity of reached outcomes related to proposal objectives and goals	x			
Quality of reached outcomes related to proposal objectives and goals	x			
Degree of integration with other ongoing programs of the Center	x			
Diffusion of the results	x			

\* If there had been none, please disregard this question

<b>PROGRAM'S NAME: RP3, PLANKTON DYNAMICS AND ITS ROLE IN CARBON CYCLING IN THE EASTERN SOUTH PACIFIC</b>
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**PRINCIPAL INVESTIGATOR:** Ruben Escribano

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	x			
Quantity of the results reached regarding the objectives and goals	x			
Quality of reached outcomes related to proposal objectives and goals	x			
Degree of integration with other ongoing programs of the Center	x			
Diffusion of the results	x			

**PROGRAM'S NAME: RP4**

PELAGIC-BENTHIC COUPLING IN THE EASTERN SOUTH PACIFIC

**PRINCIPAL INVESTIGATOR:** Humberto González

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	x			
Quantity of reached outcomes related to proposal objectives and goals	x			
Quality of reached outcomes related to proposal objectives and goals	x			
Degree of integration with other ongoing programs of the Center	x			
Diffusion of the results	x			

\* If there had been none, please disregard this question

**PROGRAM'S NAME: RP5** COMMUNITY STRUCTURE, METABOLISM AND BIOGEOCHEMISTRY, IN THE BENTHIC REALM OF THE EASTERN SOUTH PACIFIC

**PRINCIPAL INVESTIGATOR:** Renato A. Quiñones

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	x			
Quantity of the results reached regarding the objectives and goals	x			
Quality of reached outcomes related to proposal objectives and goals	x			
Degree of integration with other ongoing programs of the Center	x			
Diffusion of the results	x			

**PROGRAM'S NAME: RP6 PALEO-STUDIES IN THE EASTERN SOUTH PACIFIC:  
A JOINT GEOCHEMICAL AND PALEOBIOLOGICAL APPROACH**

**PRINCIPAL INVESTIGATOR:** Silvio Pantoja

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	x			
Quantity of reached outcomes related to proposal objectives and goals	x			
Quality of reached outcomes related to proposal objectives and goals	x			
Degree of integration with other ongoing programs of the Center	x			
Diffusion of the results	x			

\* If there had been none, please disregard

## IV. CENTER EVALUATION

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Usó Interno
Degree of adoption of suggestions from the last report *	x			
Accomplishment of objectives and goals of the Center	x			
Quantity of reached outcomes related to proposal objectives and goals	x			
Quality of reached outcomes related to proposal objectives and goals	x			
Degree of integration between the programs of the Center	x			
Creation and reinforcement of international networks	x			
Outreach	x			
Diffusion of results	x			
Establishment and tasks of the Advisory Committee	x			

### RECOMMENDATIONS (see following concepts)

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input style="background-color: #add8e6;" type="checkbox"/>
APPROVE	APPROVAL WITH SUGGESTIONS	ADDITIONAL INFO.	PENDING	REJECT	FONDECYT USE

06	04	2011
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Evaluation Date

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Signature reviewer

## EVALUATION CONCEPTS ANNUAL REPORT

1. **Approve:** The reviewer recommends to accept the report in its present form since he/she considers objectives and goals fully accomplished and all relevant issues covered by the report.
2. **Approval with suggestions or minor observations**
  - 2.1 **Minor observations:** The reviewer recommends the approval of the report despite the justified incompleteness of some aspects that does not constitute an obstacle for the continuity of the Center activities.
  - 2.2 **Suggestions:** The reviewer recommends minor changes in order to improve the future performance of the Center.
3. **Additional information:** The reviewer requires additional documentation or specific explanations to fully evaluate the report.
4. **Pending:** The reviewer makes significant observations to the report and conditions its approval to the accomplishment of specific demands.
5. **Reject:** The reviewer has strong objections to the contents of the report.

## **EVALUATION COMMENTS:**

The major theme of this year's activity is the recovery from the tragedy of last year's earthquake and tsunami. These events dealt major blows to the activities of the COPAS program, via losses of facilities, time and momentum. The people in COPAS have done an amazing job in recovering from these events in more than one way.

The various sub-programs had differing exposures to damage, depending on their use of Dichato and, to a lesser extent, the time-series field work. The core time-series sampling was restored in a short time frame, adapting to a chartered vessel while the Kay-Kay was immobilized. Planning has begun on the nature and location of the replacement for the Dichato lab. The program has internally reoriented resources to help with those sub-programs hit hardest. It has shown the cohesion necessary to make these redirections of resources based on prioritization of the group's goals, and has therefore proven a benefit of the COPAS structure. In ecological terms, this research ecosystem demonstrated resilience.

The group responded to national needs by quickly adapting outreach and education programs to deal with the oceanography of tsunami's. While the country's attention is focused on the issue, COPAS has begun public lectures and reorientation of the Summer Austral Institute program toward tsunami-related issues as well as other human-related concerns. Some science is also being redirected in response to this event (e.g., the work on wood degradation).

Research productivity has continued strongly, as far as metrics such as publication rate are concerned, even as some efforts lost productivity in the lab or field. Although much of the work for these publications occurred before the events of February, 2010, it takes time and attention to bring such publications to fruition even after the data are worked up, and it is testimony to the dedication of COPAS staff that this stream of papers has continued in numbers and journal quality. It is very encouraging that the papers show increasing integration – not only in coauthorships, but clearly in the science that is being reported. The physical oceanography, for example, is nicely integrated with a variety of biological questions in several of the papers. It is good to see more horizontal motion being incorporated into this integration of physical oceanography (e.g., the work with eddies). In addition, the work inside the Patagonian fjords is being integrated with the offshore work – for example in the consideration of nutrient sources and carbon sinks. The ability to perform integrations such as these provides more evidence for the importance of a group such as COPAS in the national portfolio of marine research.

The overall quality of science reported this year is excellent, and one aspect that seems evident is the greater emphasis on generic science questions as well as site-specific ones. Examples here include papers such as those on biomass size spectra, variations in egg quality, diazotrophy and the role of fungi in decomposition. These generic discoveries provide evidence that COPAS provides an opportunity for internationally significant science to be done here.

The visit and report by the External Advisory Committee are welcome. The suggestion of Dr. Bernal regarding establishment of an international hub for Easter South Pacific oceanographic logistics is an interesting one and perhaps valuable in the planning for the future. The report alludes to other useful outputs from this meeting, and one hopes that it was worth the investment of COPAS time that went into it.

The opening of the new building on the UdeC campus marks a major event in the COPAS evolution. It marks both a needed addition to facilities and, more importantly, a reinforcement of the federation of scientists that COPAS represents and an important step in its institutionalization within UdeC. The centrality of purpose that it represents should be an even larger challenge for the future for the scientists that move into it. From the pictures it looks to be an attractive and excellent facility. The building's

completion is a major accomplishment, but equipping it remains a challenge to be met, and one hopes that the resources for both this challenge and that of Dichato can be found quickly enough.

Graduate education also continues strongly. There are students in place across the research programs, and graduation rates are strong. Student participation in publications is moderate. The abundance of research opportunities at the undergraduate level is gratifying, both to provide that experience for terminal undergraduates and to help identify student aspirations and talents for further work in the field.

The maintenance and continued development of international collaborations is excellent. The new arrangement with Banyuls in France looks interesting, and provides another mechanism to help carry the COPAS past the FONDAP program funding period. COPAS is well established both in the international community at large and with a wide variety of individual countries and institutions.

The impacts of graduate education, international collaborations, and grant-getting all appear to be working together to extend the life of the COPAS mission. The emplacement of Drs. Tapia, Hildalgo, de Pol, and Fernandez into positions with a future in the academic unit seems very promising for the institutionalization of COPAS. The Basal funding should extend the Patagonian work with extensive COPAS involvement. Similarly, it's good to see the suggestions of national-level availability of ship infrastructure that would help promote continuance of the ESP work.

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**ADDITIONAL INFORMATION REQUIRED FOR THE FULL EVALUATION OF THE ANNUAL REPORT:**

If you require additional information or leave the evaluation pending, please indicate the documentation or explanations required to complete the evaluation. In case there are additional demands that the Center's director has to accomplish, these have to be explained so the director may take the necessary measures.

If you entirely reject the contents of the report (or significant portions of it) please indicate here the demands that should be posted to the Center' director.

**RECOMMENDATIONS TO THE CENTER DIRECTOR:**

(only if report is approved))

I have no recommendations – only congratulations for a difficult job well done.



Comisión Nacional de Investigación Científica y Tecnológica - CONICYT

<p style="text-align: center;"><b>ESTADO FINAL RESOLUCION DEL CONSEJO</b></p> <p>Observaciones: _____</p> <p>_____</p>	<p><b>FECHA</b></p> <table border="1" style="margin: auto;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>				<table border="1" style="margin: auto;"> <tr> <td style="width: 40px; height: 20px;"></td> </tr> </table> <p>1. APROBADO 2. PENDIENTE 3. RECHAZADO 4. A FISCALIA</p>	

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## EVALUATION REPORT CENTERS FOR ADVANCED RESEARCH

### I. PROJECT INFORMATION

CENTER'S NAME

Center for Oceanographic Research in the eastern South Pacific (COPAS)

DIRECTOR

Carina B. LANGE

### II. EVALUATION PANEL

NAME	ORGANIZATION/ INSTITUTION	E-MAIL	SIGNATURE
REVIEWER 2			

**III. PROGRAMS EVALUATION (please fill up as many forms as programs exist within the Center)**

<b>PROGRAM'S NAME</b> RP 1. Circulation and Mixing in the Eastern South Pacific Ocean
<b>PRINCIPAL INVESTIGATOR</b> Wolfgang Schneider

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of the results reached regarding the objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

<b>PROGRAM'S NAME</b> RP 2. Microbial Communities and Water-Column Biogeochemical Cycling
<b>PRINCIPAL INVESTIGATOR</b> Osvaldo Ulloa

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results		X		

\* If there had been none, please disregard this question

**III. PROGRAMS EVALUATION (please fill up as many forms as programs exist within the Center)**

<b>PROGRAM'S NAME</b> RP 3. Plankton Dynamics and its Role in Carbon Cycling in the Eastern South Pacific
<b>PRINCIPAL INVESTIGATOR</b> Ruben Escribano

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of the results reached regarding the objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals				
Degree of integration with other ongoing programs of the Center		X		
Diffusion of the results		X		

<b>PROGRAM'S NAME</b> RP 4. Pelagic-Benthic Coupling in the Eastern South Pacific
<b>PRINCIPAL INVESTIGATOR</b> Humberto González

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

\* If there had been none, please disregard this question

**III. PROGRAMS EVALUATION (please fill up as many forms as programs exist within the Center)**

**PROGRAM'S NAME**

RP 5. Community Structure, Metabolism and Biogeochemistry, in the Benthic Realm of the Eastern South Pacific

**PRINCIPAL INVESTIGATOR**

Renato A. Quiñones

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of the results reached regarding the objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

**PROGRAM'S NAME**

RP 6. Paleo-Studies in the Eastern South Pacific: A Joint Geochemical and Paleobiological Approach

**PRINCIPAL INVESTIGATOR**

Silvio Pantoja

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Internal use
Degree of adoption of suggestions from the last report *				
Accomplishment of objectives and goals of the reported program	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration with other ongoing programs of the Center	X			
Diffusion of the results	X			

\* If there had been none, please disregard this question

## IV. CENTER EVALUATION

ITEM	Total/ Good	Partial/ Regular	Insufficient/ Deficient	Uso Interno
Degree of adoption of suggestions from the last report *		X		
Accomplishment of objectives and goals of the Center	X			
Quantity of reached outcomes related to proposal objectives and goals	X			
Quality of reached outcomes related to proposal objectives and goals	X			
Degree of integration between the programs of the Center		X		
Creation and reinforcement of international networks	X			
Outreach	X			
Diffusion of results	X			
Establishment and tasks of the Advisory Committee	X			

### RECOMMENDATIONS (see following concepts)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
X					
APPROVE	APPROVAL WITH SUGGESTIONS	ADDITIONAL INFO.	PENDING	REJECT	FONDECYT USE

10	04	2011
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Evaluation Date

\_\_\_\_\_

Signature reviewer

## EVALUATION CONCEPTS ANNUAL REPORT

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3. **Additional information:** The reviewer requires additional documentation or specific explanations to fully evaluate the report.
4. **Pending:** The reviewer makes significant observations to the report and conditions its approval to the accomplishment of specific demands.
5. **Reject:** The reviewer has strong objections to the contents of the report.

## **EVALUATION COMMENTS:**

The following comments are divided in three parts. The first two parts correspond to above Sections III (Programs Evaluation) and IV (Center Evaluation), respectively. The third part concern the reports presented by Drs. Tapia and Fernandez.

### Comments concerning the Programs Evaluation (Section III)

For each of the six programs, the comments that follow address only the items that I rated *Partial/Regular* in Section III.

*RP1.* All items rated *Total/Good*.

*RP2* investigates several cutting-edge topics and its results are of remarkably high quality. *Integration.* The degree of integration with the other COPAS RPs could be better, e.g. only 1 of the 8 publications listed in the Year 9 Report involved another RP (the RP did not mention any other information on integration in its Year 9 Report). *Diffusion of results.* Although the RP published its results in very good to excellent journals (including *Science*), for which the RP must be congratulated, the number of publications could perhaps have been slightly higher given the large workforce of the RP, i.e. 5 investigators (including postdocs), 1 bioinformatics engineer and 5 technicians.

*RP3. Integration.* RP3 has actively participated in COPAS integrative activities, but this did not translate into any joint publication with other RPs during Year 9. It is hoped that the situation will evolve in coming years, as one of the 13 publications under review was prepared jointly with RP2 (however, a single joint publication out 13 is still low). *Diffusion of results.* The number of publications in the Year 9 Report (i.e. 5, published in good to very good journals) could perhaps have been slightly higher given the workforce of the RP, i.e. 3 investigators and 3 technicians. The large number of publications under review (13) is very impressive, and reflects the wise decision of the RP to focus its research efforts of Year 9 on the analysis of already existing data following the destruction of the Marine Biology Station in Dichato.

*RP4.* All items rated *Total/Good*.

*RP5.* All items rated *Total/Good*.

*RP6.* All items rated *Total/Good*.

### Comments concerning the Center Evaluation (Section IV)

The following comments address all items evaluated in Section IV.

*Degree of adoption of suggestions from the last Report.* Three of the suggestions/comments from the reviewers in Year 8 Report were not fully answered in Year 9 Report.

- The first suggestion/comment came from Reviewer 1: "Last year I discussed co-advising of graduate students, and the response was that about half of the 49 students were co-advised by 2

research programs. Yet only 10-15% of publications involve 2 research programs. Is this discrepancy due to lack of publication by graduate students, or?" I could not find a clear answer to that question in Year 9 Report.

- The second suggestion/comment came from the two reviewers, i.e. the weak integration among RPs. There was a partial answer in Year 9 Report: "Publication among research groups (2 or more) has greatly improved, from 10-15% in 2009 to ca. 27% in 2010. Within each central theme, we are making progress with synthesis articles; some have been published during 2010, some are in preparation while others have been submitted or are in final stages almost ready for submission." This statement was followed by a list of publications (which was quite different from the list on page 29 of the same Report entitled "Inter-program publications during the reported period"). The increasing number of multi RP publications is encouraging, and COPAS must be congratulated for this progress. However, analysis of the RP reports and the Table on page 29 of the Center Report indicates that some RPs are little involved in integration publications, i.e. RP2 and RP3, which are dealing with water-column biology. Conversely, RP1 and RP6 share  $\geq 50\%$  of their publications with other RPs.

- The third suggestion/comment mostly came from Reviewer 2 but was implicit in comments from Reviewer 1, i.e. the need "to bring researchers to work among RPs at developing Theme-level syntheses" (Reviewer 2). The two Reviewers thought that new modelers in addition to Dr. Tapia could help in that respect. There was a partial answer in the present Report: "We are making progress in the 'modeling front' and synthesis papers. We did not hire a second modeler but included postdocs and outside collaborators who are working on different modeling aspects within COPAS' objectives". There is a need, however, to involve in the task non-modeling COPAS investigators, who know about the systems to be modeled.

*Accomplishment of objectives and goals of the Center.* Despite the major disruption caused by the earthquake and tsunami of February 2010, and the resulting destruction Marine Biological Station of Dichato and damages to research vessels, COPAS managed to reach and even exceed its objectives in terms of scientific, educational, networking and outreach goals. This almost unbelievable accomplishment is largely due to the rapid actions taken by COPAS after February 2010, which are summarized on pages 18-19 of the Report.

The Center internal analysis (pages 35-36 of Year 9 Report) lists a number of scientific, educational, outreach and networking strengths of COPAS, with which I fully agree. However, I was at lost to interpret the COPAS weakness cited on page 36, i.e. "increasing prices and a stable annual budget of \$600 million Chilean pesos result in a yearly decrease of the budget left for operational costs". The increasing prices and constant revenues do not seem to me to be a weakness of COPAS, except if it meant that COPAS did not take measures to seek additional funds from non-traditional sources of funding. However, I am not sure that my tentative interpretation is correct.

*Quantity of reached outcomes related to proposal objectives and goals.* The quantity of reached outcomes is very good. For example, COPAS reports the publication of 37 ISI articles and 7 book chapters. In addition, articles in the special volume of *Continental Shelf Research* "Oceanography of the Chilean Patagonia" were posted online before their publication in February 2011. The Special Issue of *Progress in Oceanography* devoted to the COPAS Time Series Study, "Spatial and temporal scales of variability in the coastal upwelling system off central-southern Chile" will be published soon. Concerning education, 6 Ph.D. students and 3

M.Sc. completed their degree and successfully defended their thesis, 3 new Ph.D. and 4 M.Sc. students defended their thesis project, and 15 undergraduate students completed their undergraduate thesis and graduated in 2010-2011. In addition 61 students and 10 visiting professors participated in the Austral Summer Institute XI (ASI XI), co-organized by the Department of Oceanography of UdeC and COPAS.

*Quality of reached outcomes related to proposal objectives and goals.* The quality of reached outcomes is high. Concerning publications, the impact factor of the journals in which COPAS published its 37 ISI COPAS articles ranged between 0.4 and 29.7 (one article in *Science*), with an overall average of 3.0 (2.3 without *Science*), which is high in the field of marine sciences. Such a result was only possible because of the intellectual, financial, organizational and technical synergies developed within and provided by COPAS. However, there remain some problems concerning the degree of integration among the six COPAS RPs, which are discussed in the next paragraph.

*Degree of integration between the programs of the Center.* Concerning integration, it is written in the Year 9 Report that “~73% of all ISI publications involve one Research Program, and 27% include 2 or more RPs (increment since last year which was 15%)” (page 15). Details concerning the contributions of RPs to the COPAS ISI Publications and Books/Book Chapters are given in the Excel Table “Publication Summary”. Hence, there is an obvious improvement over Year 8, for which COPAS must be congratulated. However, as already explained above, analysis of the RP Reports and the Table on page 29 of the Center Report indicates that some RPs are little involved in integration publications, i.e. RP2 and RP3 (the latter is otherwise actively involved in COPAS integrative activities); this is unfortunate as these two RPs are those dealing with water-column biology. Conversely, RP1 and RP6 share  $\geq 50\%$  of their publications with other RPs. Hence, there was significant progress in the degree of integration among COPAS RPs during Year 9, and it is hoped that there will be further progress during Year 10.

*Creation and reinforcement of international networks.* The networking success of COPAS is nicely summarized in the Center Report (page 12): “COPAS retained its strong position in the existing major network and international programs, in South American Network initiatives, and maintained existing scientific and educational collaborations with laboratories and centers around the world”. In addition, the creation of the Laboratoire International Associé UPMC-CNRS/COPAS-UdeC (LIA-MORFUN) “will strengthen training and research activities, and will significantly influence the next phase of COPAS research activities”. In other words, COPAS has created and is continuously reinforcing a very strong international network, which is comparable to the networks of the best oceanographic institutes around the world.

*Outreach.* The quality and quantity of COPAS outreach activities is very impressive. This is a task that only a center could undertake, and COPAS is doing it superbly. Two caveats. (1) Much of the “Marine Science education and Ocean literacy activities designed for hands-on activities with school children and teachers” listed in the Table on page 33 of Year 9 Report are conducted in or close to Concepcion. This may be normal given that the UdeC is the center of gravity of COPAS. However, COPAS is the only oceanographic center funded by FONDAP, and as such I think that it has a national mandate. It would be nice if more marine science education activities could be developed elsewhere, especially in large cities such as Santiago, for example through the internet or in collaboration with organizations or centers that already exist outside Concepcion. (2) Close examination of the RP Reports seems to indicate that the involvement in outreach varies widely among RPs, e.g. RP5 did not report any participation in outreach, and the only “outreach” activity reported by RP1 is the publication of papers in

primary scientific journals (which is not truly outreach). However, all RPs should contribute significantly to COPAS outreach. (One small detail. On page 37, it is written that: “On average, our web site ([www.copas.udec.cl](http://www.copas.udec.cl)) is visited by 1,500 outside (non-COPAS, non-UDEC) individuals”. Question: is it 1500 visits per day, per month, or per year?)

*Diffusion of results.* The numbers of papers, books/chapters, and presentations by COPAS researchers are high. The journals in which the ISI papers were published range from good to excellent.

*Establishment and tasks of the Advisory Committee.* The COPAS External Advisory Panel (EAP) of COPAS met in October 2010. One of the main points discussed by the EAP was how COPAS could or should continue after 2012 when the funding by FONDAP ends. Areas in which the center could take regional and international leadership were identified for the future science plan of COPAS. The EAP meeting was therefore very significant for the future of COPAS.

#### Comments concerning the Reports presented by Drs. Tapia and Fernandez

*Dr. Fabian Tapia.* The research activity described by Dr. Fabian Tapia in his Year 9 Report is very impressive in both quality and quantity. Dr. Tapia both undertook new field measurements and started to analyze and synthesize some of the information acquired by COPAS in previous years. His publication record for Year 9 is excellent. His research output, combined with his participation in training/teaching activities, led to his promotion in July 2010 I from COPAS researcher to Associate Faculty at the Oceanography Department at UdeC. I hope that under his leadership, COPAS investigators will progressively see the value of developing conceptual models that would combine information from different RPs, which would provide the bases for new numerical models.

*Dr. Camilia Fernandez.* The prospects following from the creation of a French-Chilean international associated laboratory, described by Dr. Camilia Fernandez in her Year 9 Report, are very promising. Her investigations of nitrogen-related processes at sea and in the laboratory are not only at the cutting edge of science, but some of her results seem to be already challenging existing models. The publication record of Dr. Fernandez during the Year 9 Report period (i.e. 01 March 2010 to 28 February 2011) is modest, but the two papers in press, those in preparation and the very interesting results she reported are indications that her publication output should improve fast.

**ADDITIONAL INFORMATION REQUIRED FOR THE FULL EVALUATION OF THE ANNUAL REPORT:**

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If you entirely reject the contents of the report (or significant portions of it) please indicate here the demands that should be posted to the Center' director.

No additional information required.

**RECOMMENDATIONS TO THE CENTER DIRECTOR:**

(only if report is approved))

Technical reporting recommendations:

1. The Table provided on page 13 of the Center Report (Section 2.A.1) is interesting because it shows that the six Research Programs participate in Central Themes 1 and 2, and four of the RPs also participate in Central Theme 3. However, it would be very useful for reviewers to know the distribution of efforts of each RP among the three Central Themes, i.e. the approximate percentage of its total efforts each RP devotes to each Central Theme. In practice, this could be done by replacing the Xs in the table by percentages that would add up to 100% for each RP.

2. It would be useful for reviewers if all Program Reports followed the same format, which was not entirely the case in Year 9. Examples of inconsistencies are: RP2 did not break down its graduate students into PhD and MSc, and did not report on undergraduate students or integrative activities; RP5 did not report on outreach (and RP1 basically dismissed the point).