 Memories of Alan Edward Beck (1928–2020)

Valiya Hamza1
1 Department of Geophysics, National Observatory, Rio de Janeiro, Brazil.

Email address
valiyahamza@gmail.com (V. Hamza)
Corresponding author

Abstract

This is article providing a brief description of the life and scientific achievements of Alan Edward Beck, emeritus Professor of Western University. He was born in England on January 27, 1928 and passed away on December 1st, 2020 at his home in London (Ontario), Canada. He will be remembered not only for his significant contributions in Geophysics but also his active participation in activities of the International Heat Flow Commission-IHFC. In 1958 he was a founding faculty member of the Department of Geophysics of the University of Western Ontario, London, Canada. Shortly thereafter became Acting Head (1961), and then Head (1963) of the Department of Geophysics. He was a founding member of the International Heat Flow Commission, Vice Chairman for the period of 1979 to 1983 and then Chairman during 1983 to 1987. He retired in 1993 but continued to be active with participation in several international organizations. Beck was honored with the J. Tuzo Wilson Award of the Canadian Geophysical Union in 1993.

1. Introduction

Dr. Alan Edward Beck, Professor Emeritus of Geophysics at Western University, passed away peacefully on December 1st, 2020 at his home in London, Ontario. He was born January 27th, 1928 in London, England. Alan was predeceased by his brothers John and Ronald. He graduated with Honors from Battersea Polytechnic (University of London) in 1951. After graduation he got a scholarship to study towards a PhD in Geophysics at the Australian National University (ANU) in Canberra. He was advised to do PhD under the guidance of Professor John C. Jaeger. Alan accepted the dissertation topic suggested by Jaeger, in the field of measurement of terrestrial heat flow. The initial fieldwork started in the region of Great Lake in Tasmania. Within a year, in 1953, scientific paper was published in the Australian Journal of Physics, co-authored with Gordon N. Newstead.

He met Julia Langley at Australian National University where he did his doctoral thesis work. They married in Sydney, Australia in 1955, and raised three children. He is lovingly remembered by his children Helen, James and Graham, brother Harold and sister Mary.

2. Terrestrial Heat Flow Studies at ANU

Professor Jaeger, at ANU, was aware of the importance of heat flow measurements and planned the initial work for temperature measurements in Tasmania. Alan’s thesis work was directed for measurements of terrestrial heat flow in boreholes. Later he returned for laboratory studies and further field measurements in the region of Snowy Mountain. He soon realized that the effective value the heat flux depends on local fluid flow as well as the geologic history of the area. This resulted in two co-authored publications.

After the conclusion of thesis work Alan found temporary jobs, teaching mathematics at the Westminster College of Commerce. After waiting for several weeks, he heard from Jaeger, that he had passed.
3. Physics Department at UWO in the 1950s

In 1949 Meisner, was appointed Head of the Physics Department at the University of Western Ontario. Beck was awarded a Post-Doctoral Fellowship. Following this Beck awarded with a position in the Department of Physics. Within three years he went onto publish two papers bringing him to international scene.

Figure 2 - From a group photo of the Dept. of Geology and Geophysics in 1958. Alan Beck is at upper left. Robert Uffen is at the lower right. Other persons in the photo may be identified at www.uwo.ca/earth/about_us/geophistory.html.

In 1961 Uffen was appointed Principal of University College (essentially Dean of Arts and Science). Beck became Associate Professor and Acting Head. At the 13th General Assembly of the International Union of Geodesy and Geophysics (IUGG) in Berkeley, California Alan Beck was recognized a founding member of the new International Heat Flow Commission (IHFC).

4. The Department of Geophysics

During 1960s and 1970s Beck proactively solicited funding for faculty to cover new sub-disciplines: Geomagnetism (Charles Carmichael, Currie Palmer); Seismology (Robert Mereu); Theoretical Geophysics (Douglas Smylie); Geochronology (Tadeusz Ulrych, Akiro Hayatsu); High Pressure Geophysics (Helmut Schloessin, Richard Secco).

As the department became recognized many geophysicists of note visited, among them W. Domzalski, H. Takahashi, U, Aswathhanarayana, Sam Carey, John Jaeger, Ron Green, Frank Stacey, R.G. Park, Karsten Storetvedt, Jim Briden, Richard Facer, Henry Pollack, and Akito Ikami and Po-Yu Shen.

In 1969 the Department hosted a NATO Advanced Study Institute on Earthquakes and the Rotation of the Earth.

In 1981 the 21st General Assembly of the International Association of Seismology and Physics of the Earth’s Interior (IASPEI) was held at UWO. Over 500 delegates and guests from 50 countries attended. Over 400 papers were given.

UWO came to be known as a center for research in terrestrial heat flow studies through the work of Beck and his students.

His students have gone on to shine with their own works: John Sass, John Conaway, Anne Stevens, Alan Judge, Trevor Lewis, Valiya Hamza, Soren Nielsen, Kelin Wang and many more.

5. Head of Geophysics and Acting Chair of Geology

Beck had arrived just as UWO was beginning a phase of rapid expansion. Under President George Hall (1947 to 1967) the university was being run from above.

With a new president in 1967, and the expansion there were more students and new faculties and new departments. The administrative responsibilities evolved from the ‘top down’ system towards one of collegiality and increasing faculty empowerment in decisions.

New rules, regulations and committees were adopted university wide.

In 1986 he took part in the organization of the meeting International Heat Flow Commission (IHFC) in Brazil. About 100 delegates and guests from 30 countries attended. Over 100 papers were given.

Figure 4 - Alan Beck and Valiya Hanza, IHFC meeting, Brazil, 1986.
6. Service in and out of Canada

Beck devoted significant time at the Faculty of Science, the university, the geophysics community in Canada, and internationally. Over 1971 to 1984 Beck acted as Sessional Lecturer at McMaster University. In 1971 Beck became the Chair of the Earth Physics Division, of the Canadian Association of Physicists. With the collaboration of Jack Jacobs and Mike Keen, and many others, Beck helped found the Canadian Geophysical Union in 1974.

7. Influence of Julia Beck

His wife Julia graduated in Geology and Mathematics from the University of Sydney. Later Julia got interested in the heritage buildings in around London, and in Ontario. She became an activist, for the preservation of so much that was part of history, and much that added to the character of neighborhoods. Julia was the featured speaker at the unveiling of a bronze plaque at the park on May 27, 2000.

Julia received many awards, including the Lieutenant Governor’s Ontario Heritage Award for Lifetime Achievement (2007). The work in conservation was recognized by her election as President (1992-94) of the Architectural Conservancy of Ontario. Later she was awarded with master’s degree in geography at Western. She was recognized for her significant contributions to the smooth functioning of the Department. Julia passed away in 2012.

Figure 5 - Julia and Alan Beck at the Great Wall of China.

8. Retirement in 1993

Beck was honored with the J. Tuzo Wilson Award of the Canadian Geophysical Union in 1993. Also, a colloquium was organized on The Thermal State of the Earth, an event co-sponsored by International Heat Flow Commission – IHFC. After retirement Beck joined the Editorial Board of the Geophysical Journal International of the Royal Astronomical Society, during the period of 1993 – 2005.

Later Alan and Julia moved into a heritage house at 39 Carfrae Street. He passed away on December 1, 2020.

9. Acknowledgements

Sometime in 2019 a proposal was made to recognize and honor the contributions by Alan Beck. I am indebted to my colleagues at Western for exchange of information on life and carrier of Alan Beck. The archived Calendars of the University of Western Ontario provided information on the history of geophysics at UWO. Thanks are due for academic collaboration of Lalu Mansinha.

References

Beck, A.E. 1956. The Measurement of the Flow of Heat Through the Crust of the Earth and Through Rocks. PhD Thesis, Australian National University.

Beck, A.E. (undated) A Brief History of the Department of Geophysics, 1958-1993. In: https://www.uwo.ca/earth/about_us/ geophistory.html (Accessed 1 December 2020).

Brodie, J.H., Newstead, G.H. 2012. Australian Dictionary of Biography, 18. In: http://adb.anu.edu.au/biography/newstead-gordon-henry-14979 (Accessed 1 December 2020).

Carver, J.H., Compton, R.W., Ellyard, D.G., Inall, E.K. 2003. Marcus Laurence Elwin Oliphant (1901 – 2000). Historical Records of Australian Science, 14(3). In: https://www.science.org.au/fellowship/fellows/biographical-memos/marcus-laurence-elwin-oliphant-1901-2000/about (Accessed 20 December 2020).

Cermak, V., Beck, A.E., Hamza, V.M. 2018. International Heat Flow Commission: History and Accomplishments over the last fifty-five years. International Journal of Heat Flow Studies and Applied Geothermics, 1(1),1-5.

Garland, G.D. (undated) The Life of John Tuzo Wilson (1908-1993). In: https://www.physics.utoronto.ca/physics/ VOLUME 21, PAGE 150/2/The_Life_of_John_Tuzo_Wilson (Accessed 20 December 2020).

Griffin, Allan. 2008. Superfluidity: three people, two papers, one prize. Physics World, 21(8), 27.

McKenzie, D.P. 1987. Edward Crisp Bullard. Bibliographic Memoirs of the Fellows of the Royal Society, 33, 66-98.

Moorcroft, D.R. 1999. A History of the Department of Physics and Astronomy at the University of Western Ontario. Physics in Canada, 55(4), 159-176.

Paterson, M.S. 1982. Professor John Conrad Jaeger. Historical Records of Australian Science, 5(3). In: http://rse.anu.edu.au/about/history/professor-john-conrad-jaeger (Accessed 20 December 2020).

Quilty, Patrick G., Banks, Maxwell R. 2003. Samuel Warren Carey (1911 – 2002) Historical Records of Australian Science, 14(3). In: https://www.science.org.au/fellowship/fellows/biographical-memos/samuel-warren-carey-1911-2002. University of Western Ontario Calendars various years https://ir.lib.uwo.ca/uwo-calendars (Accessed 20 December 2020).
Memories and Tributes

Several members of the IHFC have written to Valiya Hamza expressing their memories of and tributes to Alan Beck. Here we present a select few:

Vladimir Cermak (Czech Acad. of Sci., Czechoslovakia)

It is more than 50 years since I first met Alan Edward Beck when I came to Canada to spend two years as the PDF in that time Dominion Observatory in Ottawa. Alan E. Beck served as the Professor in Geophysics at the University of Western Ontario, London, and we had good chances to meet each other. We quickly established a really firm friendly relation and I benefited very much from his practical advices how to organize my laboratory work.

For the Earth Sciences the early sixties brought an incredible progress in geothermics. In 1963 the International Heat Flow Committee (today known as Commission, IHFC) was established at the 13th IUGG General Assembly in Berkeley. Only two years later a comprehensive volume “Terrestrial Heat Flow” (edited by WHK Lee) appeared summarizing the results and basic principles of heat flow investigations. With no exaggeration this book can be still considered as certain “Heat Flow Bible”. Alan Beck contributed by one of its chapter “Techniques of measuring heat flow on land”. Here he introduced his “Divided-Bar apparatus”, which become a useful tool for laboratory thermal conductivity measurements. I am sure that some laboratories even today are still using this instrument as an alternative method. In this sense Alan was a real pioneer of the thermal conductivity measurements.

Alan E. Beck was the 4th Chairman of the IHFC (1979-1983) and I had pleasure to work with him as the IHFC vice-secretary. Memorably days. One of the Alan’s merit was the fact that he proposed and elaborated the IHFC Bylaws, which with only some slight changes or additions are fully applicable today.

During these 50 years of our friendship and scientific cooperation we used meeting frequently attending and co-organizing various international conferences and symposia all over the world. Alan participated in the preparation of the 1987 Vancouver 19th IUGG General Assembly and was the Chairman of the Local Organizing Committee of the 1981 London 17th IASPEI Assembly. Alan also visited my country attended several of our six so called “Heat Flow Castle meetings” which I organized in Czechoslovakia/Check Republic between 1982 and 2006. I am extremely sorry that Alan due to his health problems could not attend the last 2019 IUGG General Assembly in Montreal. I was looking forward to meet him again.

I join with colleagues at Western in reminiscing inspiring memories.

Henry Pollack (Univ. of Michigan, USA)

I recall with great fondness the special aspects of my long engagement with Alan Beck. A half century ago, in the late 1960s and early 1970s, Alan was a founding member of the IHFC, and already a ‘senior statesman’ of the geothermal scientific world. In particular he served as an organizational magnet for the young geophysicists of the time who were beginning to develop programs of geothermal research. Alan was well-established at the University of Western Ontario (UWO), only a few hundred kilometers from my location at the University of Michigan. In 1985 Alan, then Chair of the Department of Earth Sciences at UWO, invited me to spend a sabbatical year at UWO. That gave a valuable opportunity for me to become well acquainted with Po-Yu (Paul) Shen, Soren Nielsen, John Sass, and several others of Alan’s students and colleagues who went on to illustrious careers in geophysics and geothermics.

Ladislaus Rybach (Inst. of Geophysics, Switzerland)

It is with great pleasure that I remember numerous, fruitful encounters with Alan. My closer interactions started in 1981, at the IASPEI General Assembly in London, Ontario, Canada. Alan held various official functions (banquets, celebrations) at this event. I noticed that he was keen to appear on stage wearing shorts and white socks (admirng his audacity as white socks are an absolute no-go in Switzerland…). Later, I learned that he was proud of his original dress code “Australian formal”.

Between 1983 and 1987, I had the privilege of working closely with Alan as he served as IHFC President and I as IHFC Secretary. He was a demanding, but always correct and understanding, principal. I was proud to appear together with him on the IHFC letterhead in those years during which we produced numerous IHFC documents.

Later, Alan contributed (with Niels Balling) the excellent Chapter “Determination of Virgin Rock Temperatures” to the Handbook of Terrestrial Heat Flow Determination – with Guidelines and Recommendations of the IHFC, just one of the many outstanding publications with which Alan contributed to our field.

Alan, you will be dearly missed! The geothermal community will remember you fondly.

Valiya Hamza (National Observatory, Brazil)

I had the privilege of doing my doctoral thesis under the guidance of Alan Beck. He had a positive outlook on geophysics, keen interest in geothermal research and a wonderful wit and both kind and stubborn streaks which shone through to the end. I am thankful for his valuable support for the 1986 meeting of IHFC in Guarujá, Brazil.

I also have fond memories of attending social events at Alan and Julia’s homes. His lifelong scientific interest in measurement of terrestrial heat flow and study of the thermal state of the Earth, led to invitations to speak around the world. More than professional, it flowed into his passion for recording internal temperatures of the Earth and measurement of thermophysical properties as part of his personal life. I join with ex-colleagues at Western in reminiscing inspiring memories.
Publications of A. E. Beck

Newstead, G.N., Beck, A. E., 1953 "Borehole temperature measuring equipment and the geothermal flux in Tasmania", Austral. J. Phys. 6:480-489.

Beck, A. E., 1955. "Temperature and conductivity measurements in the Snowy Mountains Region", Departmental Report for Overseas circulation, Australian National University.

Jaeger, J. C. Beck, A. E., 1955. "The calculation of heat flow through discs and its application to conductivity measurements", Brit. J. Appl. Phys., 6:15-16.

Beck, A. E., 1956. "The stability of thermistors", J. Sci. Instruments, 33:16-18.

Beck, A. E., Jaeger, J.C., Newstead, G.N., "The measurement of thermal conductivity of rocks by observations in boreholes", Austral. J. Phys. 9:286-296, 1956.

Beck, A. E. "The measurement of the flow of heat through the crust of the earth and through rocks", Ph.D. thesis, Australian National University, Canberra, 1957.

Beck, A. E., 1957. "A steady state method for the rapid measurement of the thermal conductivity of rocks", J. Sci. Instr. 34:186-189.

Beck, A. E., Beck, J.M., 1958, "On the measurement of the thermal conductivity of rocks by observations on a divided bar apparatus", Trans. A.G.U. 39:1111-1123.

Beck, A. E., 1960. "An expanding earth with loss of gravitational potential energy", Nature 185:677, 1960.

Meisner, A.D., Beck, A. E., "The measurement of heat flow over land", pp. 1-61 in "Methods and techniques in geophysics", ed. Runcorn, Interscience, London.

Beck, A. E., 1961. "Energy requirements of an expanding earth", J. Geophys. Res. 66:1484-1490.

Sass, J.H., Beck, A. E., 1961. "The in-situ measurement of the thermal conductivity of rocks in boreholes", 31st Annual International Meeting, S.E.G.

Beck, A. E., Valliant, H.D., 1962. "On minimum pendulums", Geophysics 27:274-275.

Beck, A. E., 1962. "Terrestrial flow of heat near Flin Flon, Manitoba, Nature 195:368-369.

Nwachukweu, S., Anglin, F.M., Beck, A. E., 1962. "Preliminary magnetic survey of Lake Huron", Annual Report, Great Lakes Institute, p.58.

Beck, A. E., 1962. "Sulla teoria del `espansione terrestre", La Scuola in Azione, 21-38, November 1962.

Mereu, R.F., Uffen, R.J., and Beck, A. E., 1963. "The use of a coupler in the conversion of impact energy into seismic energy", Geophysics 28:531-546.

Beck, A. E., 1963. "Lightweight borehole temperature measuring equipment for resistance thermometers", J. Sci. Inst., 40:452-454, (Canadian contribution No.9 to the International Upper Mantle Project).

Beck, A. E., 1964. "Flusso di calore terrestre ed energia geotermica", La Scuola in Azione; p. 166, January.

Beck, A. E., Logis, Z., "Terrestrial flow of heat in the Brent Crater", Nature 201:383-384. (Canadian contribution no. 42 to the International Upper Mantle Project).

Beck, A. E., 1964. "A note on the thermal history of the earth and the possible origin of a solid inner core", Can. J. Phys. 42:825-829.

Anglin, F.M., Beck, A. E., 1964. "The use of terrestrial heat flow data in interpreting regional geology", paper no.8, Proc. Third Annual Conference, Ontario Petroleum Institute, (Canadian contribution no. 55 to the International Upper Mantle Project).

Anglin, F.M., Beck, A. E., 1965. "Regional heat flow patterns in Western Canada", Can. J. Earth Sci. 2:176-182. (Canadian contribution no. 60 to the International Upper Mantle Project).

Nwachukweu, S.O., Beck, A. E., Currie, J. P., 1965. "Magnetic provinces of Lake Huron and adjacent areas and their geologic significance", Can. J. Earth Sci. 2:227-236.

Beck, A. E., 1965. "Techniques of measuring heat flow on land", Ch.3, p.24 IN "Terrestrial heat flow", Geophysical monograph no.8, ed. W.H.K. Lee, A.G.U. Washington. (Canadian contribution no.69 to the International Upper Mantle Project).

Nwachukweu, S. O., Beck, A. E., Currie, J. B., 1965. "Regional magnetic map of Lake Huron and adjacent areas", Great Lakes Institute, Report PR22.

Beck, J. M., Beck, A. E., 1965. "Computing thermal conductivities of rocks from chips and conventional specimens", J. Geophys. Res. 70:5227-5239.

Beck, A. E., 1966. "Problems in measuring temperature and terrestrial heat flow in deep boreholes", p.77 in Drilling for scientific purposes, eds. D.C. Findlay and C.H. Smith, Geological Survey of Canada, paper 66-13.

Hobson, G. D., Beck, A. E., Findlay, D.C., 1966. "Notes on geophysical logs and borehole temperature measurement from the Muskox drilling project", p.108 in Drilling for Scientific Purposes, eds. D.C. Findlay and C.H. Smith, Geological Survey of Canada, paper 66-13.

Beck, A. E., Sass, J.H., 1966. "A preliminary value of heat flow at the Muskox intrusion near Coppermine, N.W.T., Canada", Earth and Plan. Sci. Letters, 1:123-129, (Canadian Contribution no. 117 to the International Upper Mantle Project).

Beck, A. E., 1967. "Underground temperature measurements in the geothermal areas of El Salvador", Report to United Nations, Special Fund Operations Section.

Beck, A. E., "Heat flow studies", Canadian Upper Mantle Report, G.S.C. paper 67-41, p. 13, 1967.

Judge, A. S., Beck, A. E., 1967. "An anomalous heat flow layer at London, Ontario", Earth and Plan. Sci. Letters 3:167-170.

Beck, A. E., Neophytou, J. P., 1969. "Heat Flow and underground water flow in the Coronation Mine area", p.229, in Symposium on the Geology of Coronation Mine, Saskatchewan, ed. A.R. Byers, Geological Survey of Canada paper, 68-5.

Beck, A. E., 1969. "Energy changes in an expanding earth", p.77 In the application of modern physics to the earth and planetary interiors, ed. S.K. Runcorn, Elsevier.

Beck, A. E., Judge, A.S., 1969. "Analysis of heat flow data - 1, Detailed observations in a single borehole", Geophys. J. Roy. Astr. Soc., 18:145-158.

Beck, A. E. 1970. "Nonequivalence of oceanic and continental heat flows and other geothermal problems", Comments on Earth Sciences: Geophysics 1:29-35.

Mansinha, L., Smylie, D. E., Beck, A. E., 1970. eds. "Earthquake displacement fields and the rotation of the earth", Reidel, Holland.

Beck, A. E., Anglin, F. M., Sass, J. H., 1971."Analysis of heat flow data - In Situ thermal conductivity measurements", Can. J. Earth Sci. 8:1-19.
Beck, A. E., 1971. Prospects for geothermal power. Comments on Earth Sciences: Geophysics 1:139-149, 1971.

Hamza, V.M., Beck, A.E., 1971. Vertical variations of heat flow and heat production in sedimentary sections, EOS, Am. Geophys. Un. Trans. 52, p.354.

Beck, A. E., 1972. "Terrestrial Heat", Encyclopedia Della Scienza E Della Tecnica.

Beck, A. E., 1972. "Terrestrial Radioactivity", Encyclopedia Della Scienza E Della Tecnica.

Beck, A. E. Mustonen, E., Beck, A. E., 1972. "Preliminary heat flow data from Ghana", Nature (Phys. Sci.) 235:172-174.

Hamza, V. M., Beck, A. E., 1972. "Terrestrial heat flow, the neutrino problem, and a possible energy source in the core", Nature 240:343-344.

Judge, A. S., Beck, A. E., 1972. "Analysis of heat flow data - several boreholes in a sedimentary basin", Can. J. Earth Sci. 10:1494-1507, 1973.

Hamza, V. M., Beck, A. E., 1975. "Analysis of heat flow data - vertical variations of heat flow and heat producing elements in sediments", Can. J. Earth Sci. 12:996-1005.

Beck, A. E., 1976. "An improved method of computing the thermal conductivity of fluid filled sedimentary rocks", Geophys. 41:133-144.

Beck, A. E., 1976. "The use of thermal resistivity logs in stratigraphic correlation", Geophysics. 41:300-309.

Beck, A. E., Hamza, V.M., Chang, C. C., 1976. "Analysis of heat flow data - Correlation of thermal resistivity and shock metamorphic grade and its use as evidence for an impact origin of the Brent Crater", Can. J. Earth Sci. 13:929-936.

Beck, A. E., 1977. "Geothermal measurements in five small lakes of northwest Ontario: Discussion", Can. J. Earth Sci. 714:332-334.

Conaway, J. G., Beck, A. E., 1977. "Continuous logging of temperature gradients", Tectonophysics 41:1-7.

Beck, A. E., 1977. "A potential systematic error when measuring the conductivity of porous rocks saturated with a low conductivity fluid", Tectonophysics 41:9-16.

Beck, A. E., 1977. "Climatically perturbed temperature gradients and their influence on regional and continental heat flow means", Tectonophysics 41:17-39.

Lewis, T. J., Beck, A. E., 1977. "Analysis of heat flow data - Detailed observations in many holes in a small area", Tectonophysics 41:41-59.

Conaway, J. G., Beck, A. E. 1977. "Fine-scale correlation between temperature gradient logs and lithology", Geophysics 42:1401-1410.

Beck, A. E., Darbha, D. M., Schloessin, H.H., 1978. "Lattice conductivity of single crystal and polycrystalline materials at mantle pressures and temperatures", Phys. Earth Planet Int. 17:35-53.

Beck, A. E., 1978. Guest editorial, Special Edition of Physics of the Earth and Planetary Interiors, "Laboratory measurements of physical properties under mantle conditions", 17:vi-vii.

Beck, A. E., 1979. "The effect of Pleistocene climatic variations on the geothermal regime in Ontario: a reassessment: Discussion", Can. J. Earth Sci. 16:1515-1517, 1.

Beck, A. E., 1980. "Heat flow measurements under some lakes in the Superior province of the Canadian Shield", Discussion, Can. J. Earth Sci., 17:1108-1110.

Facer, R. A., Cook, A. C., Beck, A. E. 1980 "Thermal properties and coal rank in rocks and coal seams of the southern Sydney Basin, New South Wales: A paleo-geothermal explanation of coalification", Int. J. Coal Geology 1:1-17.

Beck, A. E., Shen, P. Y., 1980. "An interactive program for the extraction of past climate from precision temperature logging", DEMR Research Agreement 202-3-80, p.39.

Minges, M. L., Beck, A. E., Berman, L., Cabonnes, F., Shpilrain, E. E., Touloukian, Y. S., and White, G. K., "Criteria for the presentation of scientific and technical information on thermophysical properties of solids", Ind. J. Thermophys. 1:135-140.

Roy, R. F., Beck, A. E., Touloukian, Y. S. 1981. "Thermophysical Properties of Rocks" IN Physical Properties of Rocks and Minerals, ed. Y. S. Touloukian, W. R. Judd and R. F. Roy, McGraw-Hill, New Y ork, 409-502.

Beck, A. E. 1981. "Physical Principles of Exploration Geophysics - an Introductory Text for Geologists and Geophysicists", MacMillan Press, London, pp.234 + xii.

Beck, A. E., Shen, P. Y., 1981. "Determination of surface temperature history from borehole temperature gradient date", DEMR Research Agreement 168-3-81, pp.53.

Beck, A. E., 1982. "Precision logging of temperature gradients and the extraction of past climates", Tectonophys 83:1-11.

Fodoremesi, S. P., Beck, A. E., 1983. "Induced convection during cylindrical probe conductivity measurements on permeable media", in Proceedings of Seventeenth International Thermal Conductivity Conference, ed. J.G. Hust, Plenum Press, 619-634.

Shen, P. Y., Beck, A. E., 1983. "Determination of surface temperature history from borehole temperature gradients", J. Geophys. Res. 88:7485-7493.

Beck, A. E., 1985. "Some views from beneath the top: A commentary on NSERC grant selection policies and procedures", Geoscience Canada 12:33-38.

Beck, A. E. Shen, P. Y., 1985. "Temperature distribution in Equid flowing wells", Geophysics 50:1113-1118.

Beck, A. E., Wang, K., Shen, P. Y., 1985. "Sub-bottom temperature perturbations due to temperature variations at the boundary of inhomogeneous lake or oceanic sediments", Tectonophysics, 121:11-24.

Beck, A. E. 1985. Guest editorial, Special Edition of Tectonophysics, "Terrestrial heat flow and thermal regimes", 121: vii-ix.

Beck, A. E. Ashworth, T., 1985. "Thermophysical properties of geological materials", High T temperatures - High Pressures, 17:357-358.

Shen, P. Y., Beck, A. E. 1986. "Stabilization of bottom hole temperature with finite circulation time and fluid flow", Geophys. J. R. Astr. Soc., 86:63-90.

Wang, K., Shen, P.Y., Beck, A. E., 1986. "The effects of thermal properties structure and water bottom temperature variation on temperature gradients in lake sediments", Can. J. Earth Sci., 23:1257-1264.
Wang, K., Beck, A. E., 1987. "Heat flow measurement in lacustrine or oceanic sediments without recording bottom temperature variations", J. Geophys. Res., 92:12,837-12,845.

Beck, A. E., 1988. "The maturation of geothermics as a discipline and some unresolved problems", Rev. Brazilian Journal of Geophysics, 5:74-90.

Beck, A. E., Balling, N., 1988. "Determination of virgin rock temperatures", in Handbook of Terrestrial Heat-Flow Density Determination, Ch.3, Reidel, Amsterdam, Edited by R. Haenel, L. Rybach and L. Stegena, 59-85.

Beck, A. E., 1988. "Methods for determining thermal conductivity and thermal diffusivity", in Handbook of Terrestrial Heat-Flow Density Determination, Ch.4.1, Reidel, Amsterdam, Edited by R. Haenel, L. Rybach and L. Stegena, 87-124.

Powell, W. G., Chapman, D. S., Balling, N., Beck, A. E., 1988. "Determination of continental heat-flow density", in Handbook of Terrestrial Heat-Flow Density Determination, Ch.5, Reidel, Amsterdam, Edited by R. Haenel, L. Rybach, and L. Stegena, 167-222.

Shen, P. Y., Beck, A. E., 1988. "Inversion of temperature measurements in lake sediments", Geophys. J. R. Astr. Soc., 94:545-558.

Beck, A. E., Shen, P. Y., 1989. "On a more rigorous approach to geothermics problems", Tectonophysics, 164:83-92.

Nielsen, S. B., Beck, A. E., 1989. "Heat flow density values and paleoclimate determined from stochastic inversion of four temperature-depth profiles from the Superior Province of the Canadian Shield", Tectonophysics 164:345-360.

Wang, K., Shen, P. Y., Beck, A. E., 1989. "A solution to the inverse problem of coupled hydrological and thermal regimes", in Hydrogeological Regimes and Their Subsurface Thermal Effects, AGU Monograph 47 (IUGG Volume 2), Edited by A. E. Beck, L. Stegena and G. Garven, 7-21.

Wang, K., Beck, A. E., 1989. "An inverse approach to heat flow study in hydrologically active areas", Geophys. J. R. Astr. Soc. 98:69-84.

Shen, P. Y., Wang, K. Beck, A. E., 1990. "Two-dimensional inverse modelling of crustal thermal regimes with application to east European geotracers", J. Geophys. Res. 95:19903-19925.

Shen, P. Y., Wang, K. Beck, A. E., 1991, "Crustal thermal models along east European geotracers - inverse solutions", Tectonophysics, 194:363-385.

Chen, Y-h. and Beck, A. E., 1991, "Application of the boundary element method to a terrestrial heat flow problem", Geophysical Journal International, 107:25-35.

Shen, P. Y. and Beck, A. E., 1991, "Least squares inversion of borehole temperature measurements in functional space", J. Geophys. Res. 96:19965-19979.

Beck, A. E., 1992, "Inferring past climate change from subsurface temperature profiles: some problems and methods", in Climatic change inferred from underground temperatures, ed T.J. Lewis, Special Edition of Paleogeography, Paleoclimatology, Paleoeology (Global and Planetary Change Section), 1992, 98:73-80.

Beck, A. E., Shen, P. Y., Beltrami, H., Mareschal, J.-C., Safanda, J., Sebagenzi, M. M., Vasseur, G. Wang, K., 1992, “A comparison of five different analyses in the interpretation of five borehole temperature data sets, in Climatic change inferred from underground temperatures, ed T.J. Lewis, Special Edition of Paleogeography, Paleoclimatology, Paleoeology (Global and Planetary Change Section), 1992, 98:113-127.

Shen, P. Y. Beck, A. E., 1992, “Paleoclimate change and heat flow density inferred from borehole temperature data in the Superior Province of the Canadian Shield”, in Climatic change inferred from underground temperatures, ed T.J. Lewis, Special Edition of Paleogeography, Paleoclimatology, Paleoeology (Global and Planetary Change Section), 1992, 98:142-165.

Beck, Alan E., 2002, "Brief history of the Department of Geophysics, U.W.O., 1958 - 1993", in International Handbook of Earthquake & Engineering Seismology, Part B, 81B, ed William Lee, Hiroo Kanamori, Paul Jennings and Carl Kisslinger, 2002, on CD.

Cermak, C., Beck, A. E., and Hamza, V.M., 2018, “International Heat Flow Commission: History and Accomplishments over the last fifty-five years”, International Journal of Terrestrial Heat Flow and Applied Geothermics, 2018 v 1 n 1 pp1-5.

Books by A. E. Beck

Earthquake Displacement Fields and the Rotation of the Earth, editors: L. Mansinha, D.E. Smylie, A. E. Beck, Springer-Verlag, New York, 1970.

Physical Principles of Exploration Methods, A. E. Beck, pp.250, MacMillan, London, 1981. Reprinted 1982.

Hydrogeological Regimes and their Subsurface Thermal Effects, editors: A. E. Beck, G. Garven, L. Stegena, Am. Geophys. Un. Monograph No. 47, 1989.

Physical Principles of Exploration Methods, 2nd edition, A. E. Beck, pp.290, Wuerz, Winnipeg, 1991.

Worked Answers to Questions in Physical Principles of Exploration Methods, 2nd edition, A. E. Beck, pp.100, Wuerz, Winnipgeg, 1992.

Patents of Alan Beck

"Apparatus for measuring resistance at the end of a long cable". Patent no.3,273,396 United States, September 20, 1966. A.E. Beck - rights assigned to CPDL through UWO-CPDL agreements. No commercial sales as far as I know (CPDL are good on patents but not so hot on marketing) but a number of laboratories build their own systems.