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Laudatio

Presentation of the Emil Wiechert Medal to Don L. Anderson, Pasadena

April 8, 1986, Karlsruhe



The Executive Committee of the Deutsche Geophysikalische Gesellschaft has decided to bestow its highest award, the Emil Wiechert Medal, on Don L. Anderson. The medal bears the name of the first president of the Deutsche Geophysikalische Gesellschaft following its foundation in 1924. Since first being awarded to Julius Bartels, the Emil Wiechert Medal has been conferred on Beno Gutenberg, Albert Defant, Inge Lehmann, Sydney Chapman, Ludwig Biermann, Leon Knopoff and Ulrich Schmucker. This year, during its 46th Annual Meeting at Karlsruhe, the Deutsche Geophysikalische Gesellschaft awards the Emil Wiechert Medal to a scientist who, in his own pioneering research, unifies many of the rapidly expanding branches of geophysics and of the earth sciences.

Physics and chemistry of the earth's interior and planetary geology are his prime interests. However, seismology is still the base of his exploration of the solid earth and other planets. He provided the earliest comprehensive dispersion

tables of surface waves for oceanic and continental paths. Propagation of surface waves in heterogeneous anisotropic media was among his earliest interest in seismology. This subject can be followed through his entire career to the new frontier of three-dimensional seismic mapping of convection in the mantle, similar to medical tomography, and of delineating the direction of convection from the orientation of anisotropy. Together with A. Dziewonski, he established the preliminary earth model PREM which comprises our present knowledge of radially symmetric earth properties.

It is the strength of seismology to provide not only structure, but also physical properties of the earth's interior. There was always a certain fascination for seismologists to reach beyond their own realm of research. Early seismologists, like Wiechert, Gutenberg, Adams and Williamson, were tempted to explore the implications of their seismological findings for the physics and chemistry of the earth's interior. Don Anderson shares this fascination. Finite-strain theory led him to a seismic equation of state, relating the two seismic wave velocities directly to density. He studied the effect of partial melting on the seismic wave velocities and developed a model for the frequency-dependent attenuation and viscosity of the earth, comprising the range from seismic to tidal frequencies.

Geophysical tests of petrological hypotheses have always been a challenge to Don Anderson. Noteworthy are his investigations of the mantle-transition zone Bullen C and its relation to a change in composition. From the sharpness of the 650-km discontinuity, he postulated the lower mantle to be chemically different from the rest of the mantle.

Looking at the earth from an extraterrestrial perspective, Don Anderson explained the thin crust of the earth in comparison to that of the moon by the difference in thermal parameters of the two bodies. He concluded that most of the terrestrial "crust" is buried as an eclogite layer on top of the transition zone.

Recently he developed a hypothesis for cyclic continental aggregation and disaggregation. He related the breakup of Pangea as a supercontinent to the shape of the geoid, global heat flow, the insulating effect of the continental lithosphere and true polar wandering. Thus he explained the peculiarity of synchronous global tectonics and magmatic activity, rapid breakup and dispersal of continents, following long periods of static pole positions separated by periods of rapid polar wandering. He even linked tectonic and magnetic field variations.

Don Anderson is Professor of Geophysics and the present Director of the Seismological Laboratory at the California Institute of Technology in Pasadena. In this position he succeeded Beno Gutenberg and Frank Press. He is President-Elect of the American Geophysical Union. As a member of the National Academy of Sciences, as a fellow of the American Academy of Arts and Sciences and Foreign Honorary Fellow of the European Union of Geosciences, his merits have been previously recognized.

It is my duty and honour to award the medal. It bears the inscription:

„Die Deutsche Geophysikalische Gesellschaft e.V. verleiht die Emil Wiechert-Medaille an Don L. Anderson, Pasadena, für seinen grundlegenden Beitrag zur Erforschung der Struktur und Zusammensetzung der Erde“.

Heinrich Soffel
Vorsitzender
der Deutschen Geophysikalischen Gesellschaft