**Letters of Intent: Lau Basin**
**Target Date: August 15, 2002**

**Evaluation of biological communities for selection of a Lau Basin Integrated Study Site and preliminary investigation of community structure and physiological attributes of the fauna**

J. J. Childress, University of California, Santa Barbara;
C. R. Fisher, Penn State University;
Stephane Hourdez, Penn State University;
Stacy Kim, Moss Landing Marine Labs;
George W. Luther, University of Delaware.

We will propose a program to survey the biological communities at prospective Lau Basin ISS bull's eye sites, construct distribution maps of the biota, and conduct preliminary biological and in situ chemical analyses necessary for choosing the bull's eye site as well as for planning more detailed studies there.

To collect the data necessary to choose the appropriate area for intensive interdisciplinary studies (that include macrobiological links), we will survey the prospective sites identified on the previous legs of the expedition proposed in the Lau Basin Implementation Plan. Our surveys and collections will be made primarily with an ROV or submersible, although we may also utilize the ARGO, or DSL 120 if appropriate and necessary for a particular site. This survey will include construction of a site map of the occurrence and distribution of biological communities, more detailed photo mosaics of selected biological communities, in situ voltammetric chemical analyses (O2, Fe and S species) and thermal surveys of microhabitats in selected biological communities, and replicate quantitative collections of all fauna present in specific portions (generally 1/4 m2) of each type of community. The quantitative collections will be used for a first order estimation of the species richness, biomass and diversity in each of the community types/microhabitats identified.

To collect the data necessary to plan and propose future more detailed studies of the interactions between the biota and their environment (rocks, water, chemistry, and other fauna), the site selected will be surveyed in higher detail, the initial collections will be further processed, additional collections will be made, and further studies of live animals will be performed. Material from all collections will be preserved appropriately to allow molecular and classical description of new species (if appropriate), investigation of potential new symbioses and unresolved associations (as appropriate), for preliminary classification of trophic status and interactions of all fauna, and for appropriate physiological investigations of condition of the ecosystem engineers in the different microhabitats. In addition, experiments will be conducted to determine which of the key ecosystem engineers and symbiotic species can be maintained alive on board ship for future study, and optimal collection and maintenance conditions for these species.

We will also propose to test a number of specific ecological, phylogenetic, physiological, and chemical hypotheses over the course of this survey work that will set the stage for more integrated studies to follow.