

Reflections on the Life and Science of Professor Douglas Lamar Inman
Scripps Institution of Oceanography (SIO)
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by
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“The Rock”, Professor Douglas L. Inman, on whom the science of Coastal Processes and the Center for Coastal Studies were built

Scientific Pioneer and Coastal Activist: Among the last of the legacy SIO professors from the *Greatest Generation*, Professor Douglas L. Inman (Doug) was the first to add the “geo” part to the scientific discipline we know today as *Geophysical Fluid Dynamics*, (GFD). Generally speaking, GFD is the science of the *motion in the ocean*. While the earliest theoretical work in this field (circa 1950’s) treated ocean motion with rigid boundaries between land and sea, Inman was the first to consider the complexity of how those boundaries actually move, and in turn modify the ocean motion. He was the protege of Professor Francis P. Shephard, who was widely regarded as the father of *submarine geology*. Doug first introduced his revolutionary ideas about the mechanics of movable land/sea boundaries when (as a graduate student) he contributed two chapters to Shephard’s classic textbook, *Submarine Geology*; wherein he merged the mathematics of fluid dynamics with the principles of geology and geomorphology.

The interface between land and sea (the shoreline and nearshore), is in continuous motion because of the mobility of sediment; and Inman invented a concept known as the *Littoral Cell* that establishes natural boundaries on the complete cycle of sediment movement. While another early marine geologist, K.O. Emery, gave descriptions of features of a littoral cell, Inman made it a computational tool when he added the principles and calculus of the *sediment budget* (mass balance) to the littoral cell concept. Inman has expanded this concept to explain 95% of the world’s coastal diversity through a geomorphic coastal classification system; thereby providing a computational framework upon which nearly all of the modern coastal erosion computer models are based.



Figure 1: Philippe Cousteau (left), and Doug Inman (right) prepare to board the Cousteau dive saucer in 1966 for excursions to 1,000 ft. depths in the Scripps Submarine Canyon.

Inman proved his littoral cell concepts in a series of legendary field experiments. The earliest involved tracking dyed sand in the surf zones at El Moreno, Baja California, in 1965 and 1966 and at Scripps Beach, La Jolla, CA, in 1967 & 1968. These experiments proved mathematical predictions of the rates of sand movement in the surfzone. These early findings were presented to the public in his 1965 Academy Award winning film “The Beach, River of Sand” produced by *Encyclopedia Britannica*. In dives to 1000ft depths in the Scripps Submarine Canyon in 1966 using the Cousteau dive saucer, (Figure 1), Doug was able to prove that littoral cells are constant loss systems that require a continuous source of new sand from rivers and bluffs to maintain equilibrium. His findings were originally published in a landmark paper in *Science* in 1973 entitled, “The Coastal Challenge”, wherein he predicted that the effects of dam construction on coastal rivers, and hardening of the coastline with harbor breakwaters, seawalls, revetments and jetties, would eventually result in the loss of most of the nation’s sandy beaches. Doug was well aware of the societal implications of these pioneering works, and became a coastal activist. In collaboration with then Assistant SIO Director, Jeffery D. Frautchy, they authored many of the sections of the California Coastal Act of 1976. Language like, “protect, conserve, restore and enhance environmental and human-based resources of the California coast and ocean” were written by Jeff and Doug to discourage or forbid new coastal structures that impede or prevent the flux of new sediment into the littoral cell, so vital to maintain its steady state equilibrium. Later, Inman updated these concepts in peer reviewed publications and conference proceedings to account for climate cycle impacts and sea level rise.

Patriot: Doug hated war, and politically was a liberal, anti-war supporter his entire life. But, when his country called upon him, he was always there for his country. Shortly after the Pearl Harbor attack, Doug enlisted in the U.S. Marine Corps, while his mother drove a fork lift at North Island Naval Air Station. The Marine Corps had the good sense to not make an infantryman of him (Figure 2); and instead, sent him off to Harvard and later MIT to become a radar expert, eventually being commissioned as a major in the U.S. Marine Corps. After setting up the Marine Corps Radar School at Camp Lejeune, he led the first radar-controlled anti-aircraft artillery unit ashore in the bloody WW-II invasion of Angaur in the Palau Islands, September 1944. (He would never speak about his combat experience, not even when asked by SIO Director, Roger Revelle; but he did attend a 50th reunion of surviving members of his anti-aircraft combat unit.) Because of his experience bringing heavy radar equipment ashore in the Angaur invasion, the staff of General Douglas MacArthur sought his input and recommendations during the planning of the Inchon landings, (turning point of the Korean War), where MacArthur’s landing forces at Red Beach and Green Beach had to negotiate 25 foot tidal ranges and peak tidal currents that reached 5 knots. (Inman recommended against attempting the Inchon landings).

Decades later, in 1967, his country called on him again, to find tactical harbor sites on the coast of South Vietnam that could provide *logistics over the shore* (LOTS) for American combat units operating in remote areas along the Viet Nam coast. While performing aerial reconnaissance of potential sites, his helicopters were shot down on four separate missions, escaping injury each time; but returning home with a wealth of photographic data that he would later use to refine littoral cell parameters for his developing geomorphic coastal classification system.

Scientific Ambassador: Doug was born the son of a *China Marine* in Guam at a time when the United States was trying to intervene in China against the ideologies of European *Colonial Spheres of Influence* and the Japanese’ *Greater Asian Co-Prosperity Sphere*. For most



Figure 2: Doug Inman, newly-minted U.S. Marine Corps enlistee.

of his formative years, he grew up in China, and became near-fluent in the Mandarin dialect. He also spent a few years in the Philippines before returning to San Diego to complete his high school education. From such early beginnings abroad, he was well-suited to become an international ambassador of science in the 1950's. In 1959 he taught an international UNESCO class in marine science conducted at the old French Oceanographic Center in Nha Trang, Viet Nam, and later in Erdemli, Turkey. While the Viet Nam War was reaching a climax, President Richard M. Nixon normalized relations with the Peoples Republic of China (PRC) in February 1972. Four months later, Professor Douglas L. Inman was chosen as one of four American

scientists to form a good-will delegation to the PRC to further strengthen the normalization relationship begun by President Nixon.

Following the end of the Yom Kippur War in October 1973, fought between Israel and a coalition of Arab states led by Egypt, Doug again was at the forefront of normalizing international relations. This time his littoral cell concept became the currency of peace. After making UNESCO sponsored presentations on the Nile Littoral Cell at conferences in Alexandria, Egypt, and at the Israel Oceanographic and Limnology Institute, Doug was asked by the U.S. State Department to organize the *Middle East Cooperative Study* to get Egyptian and Israeli scientists to work together in solving the erosion problem of the Nile Delta and degradation of the Bardawil Lagoon. (Littoral drift in the southeastern Mediterranean Sea was eroding the Nile Delta, closing the mouth of the Bardawil Lagoon, and depositing the eroded delta soils along the coast of Israel). The first meetings of this group of Egyptian and Israeli scientists were held in secret at SIO in building T-29 (the *Martin Johnson House*), under protective custody of the FBI. These formative meetings at SIO went so well, that the United States Agency for International Development (USAID) provided decadal funding for the *Middle East Cooperative Study*, which provided cooperative underpinning for the Egypt-Israel Peace Treaty in 1979, brokered by President Jimmy Carter between Egyptian president Anwar Sadat and Israeli prime minister Menachem Begin. USAID funding for the *Middle East Cooperative Study* continued until 1992, and throughout that entire period, the Center for Coastal Studies at SIO was the home of visiting scientists from Egypt and Israel who became members of the *Inman Tree* by learning his special brand of the *Sverdrup-Revelle Curriculum* and traditions.

Organizational Genius: In the world of water-tight compartments that made up the organizational chart of SIO during the 1950's, (up until perhaps the 1990's), Doug was a 'tweener; i.e. marine geologists didn't think of him as a geologist; and physical oceanographers didn't regard him as a physicist. And so, in 1965, Doug convinced newly appointed SIO Director William Nierenberg to let him invent the *Shore Processes Study Group*; and it resided on the third floor of the old Ritter Hall. This group quickly expanded with the addition of new graduate students, staff research associates, and developmental technicians, and the group spread throughout old WW-II vintage buildings and trailers that no longer exist. The most precious commodity at SIO is space, but there was no more of it available on the SIO campus by the early 1970's; and so Doug created his own space. With \$48,000, he built new offices in 1973 on the roof of core locker for the Deep Sea Drilling Program, directly adjacent to where the SIO pier meets the land. He named his new facility the *Center for Coastal Studies*, (CCS), and it was elevated to the status of an *organized research unit* (ORU). As its *founding director*, Doug quickly grew the CCS, and by 1975, it took over the lower 2 floors of the Deep Sea Drilling core locker. In an all-hands meeting that summer, he walked into the conference room and broke into that little boy smile of his when he called the roll: 10 graduate students, 1 post-doctoral candidate, 29 staff, 40 dedicated coastal science folks in all! But he was paying a heavy toll managing so large a group, while directing a major USAID program. He was becoming like Gulliver with all the Lilliputians tying him down with thousands of little administrative strings, which more and more were keeping him from doing what he liked most, science.

From Tragedy to Renaissance: The decade of the 1970's were the best of times, and worst of times for Doug. While the ORU he founded was thriving, he suffered incredible personal tragedies, losing his son Mark in a traffic accident, and later, his wife, Ruthie, to leukemia in 1978. But then, in 1980, he met and married Dr. Patricia (Pat) Masters. Pat overhauled Doug's life; got him on a healthy diet; got rid of the mold in his 30 year-old home

that gave him so many respiratory troubles; and got him out from under the administrative chores he hated so much. Doug handed over the directorship of CCS to the very capable leadership of Prof. Clinton Winant, who Doug had recruited as a post-doctoral candidate in 1973. But, more importantly, Pat got him back to doing what he loved most, science; and in Pat, Doug found an eternal *science buddy*. In particular, they shared a common joy for archeology. Doug loved picking through middens with her atop coastal bluffs or SCUBA diving for ancient grinding bowls off La Jolla, looking for clues of the native Americans who foraged for shell fish along the shorelines of Southern California during and after the last ice age (18,000 – 5,000 years ago). Together they made some remarkable discoveries. From the types of clams and mussels shells they found in the middens of the ancient native Americans, they were able to prove that wide sandy beaches do not exist during periods of rapid sea level rise, and that only because of wave cut platforms formed during still-stands of sea level can such beaches be sustained. This finding is especially relevant today as the California Coastal Commission struggles with the issue of sea level rise from global warming; how to adapt to it while maintaining coastal resilience. For Doug, Pat was the gateway to some of the most interesting and scientifically productive years of his life.

Immortality: While Doug probably believed we get just one visit to this planet, the footprints of all the students he mentored give him immortality. Altogether he guided 14 graduate students in attaining their Ph.D. in Oceanography; in chronological order: Prof. Tony Bowen, Prof Paul Komar, Dr. Robert Tait, Dr. Edward Tunstill, Prof. Robert Guza, Prof. David Aubrey, Dr. Reinhard Flick, Dr. James Bailard, Dr. Scott Jenkins, Dr. Steve Pawka, Prof. Daniel Hanes, Dr. Thomas White; Dr. Saima Aijaz, and Dr. Daniel Conley. He also counselled three post-doctoral candidates: Prof. Clinton Winant, Dr. Thomas Drake, and Dr. Peter Adams. His mentorship might be referred to as *tuff love*. He put a roof over your head, gave you a stipend to live on, lots of pencils, tablets, computers and sophisticated instrumentation and a large team of field support personnel to help you with your field and laboratory work; but he would not *spoon-feed* you. In the end, it was up to you to do your own original research and extend the boundaries of science beyond the limits of what was already known. In so doing, he taught you how to be a true professional, a scientist. But he also raised us all in *The “Sverdrup-Revelle Tradition* of basic science applied to a specific problem; meaning when there is a need for basic science to be applied to help answer a problem of societal relevance, then you should do it, and you have an obligation to do it.

For more detail, cf. “Oral History of Douglas Lamar Inman”, Interview conducted by Laura Harkewicz, 8 May 2006 and 16 May 2006, <http://www.escholarship.org/uc/item/90h8q3s7>



**Goodbye, our beloved *ancient mariner*...thank you for helping us find our
northwest passage.**