The Challenges and Rewards of a Career in Field Oceanography

Professor Tommy Dickey presented a talk entitled “The Challenges and Rewards of a Career in Field Oceanography” at the May 30, 2013 UCSB Geography Colloquium and Student Award Presentations. Following is a summary of the presentation.

It was an honor to be invited to speak at the UCSB Geography Department Colloquium on the occasion of the Student Award Presentations for the 2012-2013 school year. Unfortunately, most of our students were not fortunate enough to know Professor Leal Mertes whose name resides on one of our annual awards. Leal was an amazing scientist and professor in our Department before her untimely death. Thus, I have attempted to develop a lecture that I thought she might enjoy and that would hopefully stimulate our students in the spirit that she inspired her fellow faculty members and Geography students who were fortunate enough to learn from her.

I often hear students expressing concern about choosing a successful career path and some are even anxious to learn how I came to be an oceanographer. In this talk I have used my life and professional career experiences, some serious and some amusing, to tell about some of the lessons I have learned. I grew up in a very small farm town in Indiana named Farmland – a name that my Princeton thesis advisor did not believe until he found it in an atlas! As the son of a small town sportswriter, sports have been an important part of my life. In fact, my father let me write a short article for his column when I was only about 10 years old making me a bit of a local (very local!) child celebrity! Today, both of my sons are prolific writers and excellent athletes. However, I was also fascinated by tornadoes and weather in general as we lived in tornado alley. I saw many funnel clouds and one tornado destroyed a school very near my grandparents’ Indiana home near Farmland in 1974. My brother Don and his wife earlier survived a highly destructive tornado in northern Indiana – dubbed the Palm Sunday tornado outbreak of 1965 - that included a double funnel cloud tornado. In all, 250 people were killed and 1500 were injured in what was recorded as the most devastating tornado outbreak in history. Professor Ted Fujita, a professor at the University of Chicago and often called “Mr. Tornado,” studied the aftermath of these same tornadoes which became important for advancing his theories and understanding of tornadoes. A couple of decades later, I was fortunate enough to meet Professor Fujita at a seminar while a graduate student at Princeton. Interestingly, one of my fellow graduate students, Dr. Richard Rotunno of the National Center for Atmospheric Research (NCAR), is now one of the top tornado experts.

After high school, I received scholarships to attend Ohio University (OU) where I completed degrees in Physics and Math. As a side note, while I was studying at OU, a high school friend and fellow rock band member, Rick Zehringer, wrote and recorded a song named “Hang on Sloopy,” which hit number one on the popular music charts and remained there until it was replaced by the Beatles with their pop classic “Yesterday.” “Sloopy” is now the unofficial song of the state of Ohio and is played at every Ohio State football game. Ironically, Rick, who took the stage name of Rick Derringer, toured with the Ringo Starr All-stars last summer. Rick stayed with rock music while I chose the sciences!

During the Vietnam War, my career path took a detour as I served for about four years as an electronics technician instructor and a human relations instructor in the U.S. Coast Guard. Still
intent on obtaining a Ph.D. in the physical sciences, I lived on Staten Island, New York and enrolled in night classes at Stevens Institute of Technology in Hoboken, New Jersey (both communities were devastated in October 2012 by Hurricane Sandy). My studying was done mostly on the Staten Island ferries and the U.S. Coast Guard ferry during shuttles between Governor’s Island, Manhattan Island, and Staten Island; the ferries passed the Statue of Liberty daily (a place I have never actually visited!). Interestingly, I had one cruise on a Coast Guard cutter and over 1000 “cruises” on each of the ferries! Somehow, I was able to juggle my service duties and attend enough classes to complete an M.S. degree in Physics at Stevens Tech and even taught a few extension courses for the New York Institute of Technology before receiving my honorable discharge. Lesson #1: Stay positive during adversity. Lesson #2: Be persistent. Set goals and have a plan. My persistence was about to pay off!

With the completion of four years of military service, I was anxious to go to graduate school full time. But in what discipline? Four years earlier, I had been accepted to study Physics at UCSB of all places! While teaching at the U.S. Coast Guard Training Center, I met Coast Guard marine science technicians and found the books they were using to be fascinating. The classic book, The Oceans: Their Physics, Chemistry, and General Biology by Sverdrup, Johnson, and Fleming, was loaned to me. I was hooked by this book and an introductory meteorology book as well as a classic ecology book by Eugene Odum. My interdisciplinary career path began at this juncture. So when I learned that Princeton University had recently initiated a new program in geophysical fluid dynamics (part of the newly formed Geophysical Fluid Dynamics Laboratory (GFDL) under a joint agreement between Princeton University and the National Ocean and Atmospheric Administration (NOAA), I applied and was accepted. My thesis advisor was Professor George Mellor, who had served in the Air Force and likely appreciated what I had accomplished over the previous four years. Lesson #3: Determine what kind of science and issues you are passionate about. In my case, it was geophysical fluids. The Indiana tornadoes still fascinated me, but any kind of atmospheric or oceanic fluid phenomenon got me excited.

I did my Ph.D. thesis on laboratory generated internal gravity waves and turbulence under Professor Mellor, who was developing some of the most advanced atmospheric and oceanic turbulent boundary layer models. Later, he developed the Princeton Ocean Model (POM) with Professor Dr. Alan Blumberg, who is now a professor at Stevens Tech. POM is likely the most widely used ocean circulation model in the world. Princeton’s GFDL was a crucible for atmospheric and oceanographic models. Many of today’s atmospheric and oceanic general circulation numerical models can be traced back to GFDL professors and researchers. These include Professor Suki Manabe – famed for his global models simulating climate effects of doubling of CO2 in the atmosphere, Professor Kirk Bryan and Professor Mellor for their ocean general circulation models, Professor Yoshio Kurihara for his hurricane models, and Professor George Philander for his equatorial ocean and ENSO models. Along with Professor Mellor, Professor Philander was especially influential as he encouraged me to publish results of a class project as a theoretical modeling paper in the Journal of Geophysical Research. The paper concerned trapped long equatorial waves off east Africa. Professor Philander later wrote the foreword for the introductory oceanography textbook I co-authored with Professor Sean Chamberlin. I was indeed fortunate to have experienced a paradigm shifting scientific endeavor at its early stage. Lesson #4: Learn from and respect others.
Though I had done theoretical work at Princeton, my real interest was in experimental research. Thus, upon graduation with my Ph.D., I accepted a Rosenstiel Fellowship at the University of Miami to gain experience as a sea-going oceanographer under the guidance of Professor Claes Rooth. Cruises on the RV James Gilliss (Picture 1: recovering a CTD off the Bahamas) and NOAA’s RV Researcher convinced me that ocean field work would provide me with the most scientific enjoyment. After the Miami experience, I was recruited by Dr. Don Walsh to be a professor at the University of Southern California (USC). In 1960, Dr. Walsh, then a Navy Lieutenant, and Jacques Piccard made the historic first dive to the deepest depth in the ocean, the Marianas Trench. At USC, I continued to enjoy teaching and learned how to get research proposals funded – keys to academic success! Early research projects concerned a unique set of observations of a bottom Ekman layer (described later) and pollution in the coastal ocean. The Office of Naval Research (ONR) and National Science Foundation (NSF) began to embrace large interdisciplinary field experiments and thus my time at Miami where interdisciplinary research was beginning to be nurtured served me well. I began developing instrument packages with the engineering expertise of Derek Manov (Picture 2: in the North Atlantic aboard the RV Knorr – Derek (in blue shirt and brown cap) is to the left of me (in visor and striped shirt) in the front row) that simultaneously measured physical, optical, and chemical variables. Some were very successful and others were sadly lost at sea! This included the Multi-Variable Profiler (MVP; Picture 3: MVP being deployed north of Bermuda), which was apparently attacked and destroyed by a nearby mother killer whale protecting her baby. I learned a hard lesson. Don’t paint profilers black and white!

Deep sea moorings became our next platform of choice to collect depth dependent high temporal resolution interdisciplinary data sets. Study sites included the North Atlantic near Bermuda and Iceland and off the east coast of the U.S., the Arabian Sea, the Mediterranean Sea, the equatorial Pacific, and the central and northern Pacific and off the west coast of the U.S. and off Hawaii (see www.opl.ucsb.edu). To date, our group has done about 150 research cruises. Problems of
interest have included bio-optical variability and imaging, mesoscale ocean eddies and their roles in carbon sequestration and ocean ecology, biological and physical upper ocean responses to hurricanes, interdisciplinary equatorial processes involving tropical instability waves and El Nino-Southern Oscillation (ENSO), and the physical and biogeochemical oceanic variability associated with monsoons. Most of these studies remain of interest in regard to climate change, ecosystems, and biogeochemistry and are used by data miners to this day. Lesson #5: Expect your goals and plans to change and adjust. My interests evolved from the theoretical to the laboratory to the field. All three are important and I especially appreciate the theoretical and laboratory education I received at Princeton and the sea experiences at the University of Miami.

My career has enabled me to meet many interesting and influential oceanographers including the aforementioned Princeton professors and Professor Ted Fujita. As an ONR Secretary of the Navy/Chief of Naval Operations Chair, I continue to interact with amazing oceanographers such as 95-year young Walter Munk who contributed to the wave forecasts for the D-Day invasion of Normandy during World War II (Picture 4: my Great Pyrenees dog Theodore Nansen with UCSB ROTC cadets at Therapy Dog Day 2013, which coincided with the 69th anniversary of D-Day) and Dr. Robert Ballard of Titanic (and many other shipwrecks) discovery fame. I have been blessed with the opportunity of working with great colleagues, students, and post-doctoral fellows. From our own department, I worked for several years with former Geography Department chairman and Jerlov Award winner Professor Ray Smith and both Professor Dave Siegel and Professor Libe Washburn who were with me at USC. Again, Lesson # 4: learn from and respect others.

Teaching has always been my first career love. One of my greatest experiences in this regard was writing an introductory oceanography textbook with Dr. Sean Chamberlin, who was formerly a student at USC during Professor Siegel’s studies there (Picture 5). Dr. Chamberlin’s excitement for science, writing, and teaching was and still is contagious. My teaching style has always involved personal and historical anecdotes. These often center upon my fascination with tornadoes and observations of hurricanes. As another example, after visiting the Fram Museum in Oslo, Norway in the early 1980’s, I became fascinated with polar explorer and Nobel Peace Prize winner Fridtjof Nansen who in the mid-1890’s aboard the research ship Fram first observed the surface expression of
what is defined as an Ekman spiral. Ekman spiral currents at depth in the ocean, though predicted on theoretical grounds by Walfrid Ekman in 1905, had been rarely and only rather sketchily observed while I was a student. However, with new technologies and some fortuitous oceanographic observations, my group was able to make detailed Ekman layer measurements (Figure 5) confirming Ekman’s theory. In recent years, I have done extensive research into the lives and exploits of both Fridtjof Nansen and Roald Amundsen and developed lectures about these polar heroes for history and high school groups as well as my own classes. Lesson #4 applies not only to those you meet during your career, but also historical figures who continue to serve as role models. Nansen, Amundsen, Ekman, and Michael Healy (a heroic U.S. Revenue Cutter Service captain whose Alaskan exploits are legendary and whose name resides on a present day Coast Guard icebreaker) are my favorites.

Many of my former students have seen me on campus and excitedly recounted stories about these polar explorers along with the names of my Great Pyrenees dogs well after completing my classes! Yes, my Great Pyrenees Pyrfessors are somewhat legendary (Picture 6 [upper left – cover of our oceanography textbook; upper center – Dr. Sean Chamberlin; upper right – Hot Rod Linkin with Terrie Strom and Tommy; lower left – Geog 3a student with Theodore Nansen; lower right – Theodore Nansen and Mia with my son’s high school class] and Picture 7 [at lecture on nautical dogs with Surfer Girl (Bikini) and Theodore Nansen]). One day I was lecturing about the southern California Bight and my Great Pyr Theodore Nansen ambled up to the chalk board and stood on his hind legs and pointed right at the Bight! My Great Pyrenees indeed serve to attract and amuse students. As certified and award winning therapy (and show dogs) they visit UCSB during Therapy Dog Day each quarter, participate in Special Olympics events, and visit high schools and the elderly. Lesson # 6: grow through community service.
doing activities that you enjoy. In my case, I enjoy my amazing Great Pyrenees dogs who do all
the therapy ‘work’ by just being themselves.

I hope that these stories, shared experiences, and life lessons will be useful in your endeavors.

**Bio:** Professor Dickey received his B.S. and B.A. degrees in Physics and Math from Ohio
University, an M.S. in Physics from Stevens Institute of Technology, and his M.A. and Ph.D. in
Geophysical Fluid Dynamics from Princeton University. Before joining the Geography
Department at UCSB in 1996, he co-founded and was the co-director of the Hancock Institute for
Marine Sciences at the University of Southern California. He has served as an editor for seven
oceanographic journals. He has taught over 10,000 students and his group has participated in
over 150 research cruises. In recent years, he has led 6 major national and international
oceanographic research programs. He was awarded a Secretary of the Navy/Chief of Naval
Operations Chair in Oceanographic Sciences in 2008. Only 12 oceanographers have received
this honor in the past 25 years. Other Navy Chairs include Walter Munk, Bob Ballard, and Carl
Wunsch. He is a Fellow of the American Geophysical Union and has received several other
awards for his research and teaching.