

Office of Naval Research International Field Office

New Zealand Visits to Victoria University of Wellington and The University of Auckland

Dr. Douglas W. Edsall

March 25 - 29, 2002

These reports summarize global activities of S&T Associate Directors of the Office of Naval Research International Field Offices (ONRIFO). The complete listing of newsletters and reports are available under the authors' by-line on the ONRIFO homepage: <http://www.onrifo.navy.mil>.

Contents:

1. Summary
2. Background
3. Highlights of discussions
4. Assessment
5. Points of Contact

Key Words: Visits; possible venue for bilateral cooperation; instrumentation loan; data access; new ideas.

1. Summary

Visits to Victoria University of Wellington (VUW) and The University of Auckland (UA) are part of an ongoing effort to establish a dialog with Asian-Pacific researchers. Most of the scientists I spoke with do not have current ONR/NRL ties. However, they are participating in research with colleagues at U.S. and European universities and are members of various international scientific societies and their research is in areas of interest to ONR (acoustics; modeling; detection of particulate matter in emissions of diesel engines; and bio-sensory mechanisms of fish).

Every one I spoke with was receptive to my suggestion of a new avenue for bilateral cooperation through interaction with fleet scientists. For some, access to data or a temporary loan of field equipment would facilitate their research. Another scientist has made observations that can be verified by a brief cruise to collect new data. Another wishes to convene a conference of experts to determine the "normal state" of coral atolls. This information would serve as a benchmark against which the status of all atolls could be gauged.

As an aside during a conversation, the subject of sperm whale strandings and subsequent deaths came up. At Kaikoura, on east coast of South Island north of Christchurch, there have been 11 separate incidences since 1993 and none have been publicized. These appear to be normal events, except that the area is a prime site for whale watching.

The pursuit of data on buried Quaternary shorelines and sponsorship of a workshop in cooperation with the INQUA Commission on Sea Level Changes took a major step forward with the help promised by Dr. Collen (VUW) and Dr. Nichol (UA). Their expertise, familiarity with the region and wealth of contacts will help to locate and catalog all existing data and to spur data exchange and release of unpublished material. Dr. Collen's Optically Stimulated Luminescence (OSL) lab will provide the opportunity to establish equivalency of geographically separated shorelines and perhaps insight into the relationship between an individual shoreline's age/depth and its observed acoustic nature.

Dr. Montgomery's work on biologically related topics is known in Code 32. Dr. Pridmore of NIWA stopped in for a visit when I was with Dr. Montgomery and we had an opportunity for a brief discussion.

2. Background

Visits to individuals at VUW and AU were scheduled on the basis of recommendations from ONR Colleagues and other sources. While those individuals I visited were aware of ONR/NRL, most had no direct involvement at present.

The purpose of these visits was to introduce myself and to explain ONRIFO's programs. I wanted to become familiar with their research, determine if I could assist in any way and to see if they had an interest in working directly with fleet scientists on projects of mutual interest.

My initial knowledge of their varied research efforts indicated strengths in acoustics, coastal geomorphology and dynamics, modeling, remote sensing of particulate emissions, bio-sensory mechanisms and mobility of fish.

3. Highlights of discussions

Victoria University of Wellington

Dr. John Collen's participation in SOPEG (South Pacific Applied Geophysics) and STAR (Science Technology and Resources Network) gives him access to researchers throughout the southwest Pacific region. They possess a wide variety of geological, geophysical and oceanographic data that could be of value to the DON scientists. His OSL dating laboratory will contribute significantly to correlating geographically separated shorelines. If an empirical relationship exists

between the acoustic nature of each submerged shoreline and its Quaternary age of formation or its subsequent depth of submergence, then his lab will be invaluable.

Gavin Dunbar is studying the relationship between wave energy and sediment dynamics over a yearly cycle on a pro-grading shelf. He has detailed information from a pro-grading sedimentary sequence deposited in an Antarctic shelf environment 24 my ago. He has two New Zealand coastal sites selected for his field study. These sites appear analogous to the older Antarctic site. He needs to record a year's time series of wave energy data in the present coastal environment in order to understand the relationship between wave energy variability and the dynamic balance between deposition and erosion. In addition, the wave time series data will be useful in verification of wave models.

Dr. David Kennedy's work effort is focused on volcanic islands and atolls. He wants to locate the depth of the boundary between areas affected by mass movement processes and those protected from erosion/mass movement by attachment of coral. The depth lies somewhere between 0 and 500 meters and there is generally a noticeable change in slope where the contact between the exposed basalt and basalt with coral attachment occurs. Access to seismic reflection profiler records will help Dr. Kennedy pinpoint the depth of this boundary and this information will help scientists predict the types of geological processes that will be effective at different depths on the seaward slopes of volcanic islands and atolls.

Dr. Rose Gough's educational background in diesel motor design and construction, combustion processes and applied mathematical modeling has qualified her to design, develop and test remote sensing systems capable of identifying the elemental make-up of particulate matter in diesel engine emissions. While the focus is on selected New Zealand pollutants, other applications for her efforts are apparent.

The University of Auckland

Dr. Chris Tindle's mention of 11 previously unreported incidences of sperm whale strandings and deaths since 1993 at Kaikoura suggests these are a natural phenomena rather than a result of acoustic energy utilized during naval exercises. The only known recurrent activity in the region is whale watching.

His modeling of acoustic energy reflections from the sea surface in conjunction with a colleague at SIO is apparently quite successful and is familiar to ONR Code 32 staff.

He is interested in discussions with fleet scientists and in particular wants to investigate a phenomenon offshore of the New Plymouth Power Station (west coast of North Island, north of Auckland). It is a gas fired power plant and it is well established that fish congregate in the offshore regions west of the plant. His

theory is that the fish are drawn to the area by the existence of a particular acoustic frequency in the offshore waters during the normal operation of the plant. Does this occur in association with other power plants in other parts of the world? What frequency or range of frequencies is present or responsible? He would like to have a U.S. ship with a towed array make a transect perpendicular to the coast, starting 100 km offshore and ending up at 20 km offshore. Another transect further up or down the coast would be required as would a section or two parallel to the coast. Increased concentrations of fish means increased biological noise. There are implications for both offensive and defensive naval operations in regions such as this.

Drs. Scott Nichol, Kevin Parnell and Paul Augustinus are specialists in Quaternary geology and/or coastal geomorphology. The best association for my efforts to study submerged Quaternary shorelines is with Dr. Nichol.

Dr. John Montgomery is working with scientists at WHOI, SIO and University of Chicago on projects involving adaptive motor control, critical boundary flow and an organism's bio-sensing ability to cancel self-generated noise. His guest, Dr. Pridmore, said that ONR was providing conference support to Sam McClatchey for his work on the acoustics of mesopelagic fish. Both were happy with their contacts and support from U.S. sources.

4. Assessment

Several opportunities have resulted from these visits.

Victoria University of Wellington

Dr. Collen's participation in SOPEG and STAR provides an opportunity for ONRIFO to become known by and involved with members of these groups.

His "whole atoll project" is scientifically significant and I am approaching the Geological Society of America to inquire about their sponsorship of a Penrose Conference based on his idea.

His OSL dating laboratory promises to be a very useful tool in dating various submerged shorelines and thus establishing their equivalency. Furthermore, there is the potential to establish an empirical relationship between the age/depth and acoustic signatures of the various submerged shorelines.

Gavin Dunbar needs the loan of two pressure-type wave sensors for collecting a year's time series data on wave energy at two sites on the New Zealand coast. The data will help understand the interaction between deposition and erosion processes as a function of wave energy. This current data will then be used to understand the formation of a 24 my old Cenozoic sedimentary sequence from Antarctica. Furthermore, the wave data will help to test existing wave models.

Dr. Kennedy recognizes that erosion and mass movement processes as well as the establishment of coral growth on the flanks of volcanic islands and atolls are both depth and slope dependent. He is trying to access seismic reflection data to pinpoint the depth at which coral growth becomes predominant.

Dr. Gong's development of remote sensing systems for detection and identification of the composition of particulate matter in diesel engine emissions is presently focused on identifying New Zealand polluters. There are many other applications for her work.

The University of Auckland:

Dr. Tindle's proposal for a study of increased biological activity offshore of a gas fired New Zealand power plant warrants further investigation. The reason(s) for the attraction of fish into this coastal area must be identified. Naval operations in such areas may be affected by this phenomenon.

Dr. Nichol is an important contact in my efforts to identify, map and correlate geographically separate submerged Quaternary shorelines.

Dr. John Montgomery's research is proceeding and he has well-established relationships with U.S. colleagues. Some of his efforts in critical boundary flow may be of value to ongoing AUV, ROV or UUV research.

5. Contacts

Please contact me at: edsalld@onrasia.navy.mil for detailed information on any of the individuals or research activities mention in this report.

Dr. John Collen, Associate Professor in Geology, School of Earth Sciences, Victoria University of Wellington, P.O. Box 600, Wellington, NZ, 64 4 463-5073, John.Collen@vuw.ac.nz.

Dr. Peter Barrett, Professor of Geology and Director, Antarctic Research Centre, Research School of Earth Sciences, P.O. Box 600, Wellington, NZ, 64 4 471-5336, Peter.Barrett@vuw.ac.nz.

Dr. David Kennedy, Lecturer, Institute of Geography, School of Earth Sciences, P.O. Box 600, Wellington, NZ, 64 4 463-6159, David.Kennedy@vuw.ac.nz.

Mr. Gavin Dunbar, gavin.dunbar@vuw.ac.nz.

Captain John J. Langer, USN, U.S. Defence Attache, Embassy of the United States of America, P.O. Box 1190, Wellington, NZ, 64 4 462-6073, usdao@ihug.co.nz.

Dr. Chris Tindle, Associate Professor, Department of Physics, The University of Auckland, Private Bag 92019, Auckland, NZ, 64 6 373 7599, ext. 8871, c.tindle@auckland.ac.nz.

Dr. Paul Augustinus, Department of Geology, The University of Auckland, Auckland, NZ, 64 9 373-7599, ext. 7603, p.augustinus@auckland.ac.nz.

Dr. Kevin Parnell, Senior Lecturer, Department of Geography, The University of Auckland, Private Bag 92019, Auckland, NZ, 64 9 393 7599, k.parnell@auckland.ac.nz.

Dr. Scott L. Nichol, Senior Lecturer, Department of Geography, The University of Auckland, Private Bag 92019, Auckland, NZ, 64 9 393 7599, ext. 8945, s.nichol@auckland.ac.nz.

Dr. John C. Montgomery, Professor, School of Biological Sciences, The University of Auckland, Private Bag 92019, Auckland, NZ, 64 9 373-7599, ext.7208, j.montgomery@auckland.ac.nz.

Dr. Rick Pridmore, Deputy Chief Executive and Co-Director, Institute of Aquatic and Atmospheric Sciences, National Institute of Water and Atmospheric Research Ltd., P. O. Box 11-115, Hillcrest, Hamilton, NZ, 64 7 856-1778, r.pridmore@niwa.cri.nz.

The Office of Naval Research International Field Office is dedicated to providing current information on global science and technology developments. Our World Wide Web home page contains information about international activities, conferences, and newsletters. The opinions and assessments in this report are solely those of the authors and do not necessarily reflect official U.S. Government, U.S. Navy or ONRIFO positions.

[Return to main reports page](#)