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Editorial

C. J. Ebinger

The current issue contains the last paper by F. A. Dahlen. Tony, as he was known, served our journal as an associate Editor from 1977 to 1980, when it was still the 'Geophysical Journal of the Royal Astronomical Society'. His 64th paper in the journal was submitted in his 64th year, but Tony passed away June 3 2007, before its completion.

Over the course of his distinguished career, starting with his two-part 'The normal modes of a rotating, elliptical Earth' (Dahlen 1968, 1969), Tony continued publishing seminal contributions to theoretical geophysics—at a rate of one or two papers per year in this journal alone.

Initially primarily concerned with the free oscillations of the Earth, his work eventually came to encompass all of theoretical global seismology—the title of his monumental 1998 textbook written on the subject (Dahlen & Tromp 1998), including normal-mode theory, Earth rotation, the earthquake source, body waves and surface waves. In addition, he made lasting contributions to the mechanics and themodynamics of brittle frictional mountain building. Among his numerous contributions in the last decade were paradigm-shifting papers in a series on 'finite-frequency sensitivity kernels'.

While these 'banana–doughnuts', as they became widely known, emerged as the topic *du jour* in geophysical circles, Tony had set his sights on solving a problem of a quite different nature: the analysis of noisy data distributed over incomplete portions of a spherical surface.

As paraphrased from the paper in this issue (Dahlen & Simons 2008), as often arises in the (geo)physical sciences, we do not have access to, or may simply not be interested in, the values or properties of data outside some particular subregion of the sphere. As it turns out, noise-contaminated spherical data on mere portions of the sphere are best studied using so-called 'spherical Slepian functions' (Simons *et al.* 2006). These were named after David Slepian, the mathematician whose authoritative work on the eigenfunctions of the 1-D Dirichlet kernel (Slepian 1983) led to the widely used 'multitaper method' of time series analysis (e.g. Percival & Walden 1993).

Two different statistical problems that arise in this context are (i) how to find the best estimate of signal given such data and (ii) how to construct from such data the best estimate of the power spectral density of the signal. A treatment of the first problem was published in this journal two years ago (Simons & Dahlen 2006), the second forms the subject of the paper in this issue (Dahlen & Simons 2008). Applications of the theory include disciplines as diverse as geodesy, geomagnetics, planetary science and global seismology, as well as, further afield, astronomy, cosmology, helioseismology and medical imaging.

Tony collected all of the important awards in seismology and geophysics, and was a member of the United States National Academy of Sciences—but he always seemed most happy doing science, and helping others do theirs. He was a wonderful advisor and mentor to his students and post-docs and an incredibly generous colleague and collaborator. We at the 'Geophysical Journal' feel privileged to have known this remarkable man.

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REFERENCES

Dahlen, F.A., 1968. The normal modes of a rotating, elliptical Earth, *Geophys. J. R. astr. Soc.,* **16,** 329–367.

Dahlen, F.A., 1969. The normal modes of a rotating, elliptical Earth—II: near-resonance multiplet coupling, *Geophys. J. R. astr. Soc.,* **18,** 397–436.

Dahlen, F.A. & Simons, F.J., 2008. Spectral estimation on a sphere in geophysics and cosmology, *Geophys. J. Int.,* **174,** 774–807, doi:10.1111/j.1365-246X.2008.03854.x.

Dahlen, F.A. & Tromp, J., 1998. *Theoretical Global Seismology*, Princeton Univ. Press, Princeton, NJ.

Percival, D.B. & Walden, A.T., 1993. *Spectral Analysis for Physical Applications, Multitaper and Conventional Univariate Techniques*, Cambridge Univ. Press, New York.

Simons, F.J. & Dahlen, F.A., 2006. Spherical Slepian functions and the polar gap in geodesy, *Geophys. J. Int.,* **166,** 1039–1061, doi:10.1111/j.1365–246X.2006.03065.x.

Simons, F.J., Dahlen, F.A. & Wieczorek, M.A., 2006. Spatiospectral concentration on a sphere, *SIAM Rev.,* **48**(3), 504–536, doi:10.1137/S0036144504445765.

Slepian, D., 1983. Some comments on Fourier analysis, uncertainty and modeling, *SIAM Rev.,* **25**(3), 379–393.