

Francis J. Lerch (1923-1999)

Frank Lerch, who was a key member of NASA Goddard Space Flight Center's gravity modeling effort for over 25 years, passed away quietly at his home in Bowie, Maryland, in January of 1999, after several years of heart ailment. Frank retired from Goddard in 1995. As a mathematician, he was responsible for developing many of the numerical techniques which are now in common use to process satellite tracking data, combine satellite and surface gravity data, and solve the resulting system of normal equations used to estimate the geopotential field and provide a realistic assessment of the errors. Over the entire course of his career, the gravity models he led in development were among the international standards.

Frank came to Goddard in 1960 when NASA itself was in its infancy. He had a Bachelor's Degree in mathematics from West Chester State University, Pennsylvania, in 1948, and a Master's Degree in mathematics from the University of Delaware in 1950. Prior to joining Goddard, he worked as computer program analyst in military and private sectors. Frank set Goddard on its current path for determining models of the gravity field, working closely with many NASA employees — including the (late) Jim Marsh, Dave Smith, Carl Wagner, Steve Nerem and Frank Lemoine, and supporting contractors— including the (late) Girish Patel, Joe Chan, Doug Chinn, Nikos Pavlis, Erricos Pavlis, Ron Williamson, and Steve Klosko, Frank was the constant force setting the technical direction for the gravity field development work. He also worked closely with University partners including Richard Rapp, Chris Jekeli, George Born, and Byron Tapley.

Frank's career was centered on the Goddard Earth Models (GEMs) series, Joint Gravity Models (JGMs — with the University of Texas, CNES and JPL as partners), and began the work towards achieving EGM96, Goddard's latest collaboration with the National Imagery and Mapping Agency and the Ohio State University.

Mild in nature at workplace, Frank worked tirelessly, was very innovative, and established a continuous program to make the models better through optimal procedures in incorporating improved data. He was a monumental influence to those undertaking this challenge. He struggled to understand the nuances of millions of observations. Given the elusiveness of finding calibrated error assessments, Frank developed largely objective methods for gauging the accuracy of the models he produced. In passing, Frank left a legacy of tools, techniques and work habits aimed at solving this complex problem. The techniques he developed not only are now in use for Earth-related work, but have been used to determine the gravity field and yield better orbits for Venus, Mars, the Moon, and will be used for asteroids rendezvous and other planets and satellites such as Mercury and Europa.

Many of us owe a great deal to Frank. He demonstrated how to go about solving complex numerical problems and the enjoyment of producing exceptional results. To Frank, no challenge seemed too daunting and he demonstrated an eager willingness to revisit the same science challenges over and over again as new technologies, computer systems, and data sets allowed significant improvement over earlier work. Frank cared deeply for the well-being of the gravity team around him, and through his strength and convictions, kept the team intact and performing for nearly 30 years

For all of his hard work and ingenuity, Frank was awarded NASA's Medal for exceptional Scientific Achievement (1975). He received the Certificate for Outstanding Performance, the Special Act Award, and numerous Quality Increase Awards. The Groups he led have received seven NASA Group Achievement Awards ranging from support for Apollo-Soyouz (1976), to the first GEOS-1 Geodesy Project (1965), to the recent truly remarkable achievements in delivering unprecedented orbit accuracy for the TOPEX/Poseidon Mission



(1993). Frank was an author/co-author on over 30 refereed journal publications and was selected to write the "Status of the Geopotential" section of the 1983 US National Quadrennial Report to the International Union of Geodesy and Geophysics. He was a member of American Geophysical Union's Geodesy section since 1976.

Frank had long been a tenacious player on the tennis court and a member of the Goddard Tennis Club until he was well into his 60's. He is survived by his wife Margaret, two children and one grandchild. While Frank will be missed, his insights are living on in a whole new generation of scientists who are now using his techniques. We are all saddened and share with his family a sense of loss.

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