

Career at Madison: Teaching
Graduate Students [Ph.D. candidates]

During my tenure at UW I served as "major professor" to ¹⁷24 Ph.D. candidates, ²³23 in Meteorology and one in Civil Engineering. Thesis titles are listed in App. CMT A.

At a banquet honoring the retirement of Werner Schwerdfeger and myself [Wisconsin Center, May, 24th, 1980] I was pleasantly surprised when Prof. Wahl placed into my hands a folder with personal letters from 22 of my "Ph.D.-progeny". One of the missing, from Prof. Bey at U. of Bogor, Indonesia, arrived a few days later. Dr. S. Örneý, Chairman, Dep. of Meteorology, U. of Istanbul, Turkey, has written that Prof. Mel Erkmen, former chairman at U. of Istanbul, had died of cancer in August 1978.

The addresses of the ¹⁰24 show that ~~xx~~ were employed at research institutions, ⁸yy were teaching at U.S. universities, and ⁵zz at foreign universities

- 1 Berman, S., Assoc. Prof., U. of Oklahoma at Norman
- 1 Dabberdt, W., Assoc. Director, Atm. Science Center SRI International, Menlo Park, CA
- 2 Duwe Hollingshead, Marian, Senior Res. Meteorologists, Boulder, Colorado
- 3 Hall, L., Senior Meteorologist, Montana Energy and Res. Inst., Butte Montana
- 2 Hamilton, H., Assoc. Prof. & Chairman, Dep. of Atmosph. Scie., U. of Albany, NY
- 1 Johnson, W., Director, Atm. Science Center SRI International, Menlo Park, CA
- 3 Kung, E. Prof., Dep. of Atmosph. Scie., U. of Missouri, Columbia,
- 5 Lenschow, D., Mesoscale Res. Section, Nat. Center for Atm. Res., Boulder CO
- 6 MacKay, K, Visit. Scientist, U.S. Envir. Prot. Agency, Res. Triangle Park, N. Carolina
- 4 Nicholson, S., Assoc. Prof., Dep. of Meteorology, U. of Florida, Tallahassee.
- 5 Riordan, A., Assist. Prof. Meteorology, North Carolina State U., Raleigh, NC
- 4 Rutilant Costa, J., Departamento de Geofisika, U. de Chile, Santiago, Chile
- 7 Shinn, J., Deputy Sec. Leader, Atm. & Terr. Studies, Lawrence Livermore Lab. CA
- 6 Slotta, L., Professor Civ. Eng., Oregon State U., Corvallis, OR
- 8 Sparkman, J., Senior Scientist, Nat. Oceanic & Atmosph. Ad., Rockville, Maryland
- 7 Stearns, Chs., Professor, Dep. of Meteorology, U. Wisconsin, WI
- 9 Super, A., Director, High Plains Experiment, Bureau of Reclamation, Miles City, MT
- 8 Thomson, D., Professor, Dep. of Meteorology, Pee. State U., University Park, PA
- 5 Turner, J., Professor, Dep. of Geography, U. of Newcastle, New South Wales, Austr.
- 10 Zabransky, J., Senior Scientist, GEOMET Tech., Inc. Gaithersburg, MD

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Career at Madison: Teaching Graduate Students [Ph.D. candidates]

During my tenure at UW I served as "major professor" to 24 Ph.D. candidates, 23 in Meteorology and one in Civil Engineering. Thesis titles are listed in App. CMT A. The addresses of the 24 at the time of my retirement [1980 - 85] document that 10 were employed at U.S. research institutions, 9 were teaching at U.S. universities, and all my five foreign students* were teaching at universities in their home countries.

Berman, S., Assoc. Prof., U. of Oklahoma at Norman
*Bey, A., Professor, U. of Bogor, Indonesia
Dabberdt, W., Assoc. Director, Atm. Science Center SRI International, Menlo Park, CA
Duwe-Hollingshead, Marian, Senior Res. Meteorologist, Boulder, Colorado
*Erkmen, E., Prof., Met. Dep. Chair, U. of Istanbul, Turkey [up to his death in Aug., 1978]
Hall, L., Senior Meteorologist, Montana Energy and Res. Inst., Butte Montana
Hamilton, H., Assoc. Prof. & Chairman, Dep. of Atmosph. Scie., U. of Albany, NY
Hopkins, E., Lecturer, Atm. Scie., U. Wisconsin, Madison
Johnson, W., Director, Atm. Science Center SRI International, Menlo Park, CA
Kung, E. Prof., Dep. of Atm. Scie., U. of Missouri, Columbia,
Lenschow, D., Mesoscale Res. Section, Nat. Center for Atm. Res., Boulder CO
MacKay, K, Visit. Scientist, U.S. Envir. Prot. Agency, Res. Triangle Park, N. Carolina
*Molion, L., Senior Scientist at INPE, Brazil, later Prof. U. of Alagoas, Maceio, Brazil
Nicholson, S., Assoc. Prof., Dep. of Meteorology, U. of Florida, Tallahassee.
Riordan, A., Assist. Prof. Meteorology, North Carolina State U., Raleigh, NC
*Rutllant Costa, J., Departamento de Geofisika, U. de Chile, Santiago, Chile
Shinn, J., Deputy Section Leader, Atm. & Terr. Studies, Lawrence Livermore Lab. CA
Slotta, L., Prof. Civ. Eng., Oregon State U., Corvallis, OR
Sparkman, J., Senior Scientist, Nat. Oceanic & Atm. Admin., Rockville, Maryland
Stearns, C., Professor, Dep. of Meteorology, U. Wisconsin, Madison
Super, A., Director, High Plains Experiment, Bureau of Reclamation, Miles City, MT
Thomson, D., Prof., Dep. of Meteorology, Penn. State U., University Park, PA
*Turner, J., Prof., Dep. of Geography, U. of Newcastle, New South Wales, Austr.
Zabransky, J., Senior Scientist, GEOMET Tech., Inc. Gaithersburg, MD

At a banquet honoring the retirement of Werner Schwerdtfeger and mine [Wisconsin Center, May, 24th, 1980] I was pleasantly surprised when Prof. Wahl placed into my hands a folder with personal letters from 22 of my "Ph.D.-progeny".

Thesis titles of my twenty-four PhD Students at U. of Wisconsin, 1962-85

A. Results of the Lettau-Stearns Program on Atmosph. Surf. Layer Experiments

- Hamilton, Harry L., Jr.: Measurements of infrared radiation divergence and temperature profiles near an air-water interface; June 1965
Super, Arin B.: A study of small-scale air mass modification over Lake Mendota; June 1965
Turner, John C.: Thermal response of a concrete slab to controlled daytime and nighttime cycles of radiation; January 1965
Shinn, Joseph H.: Steady-state two-dimensional airflow in forests and the disturbance of surface-layer flow by a forest wall; January 1971
Sparkman, James K. Jr.: A remote sensing technique using terrestrial refraction for study of low-level lapse rate; January 1971
Berman, Stephen: Coherence characteristics of horizontal wind components near the ground; June 1981

B Atmospheric Boundary-Layer studies [Offshoots of the O'Neill Experiment]

- Erkmen, Mehmet M.: Seasonal variation of the regional mass and energy budget terms in the atmosphere over Wisconsin; September 1962
Johnson, Warren B., Jr.: Atmospheric boundary-layer dynamics over the forests of north-eastern Wisconsin; June 1965
Lenschow, Donald H.: Airborne measurements of the structure of the atmospheric boundary layer; August 1965
Thomson, Dennis W.: Airborne measurements of tropospheric structure relating to transhorizon microwave propagation; January 1968
Mackay, Kenneth P., Jr.: Thermo-tidal winds over sloping terrain; August 1970
Hollingshead, Marion P.: The diurnal variation in radon flux from the soil due to atmospheric pressure change and turbulence; June, 1976
Hall, Leonard F.: A climatonic study of the North American interior plains; May 1976

C Physical Climatology; also general and tropical Climatology

- Kung, Ernest C.: Climatology of the mechanical energy dissipation in the lower atmosphere over the northern hemisphere; June 1963
Stearns, Charles R.: Micrometeorological studies in the coastal desert of southern Peru; January 1967
Molion, Luiz C.: A climatonic study of the energy and moisture fluxes of the Amazonas system with consideration of deforestation effects; August 1970
Nicholson, Sharon E.: A climatic chronology for Africa: Synthesis of Geological, Historical, and meteorological information and data; December 1976
Zabransky, Joseph, Jr.: Wind in and above a dry-evergreen forest and the boundart-layer characteristics of the monsoon in Thailand; May 1976
Rutilant, José C.: On the extreme aridity of coastal and Atacama Deserts in northern Chile; May 1976
Bey, Ahmad: Climatonomy modeling of four restoration stages following Krakatau's 1883 destruction [Pumice ash-desert; Savanna; Young forest; Rainforest]; May 1981
Hopkins, Edward H.: Analysis of astronomically induced monthly and zonally averaged extra-atmospheric irradiance variations for the earth over the last 500,000 years; 1985

D Antarctic Climatology

- Dabberdt, Walter F.: Wind and turbulence structure in the boundary layer over the antarctic plateau August 1969
Riordan, Allen J.: Climatonic modeling of the Dry Valleys of Victoria Land, Antarctica, with comparison to snow-covered regions; August 1977

E During years of dual appointment with Meteorology and Civil Engineering

- Slota, Larry: The value of the Karman Constant according to fluid-mechanical experiments; 1962

As advisor of students doing field experiments as part of thesis research at the Geophysical Observatory of Leipzig University [1933-38] I discovered that when you give the student full responsibility *and credit* for the results that he produces, he will demonstrate far greater motivation and creativity than when he is merely carrying out instructions. This philosophy was even more effective with my graduate students at the University of Wisconsin.

Appended are copies of the letters, written April/May 1980, by five of my graduate students. Four of these received the Ph.D. degree in 1965 and one in 1967. I had encouraged these five to present the results of their thesis research at the National Conference on Micrometeorology. American Meteorological Society, October 13 - 16, 1964, Salt Lake City, Utah [see Appendix CMT B2].

Brief extracts follow.

Harry Hamilton, Jr.: -- Memories of those five years in the early '60's include: Creating research space on tent platforms, and remodeling a caretaker's cottage into a year-round laboratory [at Second Point, Lake Wisconsin] -- installing miniature Texas-towers out in the lake -- my first scientific conference, delivering a paper prepared under your guidance --

Warren B. Johnson: -- Your door was always open to your students -- you impressed on us the necessity for evaluation of theories or models by means of data from properly designed experiments --

Chuck Stearns: -- The expedition to Peru [July, 1964] provided an opportunity to collect a unique set of micro-meteorological data which provided the material for my Ph.D. thesis, which I had been avoiding for some time

Arlin B. Super: -- It was only after teaching others myself for some years that I came to realize how much extra effort you expended upon your students -- we developed the laboratory in the cottage and the tower in the lake which formed the base for the bushel-basket and Christmas tree experiments

John C. Turner: Memories include a large micrometeorological element -- amongst others, Christmas trees, bushel baskets and a pink jeep on the ice [of Lake Mendota] --an instrumented concrete slab [at Arlington Agricultural Res. Station] surrounded by summer pasture and corn.

by the surface energy budget. An unprecedented diurnal variation of 'spiral shape' was documented: small angle and low speed near noon versus wide angle and relatively high speed near midnight; see Addendum E. Conventionally the Richardson number is employed as scaling factor for low-level wind structure. The data from Plateau and Amundsen-Scott show that $\partial Ri/\partial z > 0$ changes with inversion strength which implies that Ri = Richardson number loses significance for extreme inversions stratification. This is explained by the discovery that wind and temperature profiles have different curvature as shown by the comparison of Deacon numbers. Noteworthy is that the structure of strongly inversional temperature profiles is characterized by a level of inflection at ≈ 6 m at Plateau Station and ≈ 2.5 m at the South Pole Station.

In 1970 the American Association for the Advancement of Science prepared a special volume *RESEARCH IN THE ANTARCTIC*. The editor [Dr. L. Quam] invited my contribution. It was published in 1971 as AAAS Publication No. 93., pp 443 - 475. I choose as title: "*Antarctic atmosphere as a test tube for meteorological theories*", to express my growing conviction that climate and weather in Antarctica is endogenous to a degree as on no other continent on earth. I highlighted our study of optical refraction anomalies at Plateau Station and the rational explanation of the "Coreless Winter" of high polar latitudes by using tautochrones of monthly snow temperatures comparing Amundsen-Scott [90 deg S], Plateau [79 deg S] and Maudheim [71 deg S], leading to a discussion of Dr.P. Siple's puzzle.

Paul Siple, a veteran of the Byrd expeditions at the series of Little America Stations 1933/36, was the first US scientist to stay yearround at the south pole in preparation of the IGY wintering station. After arrival on 30 Nov., 1956, he started digging to a depth of about 5.5 m where his thermometer showed $T = -53^{\circ}\text{C}$ which is 31°C below the warmest summer temperatures measured by Amundsen and by Scott 1909 on the plateau. Using his experience from diggings at sites near the antarctic circle, Dr. S. assumed -53°C equal to the annual mean at 90 deg S., and predicted that the coldest temperature would be $-53 - 31 = -84^{\circ}\text{C} \approx -120^{\circ}\text{F}$, i.e., as much below -53°C as the warmest month had been above it.

Toward the end of the 1957 winter night Dr.S. commented that it was one of the most puzzling things about the winter at the south pole that temperature did not hit the predicted low of -120°F . The T-curve which he had expected to round normally at the bottom, instead flattened out around -90°F [-67°C]. Dr.S. thought that exogenous factors were responsible for the 30°F error. In his monograph [*90 Degrees South ; The Story of the American South Pole Conquest ;1959; Putnam's Sons, New York*] he wrote: '*We could only hypothecate that the normal curve was flattened out by mixing action of the winds*'. Actually, his diggings established the typical high-sommer tautochrone for 90 deg.S and his prediction was based on its mirror image. As shown in Addendum B this was legitimate at latitudes near the antarctic circle but not at the pole simply due to the truly endogenous factor of the regional surface energy budget.

The "coreless winter" of high polar latitudes has as counterpart a "coreless or topless summer", documented by temperature records at a wintering station on *Ice-Island T3* ; see addendum F. Ice islands are floating in the Arctic Ocean and are most likely to have calved from the ice shelves of Ellesmere Island. The known larger ones have a thicknes of about 50 m, tabular surface areas of several hundred square kilometers, and are elevated by about 5 m above the surrounding arctic packice. The energy consumed for melting at the upper surface truncates the summer arc of netradiation. This causes that surface temperatures hover around 0°C during the two warmest months of July and August.

One of Schwerdtfeger's MS-students, Tom Frostman , volunteered and was selected to winter at Plateau Station during1968. However, the station was plagued with difficulties. In October, the electrically heated insulation at the fuel-line junction caught fire; that situation was quickly brought under control. However, unreparable damages of the recording equipment had caused a premature end to the Natick micrometeorology program. The three-year scientific program at Plateau was terminated and the station deactivated on Jan. 29, 1969. The tower was left standing. According to three years of data the accumulation has the order of 0.1 m per year. On this basis, the tower will be burried about 300 years from present.

It is hard for me to find the right words to honor appropriately the willpower of all the scientific observers. They had to withstand extreme hardships in antarctic winters and yet, Paul D., Mike K., and Marty S. brought home valuable results. Marty S. was not afraid to let us know how he among the small group of people isolated completely from civilisation during the polar night at Plateau Station felt as human beings. He likens their life to that of *magi*, the members of the Zoroastrian priestly caste of the ancient Persians with their eternal struggle between good and evil; see: *Among the magi: research tracks in the desert snow*, by Martin P. Sponholz
<BASE HREF="http://205.174.118.254/nspt/magi/magio1.htm".>

The period of antarctic research produced some direct as well as indirect beneficial consequences for the U. of Wisconsin Dept. of Meteorology. Werner Schwerdtfeger and I co-authored a report on the dynamics of the surface-wind regime over the interior of Antarctica. Werner S. wrote a monograph: *Weather and Climate of the Antarctic*. Of my graduate students Walt Dabberdt evaluated antarctic data in his Ph.D. thesis and was employed as post-graduate at Natick, Mass.; Allen Riordan wintered in Dry Valley, Antarctica, and used his recordings as mainstay for his Ph.D. thesis. Charles Stearns, starting as my research assistant and as project associate managing the graduate student experiments on the ice of Lake Mendota, rose 'through the ranks'. As professor, Stearns developed a substantial research program using networks of automatic weather stations [AWS] in Antarctica, including a special network on the Greenland Crest.. He and his Ph.D. student David Bromwich edited Vol. 61 of Antarctic Research Series, with many contributions of their own. Among the AWS on the Ross Ice Shelf, Stearns named one at 79.9 deg S *Schwerdtfeger Station* and one at 82.6 deg S *Lettau Station*. Both of us acknowledged this as benchmarks for what had been stated on page 10 of the 1963-brochure: *Meteorology at Wisconsin, a Plan for the Future*: "A U. of Wisconsin motto is 'the boundaries of the campus are the boundaries of the State.' It is just as true that the boundaries of the Meteorology Department are the boundaries of the world, for its field programs did extend from the South Pole to the Arctic, from beneath the surface of the earth to the edge of interplanetary space."

List of References

- 1935, H.L.[translated title]: Exchange of air masses and energy between low and high north-hemispheric latitudes during the polar year 1932/33
Beiträge z. Phys. d. freien Atmosph. 23, 45-60