

DRAFT MINUTES

Meeting of the Shallow-Water Systems PPG

Aix-en-Provence

September 24-25, 1999

Present:	Terry Quinn Gregory Mountain Edouard Bard Christian Betzler Peter Bruns Gregor Eberli Larry Edwards Craig Fulthorpe Yasufumi Iryu Hiroki Matsuda	(<i>Co-Chair</i>) (<i>Co-Chair</i>) <i>(alternate for Jeroen Kenter)</i>
Regrets:	Rick Fairbanks Michael Gagan Sandy Tudhope	
Guests:	Jamie Austin William Hay	<i>(liaison from SSEP - Environment)</i> <i>(SCICOM Chair)</i>

Introduction - We assembled in the meeting room at CEREGE at 9:00 AM, but delayed our formal start until 9:45 AM because several of the expected members and guests had not yet arrived. Quinn began by describing the Chair's understanding of the life expectancy of our PPG. Noting that 'perception is reality' he remarked that despite the products we have produced, there is a view from elsewhere in the advisory structure that we have been low performers. Either he or Mountain would report in person to the ESSEP meeting in November, and he requested items of support from all panelists to bolster our image and demonstrate that we have been productive, useful, and have an important role to play in helping to plan for post-2003 drilling activities.

White Paper Status - Quinn then summarized the basic elements of that part of the White Paper placed on the web last March that deals with the role of the tropics in global climate. Discussion followed. Austin volunteered that the coral community as a whole needs to identify reasons why it needs the ODP, and vice versa. Bard agreed, stating that the coral 'group' is at an impasse without a significant improvement in offshore sampling technology. Furthermore, improved cooperation between labs across national boundaries is needed to be able to intercalibrate the laboratories, meet the costs, and solidify the intellectual pursuits of the many people involved. Austin asked that we consider as part of our mandate the issue of post-drilling sample analyses, in particular regarding the need for a centrally managed facility(s). Quinn remarked that paired analyses at multiple labs for replication/calibration would certainly be wise and would indeed require a significant level of international cooperation. Bard cautioned that in such a scheme it must be realized that each science team must be able to pursue its own research efforts; this is currently accomplished in many projects with which he is involved, but he notes that it requires thoughtful pre-planning. Quinn concurred, saying that to work, cooperation of this type must provide each scientist with a benefit that s/he could not enjoy if pursued as an individual. He noted further that

recovering samples from multiple holes at the same site is a cost-effective way of gathering enough material for intercalibration and replication as well as for evaluating the repeatability of the geologic record. Fulthorpe summarized by saying this type of strategic planning ought to be included in the White Paper. Quinn and Mountain agreed and noted that because it is a “living document,” additions and changes of just this type were expected and encouraged. On that subject, Bard remarked that words dealing with reef ecosystems and architecture should be added as well. Eberli said that imaging techniques of reef environments must be improved to help with site assessment; the task of distinguishing between coral and non-layered substrate was especially difficult and important. Austin noted that techniques are developing (most notably chirp sonar) that could address this issue. On the subject of radiocarbon calibration of the sea-level curve, Bard noted that the calibration was reliable back to 25 ka, but that we were data-poor past that age. Given the right samples, the time scale might be extended to 50 ka, but due to subaerial exposure, it may never be possible to get a pristine record as reliable as that for the time interval since the LGM. Quinn countered by saying there may be locations with sufficiently rapid subsidence that the sequence has remained submarine; Bougainville Guyot may be one such case.

Mountain then summarized the features of the Land-Sea Interface portion of the White Paper. Brun noted his concern that we were duplicating some of the scientific objectives that were addressed by IMAGES/PAGES. Bard volunteered that indeed, an IMAGES-sponsored program of taking piston cores in thickly sedimented shelf depressions addressed our theme of tracing sea level by tracking indicators of changes in the brackish-salt water interface. Austin said we should not be concerned with this sharing of objectives; we want among other things to be building bridges rather than walls between research communities. In this regard, Eberli noted that our White Paper should include a section that briefly describes parallel research initiatives. Eberli also remarked that in a ‘strategies’ section, proponents of all shallow-water drilling proposals ought to be encouraged to seek partial support costs from oil companies, and Austin concurred.

Getting the word out - We then discussed ways in which to advertise better the products of our PPG. One suggestion was to distribute printed copies of the White Paper to all JOIDES panelists. A short discussion led to the more modest conclusion that at the very least a copy should be sent to ESSEP chair Neil Lundberg, and copies be hand-carried by Quinn or Mountain when he reports to the ESSEP in November.

Quinn described a draft-level submission to EOS that summarizes the PPG mandate and White Paper. The consensus was to get this into publication as soon as possible. Austin asked who would pay for it, and Quinn answered that JOI had agreed to pay for it and an editor at EOS had already been contacted and the preliminary preparations made. It was noted that figures would be very helpful, and we agreed that one each for high-resolution sea level / tropical climate variability and the process-architecture would be ideal. Bard was tasked with assisting Quinn with the former, while Austin and Fulthorpe would help Mountain with the latter.

Mountain remarked that figures for the White Paper were desirable as well, and he asked all panelists to send figures of their own, with captions, to both he and Quinn for inclusion in the White Paper.

Quinn described the aborted effort of sponsoring an RFP for drilling shallow-water systems. We had flagged this as an action item at our last meeting, seeing it as fulfilling our mandate

to ‘organize and nurture the development of specific drilling proposals.’ Since that time we learned that RFPs are typically instigated by a directive from SCICOM, but a request to the community for proposals to drill shallow-water systems was thought undesirable because it could mislead some into thinking that there were funds earmarked for this type of drilling. It was noted by all present that such mixed signals from the advisory structure and funding agency were precisely why there are relatively few shallow-water proposals in the system. In the chance that this issue could be re-considered, Quinn suggested that a draft RFP be prepared nonetheless and that we ask Austin to present it to ESSEP in November. Should that panel concur it could be passed up to SCICOM for action as soon as possible.

Quinn then described another means of stimulating proposal generation discussed at the last meeting - calling a workshop for generating proposals that exploit drilling submerged corals. He noted that John Farrell at JOI is in favor of this activity and is willing to contribute funds to support US participation, given favorable peer review of a workshop proposal. Quinn said he would check with the appropriate NSF program officer for support for international participants. Bard asked what the goal would be, and Quinn answered that it would be to develop a coherent science plan, prepare proposals, and develop inter-lab cooperation. Austin noted the very large head start enjoyed by the gas hydrates community. Since inception of that particular PPG there has been a large increase in proposals. Austin responded to Mountain’s question that the list of proponents is divided between panelists from the gas hydrates PPG and unaffiliated, individual investigators.

Another action item from our last meeting was to explore ways of developing a ‘drilling technology warehouse.’ The goal is to provide proponents with easy access to accurate, up-to-date information concerning shallow-water platform and tool performance and availability. Austin agreed that this function was needed somewhere, but he stressed that our PPG does not have to perform this service and may not possess the necessary expertise. Austin also thought, however, that our oversight of some aspect of this activity would indeed aid the community. The discussion from our previous meeting was reviewed and it was re-affirmed that JOI was the preferred site for maintaining this technical information, preferably on a web site. Austin then distributed an unpublished document provided to him by Kate Moran and prepared by Meghan McCarthy (currently a JOI intern) entitled “Offshore Geotechnical Tools Suitable for Shallow-Water Science.” It was concluded that if introductory sections concerning shallow-water science objectives were updated to include issues discussed in the PPG White Paper, and if other sections were amplified, this document was a good start at a useful reference for shallow-water drilling proponents. Mountain agreed to contact Kate Moran and volunteer to work with Meghan in completing this task.

Liaison Reports

ARTS (Annual Records of Tropical Systems) - Quinn reported that this is a joint PAGES/CLIVAR initiative with two primary goals: 1) to improve understanding of tropical climate variability and teleconnections over the last several centuries; and 2) to assess tropical system and teleconnection stability as background climate and forcings have changed during the late Quaternary. This group is keenly interested in the records of submerged corals and has identified transects of Pacific corals as the most valuable type of records to acquire because of their relevance to tracking ENSO in this currently under-sampled, remote region. They note the challenge and need for coordination among the many groups that will have to be involved in this type and location of study. Austin asked why this community had not submitted proposals to ODP if this issue was so important and so sample-poor? Quinn

answered that until recently the unique capabilities of the ODP were not especially crucial, but now that it was realized that many of the 'easy' sites have been drilled, something more technically and organizationally elaborate was required.

STRATAFORM (Strata Formation on margins) – STRATAFORM is an ONR-sponsored initiative to understand the origin of stratal features at scales from cm to a km and formed over the span of hours to hundreds of millennia. Fulthorpe reported on attempts to collect moderate-length core samples from the New Jersey and northern California shelves. Two days of coring from the French vessel Marion Dufresne II were completed last June offshore New Jersey with joint support from ONR and JOI. Undisturbed 4-in diameter piston cores as long as 37 m were recovered in soft slope muds. Sticky, over-consolidated debris flow muds on the uppermost slope (~150 m water depth) were especially difficult to penetrate, despite a multi-ton coring device and 43 m of core pipe. Sand-prone sediments on the shelf (78 m water depth) were also attempted, with ~8 m of penetration; the latter core has not been split. In summary, the vessel was able to acquire very long, large-diameter cores in water as shallow as 10 m. Sandy formations were difficult to penetrate, but as shown two weeks later by record-setting recovery in a fjord off the Gulf of St. Lawrence, soft sediment in relatively shallow (~350m) water can yield cores as long as 58 m. Fulthorpe continued by describing STRATAFORM interest in the PROD (Portable Remotely Operated Drill) that was described to the PPG at our previous meeting. A deep-water test is set for sometime in November offshore Australia. In March 2000 the PROD will be tested further at shallow depths offshore the state of Washington. NSF is considering a further test of deeper water capabilities using an as-yet unproven long umbilical by using the PROD offshore southern California. If these tests proceed smoothly there is a reasonable chance the PROD will be used for extensive shelf sampling by STRATAFORM on both the New Jersey and California shelves in the summer of 2000.

MARGINS - Eberli described the NSF initiative designed to focus research on the interplay of processes involved in the evolution of continental margins. Four themes have been established: rheology and deformation, seismogenesis, subduction processes, and sediment transfer from source to sink. A science plan, funding, and active projects have been developed for two of these themes, and roughly 80 scientists will meet next week to build a science plan for sediment transfer. It is anticipated that deep sampling in shallow water will be identified as critical in these endeavors.

NAD (Nansen Arctic Drilling) - Mountain reviewed the history of efforts to organize international interests in Arctic drilling, beginning with the first charter from 1988. Themes to be addressed include the geologic evolution of the Arctic basin, its past environmental changes, and the ability to predict future changes and their impact on global climate. The NAD Secretariat was established at JOI in 1991 to coordinate international funds, sponsor special projects, and publish a newsletter. Management costs were to be borne by the US NSF. An implementation plan was drawn up in 1996 and was revamped in 1998. At present NAD activities are funded on a project-by-project basis that is directed by a single NAD Committee that formulates the science, policy, and implementation. There are eight Regional Planning Groups, five of which are concerned with areas that contain continental margins. The Bering Land Bridge is one such RPG, and has recently submitted a proposal to the International Arctic Research Center seeking funds to support drilling in Norton Basin. The objectives include determining the exposure history of the land bridge between North America and Asia, its impact on Arctic climate and ocean circulation, permafrost and hydrate evolution, and the history of regional volcanism. Drilling plans call for an anchored barge

mobilized out of Nome to twin existing commercial and COST (Continental Offshore Stratigraphic Test) wells in 100 ft of water.

SHALDRIL - Mountain summarized a recent report prepared by Leon Holloway for this subcommittee of the US-composed Antarctic Earth Science Working Group. Holloway witnessed a test deployment of Geo Drilling's 'Marine Resolution' portable drilling rig in June 1999. In general he regarded it as a well-conceived, well thought-out solution to providing drilling in remote areas, specifically the margins of Antarctica. Although it features the latest in heave compensation technology that will be critical to maintaining the steady weight-on-bit required for diamond drilling, the test he witnessed was in the protected and calm waters of a Norwegian fjord. The largest unknown yet remaining is the ability of the plastic (neutrally buoyant) riser to withstand less-than-ideal sea conditions. The 'Marine Resolution' can be shipped in five 20-ft and four 10-ft containers and set up in three days aboard a ship of opportunity. It needs only ship's diesel and can be deployed over the side in a cantilevered fashion or through a moon pool. The latter, however, must be able to accommodate a seafloor frame. The vessel can be either anchored or dynamically positioned. Holloway noted that while the team he witnessed lacked much offshore experience, they would certainly improve with time; he thought it was a well-trained, skilled crew. SHALDRIL is also following the progress of the PROD, and Holloway will be attending sea trials of that device when they take place. Austin mentioned that the Cape Roberts drill equipment, until now maintained by the Office of Polar Programs at the US NSF (**is this correct?**), may be dismantled in roughly one year from now and could become available for other groups to use.

GLAD (Global Lake Drilling) - Mountain described activities of this group of scientists loosely organized around the theme of collecting climate and tectonic records from lake sediments. Kerry Keltz (Univ. Minnesota), who noted that this is not a formal organization with any agency sponsorship, provided all of this information. However, the ICDP (International Continental Drilling Project) has committed \$780 K toward building a portable rig that could be shipped in containers and installed on a barge. Although it will be built with off-the-shelf parts, it will employ hybrid design elements (such as wireline coring) and will feature ODP-size drill pipe capable of coring to 800 m. ICDP will provide technical oversight, and the proponents are already planning basic aspects of core handling and data archiving, noting that because of the relatively shallow depths, rapid core recovery will quickly overwhelm topside core handling facilities. Shore-based sample preparation will very likely be needed.

COMPLEX (Conference on Multiple-Platform Exploration) - Austin summarized the meeting of 315 attendees held in Vancouver last May. Quinn pointed out that Figure 1, purportedly highlighting the environments to be exploited by future multiple-platform drilling, neglected to include corals. Austin outlined a timetable: the COMPLEX steering committee meets the week of Oct. 1 to review community comments and prepare a final report. A recently formed IODP Science Planning Working Group, chaired by Judy McKenzie (ETH) and Mike Coffin (UTIG), will incorporate recommendations from COMPLEX, CONCORD, FUMAGES (Future of Marine Geosciences, a US NSF-sponsored document), and various PPG reports into the IODP Long-Range Plan, which is due for completion by the summer of 2000. Highlights of the current draft version 3.2 of the COMPLEX report are as follows: the Introduction notes that drilling in the post-2003 era could have direct societal relevance in the areas of natural resources, natural hazards, and global change. But the COMPLEX document notes two new foci: exploring for and learning

about the buried biosphere, and understanding the origin and distribution of gas hydrates, as well as their effects on and their response to climate and oceanographic variations. Both Quinn and Mountain pointed out that neither of these 'new foci' require shallow-water drilling, or for that matter, technology that is a significant departure from current drilling by ODP. They both viewed this as a mistake in emphasis if the purpose of COMPLEX was to identify and strengthen community interest in advancing scientific ocean drilling into new areas and objectives. Austin resumed by outlining future ocean drilling objectives that do NOT require a riser: 1) continuous sedimentary sequences of all ages from water depths of a few 10's of m to 8 km, including high latitudes, with special interest in rapidly accumulated deposits such as drifts, laminated muds, and corals (Quinn mentioned that his word processor in 'search-for' mode detected the word corals only four times in the entire COMPLEX document), 2) spatially dense arrays of drill holes, 3) ocean crust, 4) boreholes selected and instrumented for earthquake studies, and 5) polar margins. Special sampling needs were identified: fluids for microbiological and geochemical analyses, pristine (biologically uncontaminated) samples, high core recovery and quality, continuous core orientation, directional drilling, stress orientation, larger core diameter. In situ observatories were likely to be in greater demand. Top-side lab facilities will be needed to perform measurements at in situ temperature and pressure, improvements will be needed to meet the absolutely 'clean' lab conditions for exploring the deep biosphere, and the shipboard lab layout must be flexible enough to mobilize for special needs on a leg-by-leg basis. Austin noted two general gaps in the COMPLEX report: detailed description of specific technology needed in the post-2003 era, and emphasis on shallow-water drilling. Mountain asked how the community could exert influence to effect the changes apparently needed in the COMPLEX document, particularly regarding this latter issue. Austin replied that our PPG could send material directly to the Science Planning WG, which meets next in Zurich at the beginning of November. Mountain remarked that the Shallow-Water Systems PPG had not been made aware of this WG, and if it was fully staffed he thought it extraordinarily odd that no one from the SWS PPG was asked to participate. This struck him as a very unfortunate oversight because it reinforced the suspicion that, despite the generally expressed interest in future multiple-platform drilling and the formation of a PPG to investigate shallow-water objectives, plans don't seem to be developing that will make shallow-water drilling a strong component of the new international drilling program. Austin declined to reveal the names of those already selected for the Science Planning WG, but he said at least one member was very familiar with the scientific objectives of shallow-water drilling. When pressed further, Austin said there was no harm in requesting of the IPSC chair, Ted Moore, that a self-selected member of our PPG be added to the Science Planning Working Group. The panel as a whole agreed that either Quinn or Mountain would be the consensus choice, and the final selection between these two was left for later discussion.

IPSC (IODP Planning Subcommittee) - Austin continued with a status report of IPSC activities. The current Phase III of ODP can be expected to end no later than 1 October 2003, and may come sooner in that calendar year. The replacement platform for the JR will come online sometime in 2004 or 2005, and the hull of the Japanese riser vessel will be constructed in 2003. After an interim of outfitting the laboratories and drilling equipment, plus a trial period of shakedown cruises, the riser ship will be operating near Japan in around 2006. Consequently, there is sure to be a gap in drilling activities. Austin did not mention any IPSC position on the pros or cons of attempting 'fit-to-mission' shallow-water drilling efforts during this expected gap in drilling operations. He emphasized the difficulties ahead by drawing comparison to trying to change the tires of a car without stopping the vehicle. The quality of the advisory structure and current shipboard activities are generally praised and should not be

discarded. Nonetheless, IPSC recognizes several tasks ahead that require restructuring to a significant degree. These tasks include: set planning milestones, coordinate the development of a science plan, develop a strategy to hit those milestones on time and reach those science objectives, investigate options for reasonable technical capabilities, assess managerial and financial requirements of the new plan, design an advisory structure, plan the transition, and plan the initial science to be done at the start of the new program. Austin outlined two working groups that have been formed in addition to the previously discussed Science Planning WG. These are the Industrial and the Technical WGs. The former will keep abreast of technical developments in the commercial field, specify pre-site characterization that will be needed, and facilitate cooperation between IODP and the industrial sector. The latter will focus on riser design, pre-site characterization unique to riser drilling, and gathering information regarding the feasibility and costs of meeting the science objectives developed by the Science Planning WG.

Short-Term PPG Actions

Discussion turned to concentrating on those activities most urgently needed to meet our mandate and to enhance the impact of our completed tasks. These involved three areas: augmenting the White Paper, reporting to the ESSEP, and publishing an EOS article.

White Paper Figures - All agreed that figures would enhance the value of the White Paper. Everyone was encouraged to supply electronic figures with captions along with exact location of citations in the text. These need to be delivered to Quinn and Mountain by 15 October in order to be useful for the ESSEP contribution.

Report to ESSEP - It was unanimously agreed that either Quinn or Mountain should deliver a report at the November ESSEP meeting in Udine, Italy, as requested of all PPG chairs by SCICOM at its March 1999 meeting and as amended to the Terms of Reference by EXCOM in June 1999. Furthermore, it was recommended that PDF files of the White Paper and figures with an Executive Summary be sent electronically to Neil Lundberg, Chair of the ESSEP, for him to distribute to his panel.

EOS Article - It was agreed that arriving at the ESSEP meeting with text of a submitted EOS article was a desirable target. Quinn mentioned that he and Mountain had a nearly complete draft prepared at the time of COMPLEX and it could be finalized rather quickly. At present it was a summary of the White Paper, but additional input from the panel was sought. Eberli suggested that the societal relevance of understanding the history of ENSO variations should be added. In the same way, Quinn felt we should be sure to mention the value of shallow-water drilling for post-glacial sea-level change. As mentioned in the White Paper, tide gauge records of relative sea-level changes go back only to early in this century. Shallow-water depth transects could make important contributions by lengthening the observed changes in sea level in both space and time, and could thereby provide tighter constraints on mantle response to water, sediment, and ice loading of the crust. Eberli stressed further that the 'shallow-water' depth range of 0-100 m encompasses most of the Pleistocene sea-level variations, and as such, if we are to learn from direct records of past sea-level changes we must focus more drilling in this range. It was generally agreed that the EOS article would be enhanced by two figures, one relating to drilling submerged corals, the other to drilling specific stratigraphic architectures to understand the processes that caused them. Bard and Quinn agreed to work on the former, while Eberli, Austin, Mountain, Betzler, Fulthorpe and Brun would compare efforts for the latter. Additional items to stress in the EOS article included:

1) that shallow-water drilling has been ordained as the 'third leg of the stool' in IODP; 2) the variety of science to be addressed with shallow-water drilling suggests a 'fit-to-mission' approach to matching technology and goals; and 3) that modern analytical techniques and acoustic imaging have improved so dramatically in the last decade that previous obstacles such as sample measurement, dating, and stratal visualization are no longer deterrents to major breakthroughs in shallow-water studies.

Day 2

Yasufumi Iryu began the morning with a report of this year's activities in Japan regarding science in shallow water. The Ocean Research Institute hosted a meeting in early July dealing with Shallow-Water Drilling: Results and Future Plans. Later that same month the Annual Meeting of the Sedimentary Society of Japan met at Yamagato University. Mid-October will be the time for the Annual Meeting of the Geological Society of Japan at Nagoya University. Yasu stated that one of the primary goals in each meeting was and will be to solidify the national interests in shallow-water drilling, both in siliciclastic and in carbonate settings. He expects that Japanese scientists will submit two shallow-water drilling proposals to ODP within the year.

Bill Hay arrived shortly after we began and was asked to comment on the future of ODP, IODP, and the role of our PPG. He said the gap between Phases III and IV was an opportunity for ships of opportunity, provided that the goals and the means to reach those goals are thought out well in advance. The science plan for IODP should be well developed by February 2000 and will be extended at an international ICOSOD meeting in July 2000. Hay echoed the same urgency as Austin in meeting the 1 November deadline for input to both the ESSEP and the Science Planning WG. Quinn asked how plans stood regarding our encouraging the distribution of an RFP for shallow-water drilling proposals. Hay replied that NSF was unsure how to handle 'fit-to-mission' projects that were likely to hire one-off commercial technology. Eberli pointed out that as opposed to gas hydrate proposals now arriving at the JOIDES office in response to PPG encouragement, proposals from shallow-water proponents do not have a reasonable chance of getting drilled before 2003. He went on to say that if an RFP for shallow-water proposals is not issued soon, perhaps a highly visible EOS article summarizing our White Paper would encourage proposal submission. Austin cautioned that the EOS editors would not allow anything that smacks of a 'sales pitch' for proposals because it would be seen as an attempt to get free advertising.

We separated into two groups charged with developing a matrix of shallow-water drilling objectives matched to their respective settings, drilling strategies, platforms, and sampling devices. This was viewed as a useful exercise to focus our attention on linking goals to practicalities and to prepare a summary chart for presentation at the upcoming ESSEP meeting. The resulting matrix follows the text of these minutes below.

In summary, we reviewed the action items as follows:

White Paper

- electronic figures, captions, and figure citations to be sent to Quinn and Mountain
- Quinn and Mountain to post revised text and figures on web page
- all comments to be returned to Quinn and Mountain
- Quinn and Mountain to post updated White Paper on webpage
- Mountain or Quinn to present Executive Summary at ESSEP meeting in Udine

EOS article

- Figures 1 and 2 to be prepared by Quinn and Bard (tropics) and Austin (land-sea interaction) and sent to Quinn and Mountain
- Quinn and Mountain to distribute draft with figures to panelists for review
- all comments to be returned to Quinn and Mountain
- Quinn and Mountain to submit article to AGU
- Mountain or Quinn to hand carry text and figures to Udine meeting for distribution

ESSEP

either Mountain or Quinn to attend ESSEP meeting in Udine, Italy and:

- distribute submitted EOS article
- present the technical matrix of shallow-water objectives, settings, strategies, platforms, and tools
- present the Executive Summary of the White Paper

IODP Science Planning Working Group

- Quinn to request IPSC Chair Ted Moore add him to the SciPlan WG
- if request granted, Quinn attend Nov 1 meeting of SciPlan WG in Zurich

Coral Workshop

- Quinn to submit request to JOI/MESH (Marine Earth System History initiative at NSF) for funds to support workshop designed to generate coral drilling proposals

Margins Workshop

- Fulthorpe and Mountain to report on SWS PPG activities at the upcoming science planning meeting at Lake Quinnault and discuss possible interest in a proposal-generating workshop complementary to the above coral workshop

Technology Warehouse

- Mountain to request Kate Moran at JOI approve the revision/update of the McCarthy Report with input from the SWS PPG

All panelists thanked host Edouard Bard for his hospitality and the large quantities of extraordinarily fine cuisine enjoyed by all during this short visit to Provence. The meeting adjourned at 5:45 PM