Testimony of

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Introduction

Good afternoon, Madam Chair Murkowski, Ranking Member Cantwell, and honorable members of the Senate Committee on Energy and Natural Resources. It is my great pleasure and high honor to be here today, and I thank you both for holding this hearing and for the opportunity to appear here before you. For the record, I am James H. Knapp, Professor in the School of the Earth, Ocean, and Environment at the University of South Carolina, and I currently serve as Past Chair of the Faculty Senate at the University of South Carolina Columbia campus. I will be summarizing my written testimony in these opening comments, which I submit for the record.

Educational and Professional Background

By way of background, I was born and raised in California, have lived in six and traveled to 49 states (with the notable exception of the great state of Alaska), and through my profession as an Earth scientist, have worked in or visited more than 40 countries. I hold a Bachelor of Science degree with distinction in geological sciences from Stanford University, and a Ph.D. in geology from the Massachusetts Institute of Technology. From 1988 to 1991 I worked with Shell Oil, where I participated directly in oil and gas exploration in the Gulf of Mexico. For 25 years since then, my research team and I have carried out both fundamental and applied research in the Earth sciences, including the design, acquisition, processing, and interpretation of seismic surveys, both onshore and offshore. Many of my former students remain gainfully employed in the energy sector, despite the significant downturn in the industry over the last two years. For the past eight years, I have been a vocal advocate for the acquisition of new seismic data on the Atlantic OCS, both such that the Bureau of Ocean Energy Management might fairly execute its statutory obligation to adequately evaluate the resource potential of this essentially frontier petroleum province, and so that those of us in the scientific community might perpetuate the fundamental and historic legacy of this continental margin.

History of Marine Seismic Surveying

A hundred years ago, our knowledge of the geology beyond the shoreline, not only here in the United States but worldwide, was largely in a state of ignorance. Beyond simplistic soundings of water depth in near-shore areas, or primitive measurements of ocean currents, the nature of ocean basins and the submerged portions of continents, or continental shelves, was largely unknown. Beginning in the late 1920's, pioneering scientists here in the United States first developed the theoretical basis for and subsequently the practical application of marine seismic surveys, ironically right here on the Atlantic Coast at the mouth of Chesapeake Bay (Figure 1; Ewing et al, 1937), no less than 150 miles from where we currently sit.

This marine seismic work, which evolved over the ensuing decades here on the Atlantic margin of North America, was literally the stuff of legends, involving dedicated teams of scientists, operating heavy equipment at risk of life and limb in the challenging marine environment, all in the name of the public interest. These seminal studies

ultimately led to the recognition that the continents are composed of fundamentally different rocks than those underlying the ocean basins, discoveries that laid the groundwork for the eventual scientific revolution of plate tectonics in the 1960's. Given the long-standing significance of these marine seismic surveys, we still routinely recount this history in our introductory textbooks and courses in geology for thousands of college students.

Modern Seismic Surveying

Obviously, neither seismic surveying nor offshore exploration are new to the Atlantic OCS. More than 240,000 line miles (385,000 line km) of 2-D seismic reflection data were acquired off the shores of the U.S. Atlantic between the late 1960s and late 1980s (Figure 2), in support of an earlier phase of petroleum exploration during which 51 offshore wells were drilled. In preparation for these activities, extensive environmental impact studies were carried out by federal agencies, much as they are today, evaluating the potential impacts of seismic surveying and offshore drilling on tourism, commercial and recreational fishing, and marine shipping and commerce. These other uses of the marine and near-shore environment have continued apace over the last 50 years, despite the previous efforts for offshore energy development, belying the claim that such activities are mutually exclusive.

These legacy seismic data, released by the federal government following a 25-year moratorium, are providing fundamental new insights on the geologic evolution of the eastern margin of North America. Not only does it appear that a significantly larger portion of the southeastern U.S. was once a part of the African-South American continent (Gondwana) than previously thought, but these data are helping to identify previously unrecognized faults on the continental margin which may pose a significant earthquake and tsunami risk to coastal communities along the Eastern seaboard. We are also analyzing these same data through federally-funded research projects to evaluate the potential for wind energy development and geologic storage of CO2 in the offshore.

Despite the enormous scientific value of these legacy seismic data, fully 80% of the territory that was included in the draft 5-year plan has never been evaluated with commercial seismic surveys (Figure 3). Furthermore, modern seismic surveys, driven globally by exploration activities over the last two decades (Figure 4), have ushered in fundamentally new models for how continents break and continental margins evolve.

Conclusion

In conclusion, I remain hopeful that either Congress or a new administration may yet reinstate an opportunity for market forces to determine whether offshore oil and gas development is warranted on the Atlantic OCS. Those decisions can only be made in an informed way on the basis of new, state-of-the-art seismic surveys, and unless Congress is willing to appropriate the hundreds of millions of dollars for these surveys, they will likely only take place if there is at least a prospect that seismic contractors might recover a return on their investment based on a future lease sale.

Figures

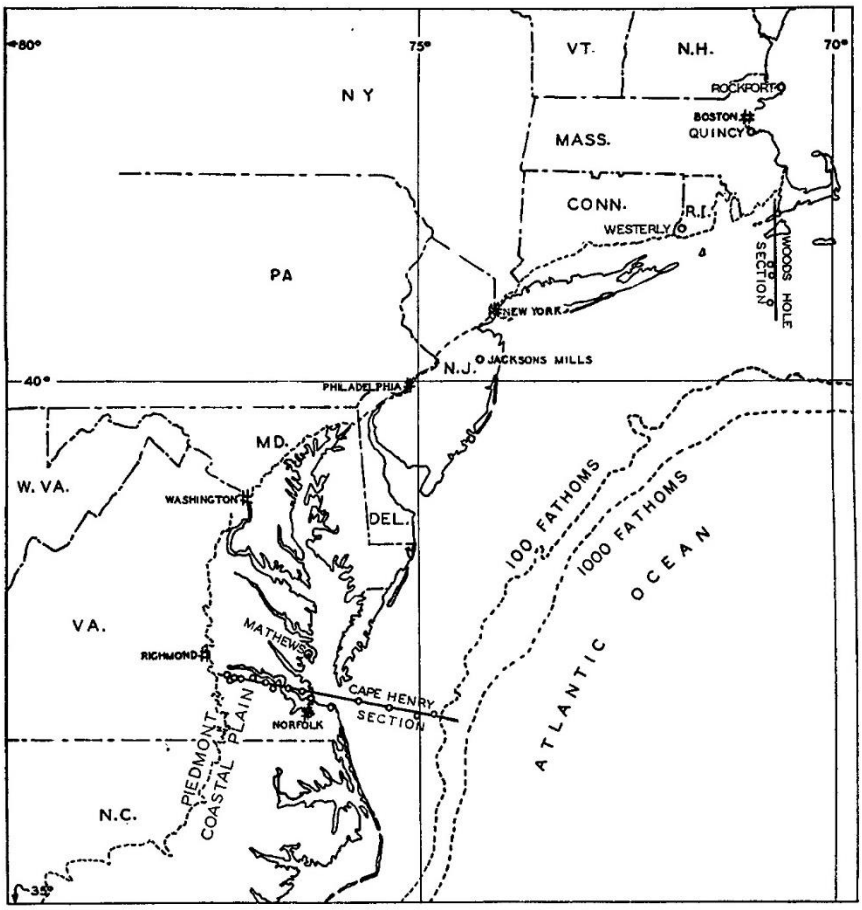

FIGURE 1.—*Key map of regions studied*

Figure 1. Location map of first marine seismic survey, conducted at the mouth of Chesapeake Bay near Cape Henry (from Ewing et al, 1937; "Hence, it seems reasonable…to consider the present work the initial application of seismic measurements to submarine geological problems.")

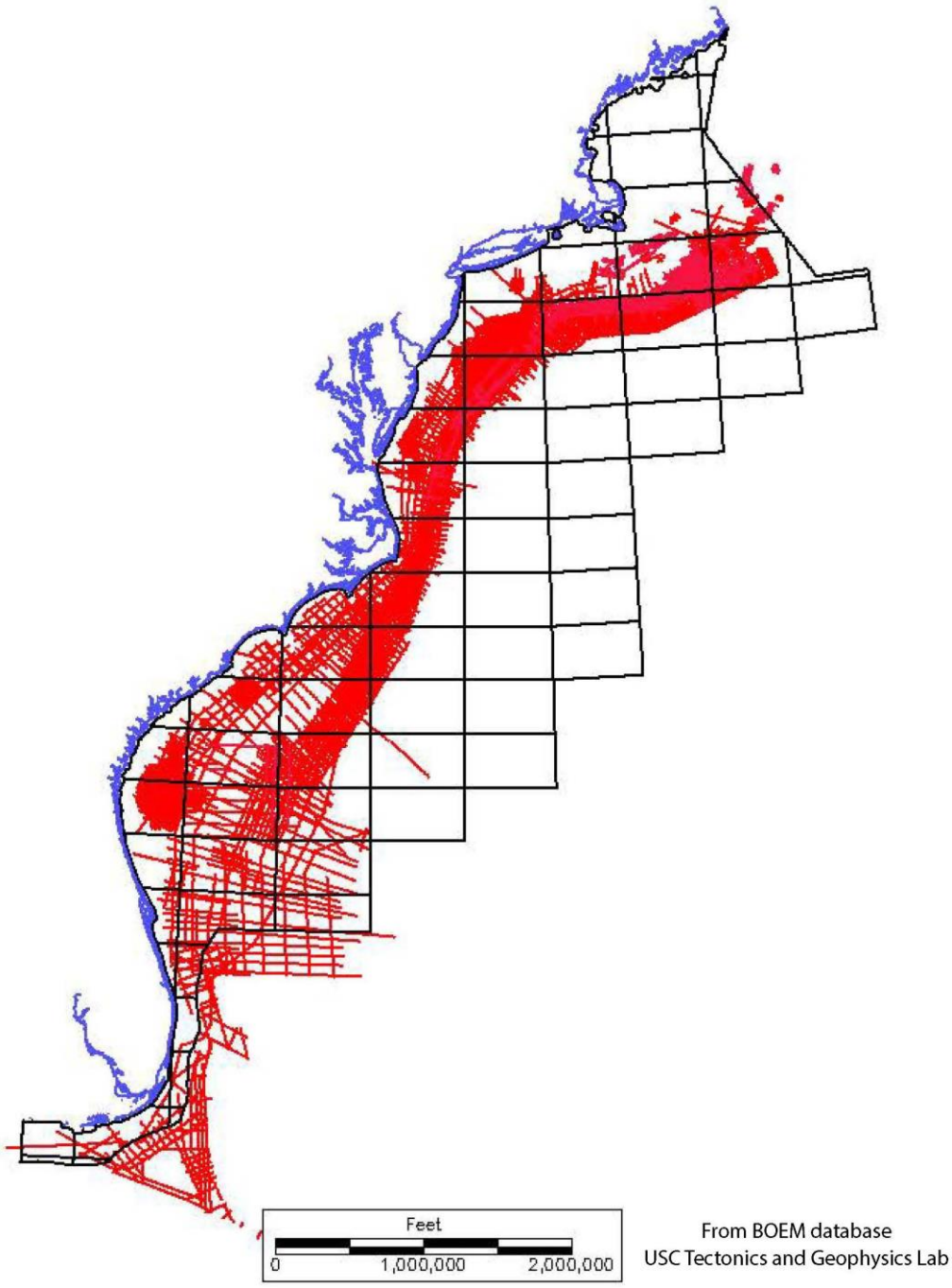

Figure 2. Map of legacy 2-D seismic data on the Atlantic OCS (courtesy of BOEM.) Approximately 380,000 line km (240,000 line miles) of 2-D seismic data were collected in the Atlantic OCS between 1966 and 1988.

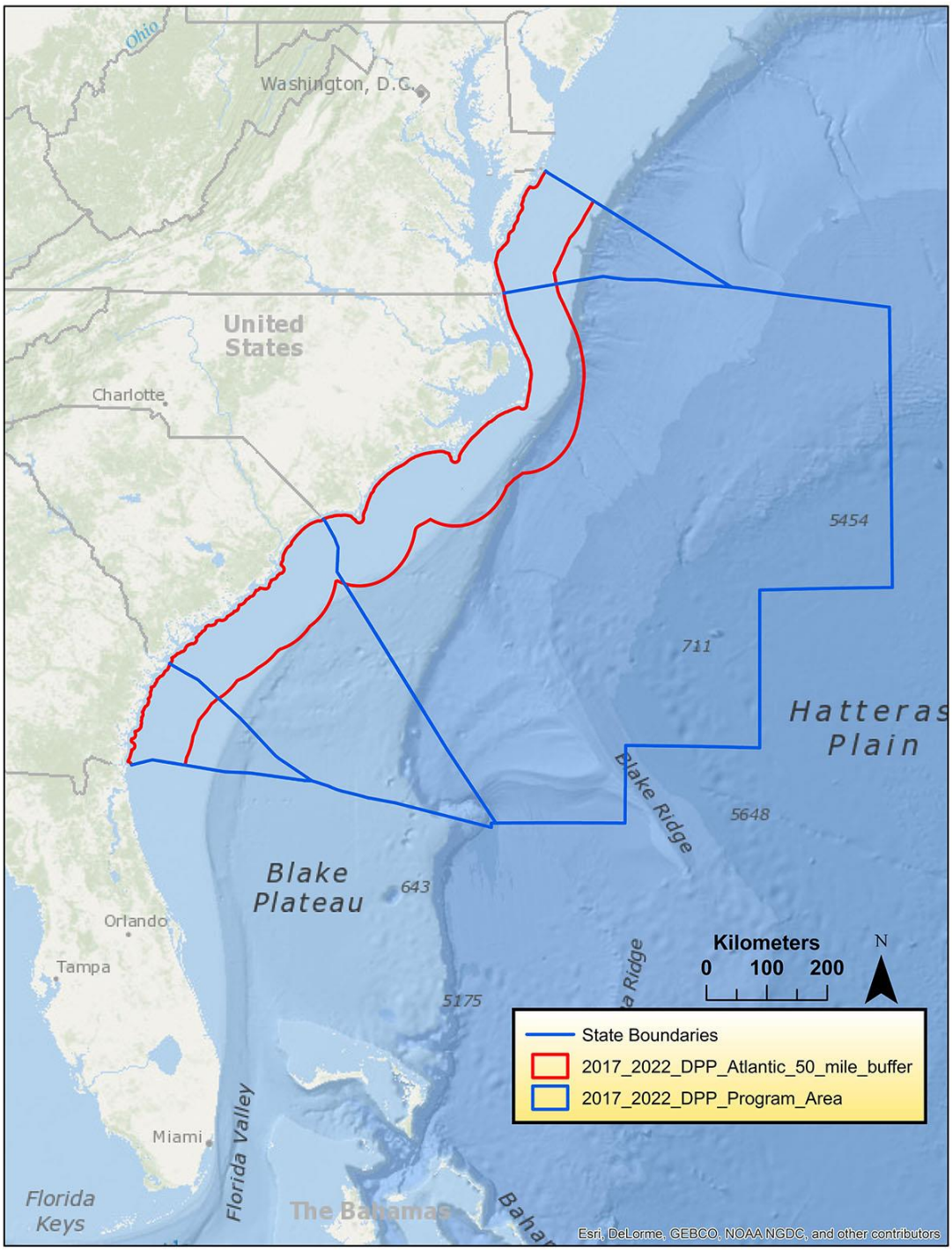

Figure 3. Area within Mid- and South Atlantic OCS Planning Areas originally included in the BOEM Draft Proposed Plan for 2017-2022. Red boundary represents 50 mile buffer zone from state waters. Fully 80% of area which was under consideration for exploration leases has never been the subject of commercial seismic surveys. (Produced at the Tectonics and Geophysics Lab at USC with information from BOEM.)

Figure 4. Map showing current offshore exploration efforts in the Atlantic Basin. Conspicuously absent are the Atlantic continental margin and Eastern Gulf of Mexico of the United States. (Courtesy of G. Steffens, Shell Oil Co.)