Why Norman?:

Meteorology Comes to University of Oklahoma

by

John M. Lewis

A presentation at the 50th Anniversary

University of Oklahoma's School of Meteorology

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Extended Abstract

A review of the University of Oklahoma's (OU's) meteorology program/department over its first 15 years of existence (1960 – 1975) has been conducted with the intention of identifying factors that led to the creation of the department; further, an attempt is made to identify its uniqueness and categorize the scientific philosophy that has underpinned the program. Data sources include letters and memos from the OU Archives, oral history from former students and faculty, and the personal experiences of the author as a graduate student and assistant professor in the department during the late 1960s.

In the immediate post-WWII years up through the late-1950s, twelve new departments of meteorology were created in the United States. That brought the total to sixteen. Yet, there were only two departments along the southern tier of states: Florida State University and University of Arizona. Thus, despite the preponderance of severe weather in "Tornado Alley" — that stretch of land running from north Texas up through Oklahoma and into Kansas and Nebraska— there was not a single department of meteorology in this region. Two southerners, Walter Saucier and John Freeman, recent PhD recipients from the University of Chicago in 1952, had a dream of creating a department in south-central USA. They began as assistant professors with the Department of Oceanography at Texas A&M College. Despite success in building the meteorological component of this program, meteorology was given little independence and Walter Saucier began searching for a new academic home in the late-1950s. His search ended when he found a contingent of researchers in physics and engineering at OU who supported the development of a meteorology program in this severe weather region.

Saucier's strength stemmed from his close association with the Air Force Institute of Technology (AFIT) that supplied him with students and research funding while at Texas A & M

and continued after he moved to OU. An exceptional group of instructors and a premier researcher, Yoshikazu Sasaki, followed him from A&M to OU. This cadre of dedicated teachers and researchers attracted quality students into the program. The scientific philosophy was true to the Bergen School theme where theory was in service to the practical problem of weather forecasting. This theme was further broadened when the U. S. Weather Bureau created a National Severe Storm Laboratory (NSSL) in Norman. The NSSL came to Norman in 1963.

A severe academic blow was leveled in 1964 when the fledgling but eminently successful program lost its affiliation with Engineering Physics, a program that had foundation in both the College of Arts and Sciences and the College of Engineering. With opposition from the Departments of Geology and Geography, meteorology was denied admittance to the College of Arts and Sciences, and was thus absorbed into the College of Engineering. The fundamental cultural and philosophical differences between science and technology became all the more problematical under a new dean of engineering who placed meteorology under the control of Environmental Engineering. In this milieu, it became difficult to attract and keep new faculty in the meteorology department. Saucier came under fire from the higher levels of administration and was forced to relinquish the chairmanship. He left the university in May 1969 and the department went through a difficult period of adjustment where Amos Eddy became chairman for 2 years, and then Rex Inman succeeded him. Inman, a protégé of Sasaki and Saucier, used his academic acumen and skills to restore confidence in the department. He secured funds for new faculty in 1972 and successfully attracted three solid professors to the program and succeeded in arguing for placement of a Cooperative Institute of Mesoscale Meteorological Studies within the university. Not only did the program survive, it grew to become one of the most influential meteorological programs within the USA and exhibits a diversity that rivals any in the world.

1. Prelude

After completion of my master's degree in geophysical science at University of Chicago (UofC) in May 1963, I told my advisor Dr. George William Platzman (or GWP as we affectionately called him) that I was going to abandon my quest for a PhD and get a job. He suggested I consider working for Dr. Yoshi Sasaki at University of Oklahoma (OU). I was unaware of the power of GWP's word that was taken as truth. An immediate phone call to Professor Walter Saucier, chair of the meteorology program at OU, got me the job. And my further inquiry was " where's the location of this job?" GWP replied, "Norman, Oklahoma". And I thought, all I know about Norman is that it's home to Bud Wilkinson and the mighty Sooners (Fig. 1). I distinctly remembered reading that the Sooners' cumulative record by the mid-1950s was something like 70 wins and 7 losses.[1] Well, this job won't be bad based on football alone. And I faintly remembered hearing the names of Saucier and Sasaki, but I didn't connect them with a school in Oklahoma.

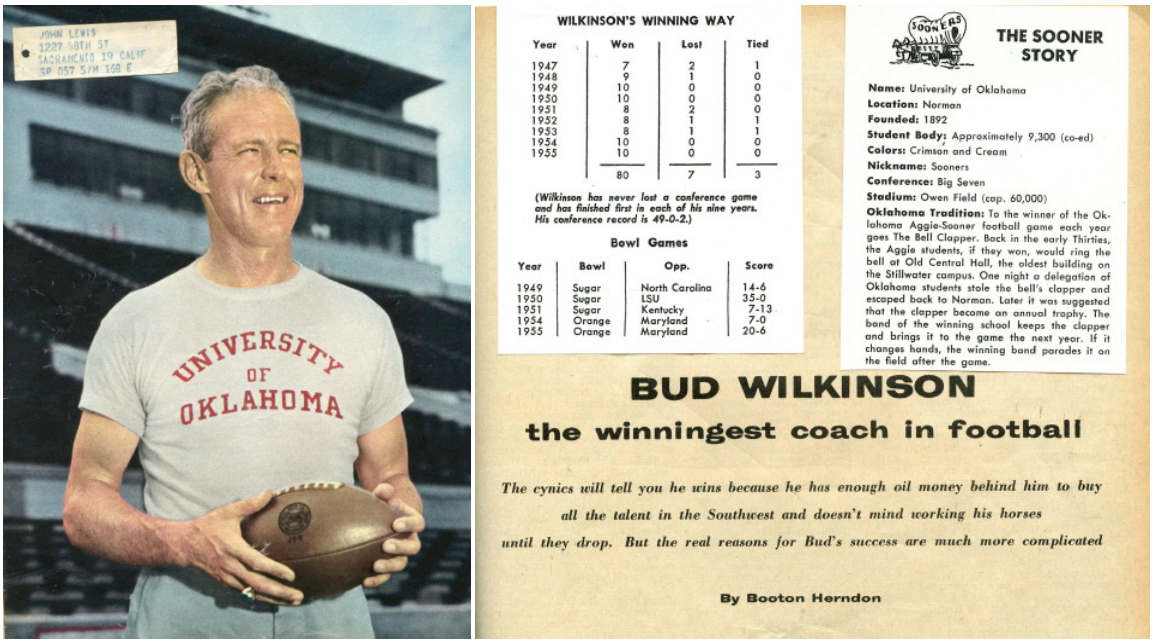
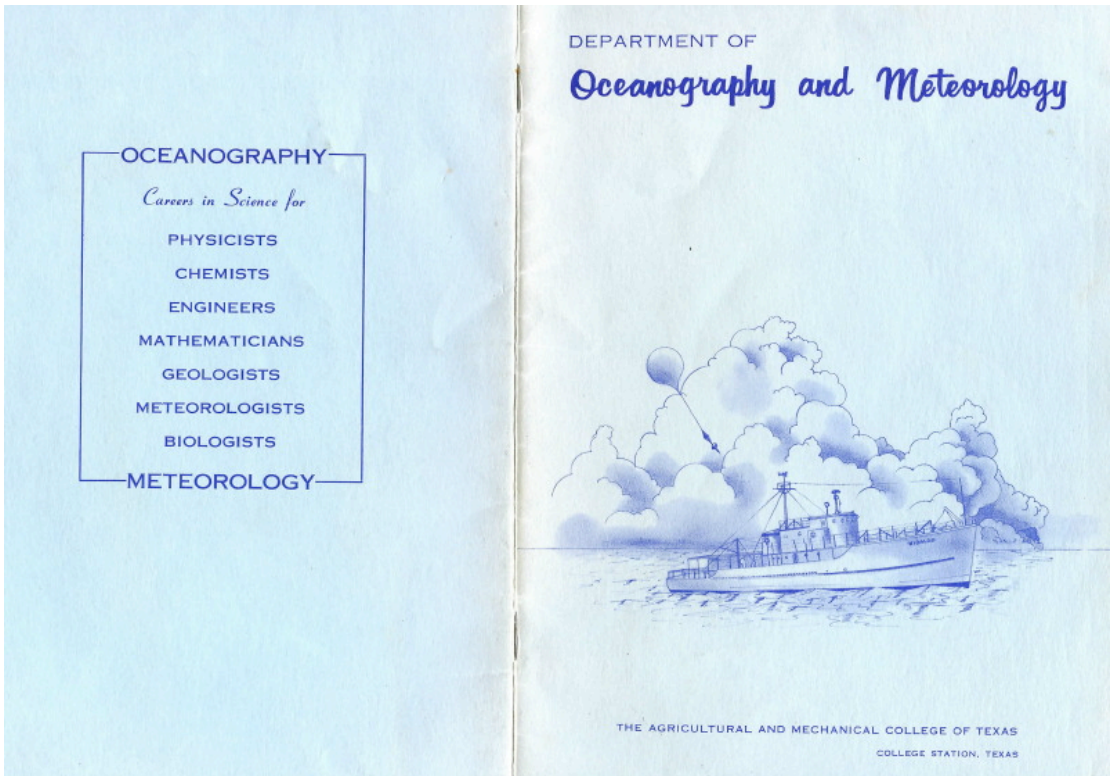


Figure 1. Pages from the author's November 1956 copy of *Sport*.

[1] Their record in 1955 was 80 wins, 7 losses, and 3 ties. (See Fig. 1)

Prior to taking the job in Norman, I decided to take a break on the family homestead – a gentrified apricot orchard and large farmhouse in the Sacramento Valley that typically housed 15 people from three, sometimes four, related families. In the vernacular of the 1960s, it was a "commune". While home, I looked at my sports magazines that my mom had kept neatly in place for me. And I found the article on Bud Wilkinson. Further, I looked through all the materials I had collected in preparation for grad school, and found the source of my acquaintance with the names Saucier and Sasaki — a brochure from Texas A&M College (Fig. 2). In early August, I hopped on the Southern Pacific and headed for Oklahoma. Two days later, I was the only departing passenger at Main Street Station in Norman. Temperature must have been close to 100F and it was humid, especially compared to the dry Sacramento Valley. Not a creature was stirring and the only person I located was the lady in the ticket booth at the Sooner Theatre across the street from the station. With my light suitcase, I started my trek to OU's South Base where I was set up to room with my classmate from Chicago, Bob Jones. This territory was so flat and I could see a row of building cumulus far to the south (Fig. 3).

To my surprise as I walked down Jenkins Avenue towards South Base, I came into contact with that great coliseum open at its south end (Fig. 4). I walked in and stared at this huge horseshoe of a stadium and in my mind's eye I could see Tommy McDonald and Billy Vessels swinging their hips as they headed for "pay dirt". And in the spirit of that latter-day song from *Annie*, I said "I think I'm going to like it here".



McDONELL, JAMES E., (1958), Instructor (Meteorology); *B. S., Huron College, 1953; M. S., Agricultural and Mechanical College of Texas, 1959.*

McLELLAN, HUGH J., (1957), Associate Professor (Physical Oceanography); *B. S., Dalhousie University, 1941; M. S., 1947; Ph. D., University of California, Scripps Institution of Oceanography, 1956.*

MOYER, VANCE E., (1958), Associate Professor (Meteorology); *B. S., Pennsylvania State, 1950; M. S., 1951; Ph. D., 1954.*

RAE, KENNETH M., (1957), Professor (Biological Oceanography) and Director of Marine Laboratory Programs; *B. S., University College, London, 1935; Ph. D., 1958.*

RAY, SAMMY M., (1958), Asst. Professor (Biology); *B. S., Louisiana State University, 1942; M. S., Rice Institute, 1952; Ph. D., 1954.*

REID, ROBERT O., (1951), Professor (Oceanography and Meteorology); *B. S., Southern California, 1946; M. S., University of California, Scripps Institution of Oceanography, 1948.*

SAUCIER, WALTER J., (1952 to June 1960), Professor (Meteorology); *B. S., Southwestern Louisiana Institute, 1942; M. S., Chicago, 1947; Ph. D., 1951.*

WILSON, BASIL W., (1953), Professor (Engineering Oceanography); *B. S., Cape Town, 1931; M. S., Illinois, 1939; D. Sc., Cape Town, 1953.*

RESEARCH STAFF

(Correct as of October 1, 1959)

(Figures in parentheses indicate date of association with Department)

CAPURRO, LUIS R. A., (1959), Research Scientist III (Physical Oceanography); *B. S., Argentine Naval School, 1940; M. S., University of California, Scripps Institution of Oceanography, 1949.*

DAVISON, RICHARD R., (1955), Research Scientist III (Chemical Engineering), *B. S., Texas Technological College, 1949; M. S., Agricultural and Mechanical College of Texas, 1958.*

HENRY, VERNON J., (1953), Research Scientist I (Geological Oceanography); *B. S., Lamar State College, 1953; M. S., Agricultural and Mechanical College of Texas, 1959.*

IBERT, EDWARD R., (1957), Research Scientist II (Chemical Oceanography); *B. S., Tulane University, 1950; M. S., Agricultural and Mechanical College of Texas, 1957.*

INMAN, REX L., (1957), Research Scientist II (Meteorology); *B. S., Central State College (Oklahoma), 1953; M. S., Agricultural and Mechanical College of Texas, 1959.*

KAJIURA, KINJIRO, (1955), Research Scientist II (Physical Oceanography); *B. S., University of Tokyo, 1948; Ph. D., Agricultural and Mechanical College of Texas, 1958.*

LOESCH, HAROLD, (1951), Research Scientist II (Biological Oceanography); *B. S., Agricultural and Mechanical College of Texas, 1951; M. S., 1954.*

LOGAN, BRIAN W., (1959), Research Scientist II (Geological Oceanography); *B. S., University Western Australia, 1955; Ph. D. work completed.*

LUMBY, JOHN R., (1958), Research Scientist III (Physical Oceanography).

SASAKI, YOSHIKAZU, (1956), Research Scientist II (Meteorology); *M. S., Tokyo University, 1950; Ph. D., 1955.*

SMITH, J. B., (1955), Research Scientist I (Geological Oceanography); *B. S., Antioch College, 1955; M. S., Agricultural and Mechanical College of Texas, 1958.*

SMITH, W. H., (1956), Research Scientist I (Chemical Oceanography); *B. S., Agricultural and Mechanical College of Texas, 1934.*

WELLS, CODIE S., (1955), Research Scientist II (Physical Oceanography); *B. S., Agricultural and Mechanical College of Texas, 1956; M. S., 1959.*

BARNES, STANLEY L., (1956), Instructor (Meteorology); *B. S., Agricultural and Mechanical College of Texas, 1958; M. S., 1959.*

ADMINISTRATIVE & TECHNICAL STAFF

Cangelose, Jake	Jackson, William M.
Chancey, Oscar	Letzering, Dean
Chaney, Kenneth	Letzering, Marsha
Elwell, James	O'Hara, Frank
Faver, Dorothy	Pierce, Sam
Grant, Jack	Stevenson, Bernadette
Groot, Pieter	Sullivan, Jim
Holdredge, Margaret	York, Andrew

In addition to the staff members listed above there are approximately 30 shorter term part time and full time employees. Of this number, about 20 are graduate students participating in the departmental research program.

Figure 2. Author's copy of the Texas A&M College's Department of Oceanography and Meteorology brochure (1960 – 1961 academic year). Faculty and staff listed include Walter Saucier, Yoshikazu Sasaki, Rex Inman, and Stan Barnes (extracted from earlier page of brochure).

Figure 3. Photograph of a line of developing cumulus on the outskirts of Norman, OK (Author's collection, 1963).

Figure 4. Author's photograph from within Owen Stadium, University of Oklahoma, looking southwards (Author's collection, 1963).

2. Why Norman?

We must start with Walter Joseph Saucier (WJS in the spirit of his referral to others such as JML in my case) (Fig.5). He was a native of Louisiana, bilingual in French and English, a Creole whose forbearers came down the Mississippi from Quebec City to the Gulf Coast in 1699. Although his voice had the Cajun French accent much in the mode of Justin Wilson of 1960s TV fame, *'Cookin Cajun'*, he made it clear that his forebears came to Louisiana 'two generations before the Nova Scotia Acadian exiles' (Saucier 2000, personal communication). He had a dream of starting a program in meteorology somewhere along the Gulf Coast. As Saucier said, "My rural southern heritage and academic interests drove me to the south" (Saucier 1995, personal communication).

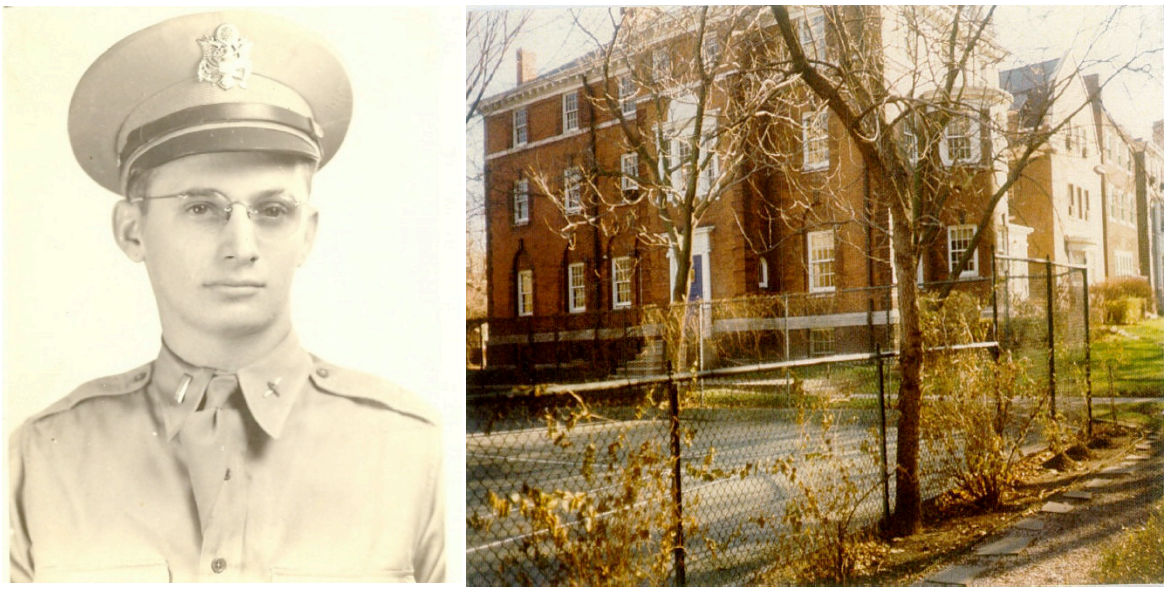


Figure 5. Walter Joseph Saucier (WJS) shortly after finishing his Cadet training at University of Chicago (UofC). The meteorology building at UofC is shown on the right side of the figure. (Photo of WJS courtesy of Gerald Saucier)

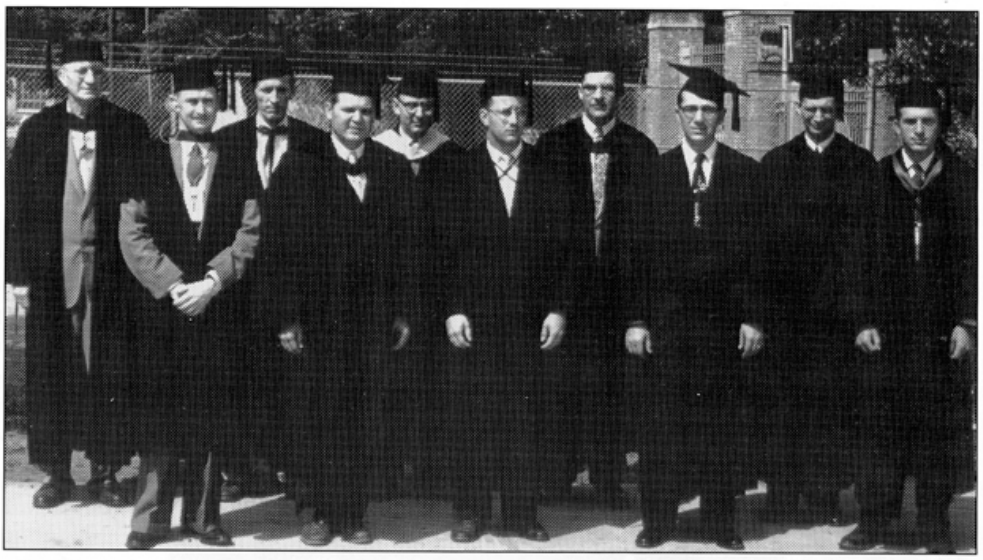
In February 1951, four months before WJS received his PhD from University of Chicago (UofC), he heard a talk by Ken Jehn at the winter meeting of the AMS held in Chicago. Jehn gave a talk on the young program at University of Texas – Austin that featured a rural micro-

meteorological tower. In summer 1951 with PhD in hand, Saucier took his young family on a trip west that included a stop in Austin where John Gerhardt, a faculty member at UT-Austin, gave Saucier a tour of the tower. Upon return to Chicago, he told his classmate and fellow southerner John Freeman about the UT-program (Fig. 6). They approached UT-Austin about the possibility of joining the faculty. Ken Jehn, head of the program, was not interested in these two "upstarts from the prestigious UofC" (Saucier 2000, personal communication). Freeman then

Figure 6. Principal organizers and researchers of the NWP project at the Institute of Advanced Study, Princeton University [ca. 1950]. John Freeman, with hands folded in front of him, is fourth from the right (Courtesy Library of Congress).

responded to an American Geophysical Union (AGU) announcement for a research meteorologist interested in marine applications within the Department of Oceanography at Texas A&M College. After successfully defending his dissertation in February 1952, he got the job. He gained credibility and strength within the department in response to immediate success in obtaining research grants. From a position of some power, Freeman became an advocate for hiring Saucier to start developing a curriculum in meteorology within the Oceanography Department. Freeman's advocacy was successful and Saucier was offered an assistant

professorship of meteorology at A&M with a salary of $5000/annum on April 4, 1952.[2] Saucier accepted the job and began work at A&M on September 1, 1952 (Fig. 7). In 1955 Freeman left A&M for private enterprise — after all, he was a protégé of Irving Krick as well as Rossby. His consulting firm still exists in Houston, operated by his daughter Jill Hasling.



Oceanography faculty members, circa 1955. Front: B. Wilson, J. Freeman, W. Elliott, D. Leipper, G. Frances–chini, W. Saucier, J. Barlow. Back: A. Price, R. Reid, A. Glazier.

Figure 7. Texas A&M faculty in the Department of Oceanography [ca. 1955] (Courtesy Texas A&M University).

WJS excelled at building up the student body in meteorology, mostly through his contacts with the Air Force Institute of Technology (AFIT). He brought in research dollars through contracts with the USWB and NSF to work on analysis of the jet stream. The meteorology curriculum expanded until a full program offering degrees at the bachelors level and graduate level was in place (both master's and doctoral degrees in oceanography with specialization in meteorology were offered). New faculty and research associates in meteorology were added — notable were Arnold Glaser and Myron ("Herb") Ligda, a pioneer in radar meteorology, and research associates Akira Kasahara and subsequently Yoshi Sasaki, both recent DSc - dynamicists out of University of Tokyo. Kasahara arrived in 1955, and after his departure to

[2] Byers offered Saucier $9600/annum to remain at UofC (Saucier 2000, personal communication).

UofC one year later, Sasaki arrived as his "replacement" in 1956.[3] During this same period of the mid-1950s, the oceanography student body dwindled (S. I. O., 2000). Contentiousness developed between Saucier and department head Dale Leipper and in 1958, six years after his arrival, Saucier began to look elsewhere for his "southern meteorology university"

His choices of "southern universities" in order of descending rank were: Louisiana State University (LSU), University of Oklahoma, and North Carolina State University. LSU showed no interest. Oklahoma, in "tornado alley", was promising according to Saucier because of "mesoscale weather and severe storms, of interest to the Oklahoma public and to federal sponsorship of research" (Saucier, personal communication, 2007; Lewis 2007). He favored OU over Oklahoma State University because they did not take advantage of a golden opportunity presented to them in the early 1950s. Quoting Saucier:

> I did not approach Okla. State U. [OSU][4]. With onset of Korean War, USAF [U. S. Air Force] contracted airman forecaster training [with OSU], as done at Chanute TTC [Technical Training Center], Ill., to serve field operations of AF and Army. That terminated before 1959. Failure by OSU to take interest in meteorology degree programs in "tornado alley" indicated to me no purpose in contacting them.
>
> (Saucier, personal communication, 2010)

Instead, a letter was sent to OU. As remembered by WJS: 'So I took a shot in the dark with a long letter dated 12 April 1959, addressed 'President, University of Oklahoma, Norman, Oklahoma…' (Saucier, personal communication, 2000). He was offered a Full Professorship of Engineering Physics, offer dated 15 February 1960, with a significant and prominent group of professors endorsing the appointment. Among them Richard Fowler (Engineering Physics

[3] See Section 4, Premeir Researcher.
[4] Information in brackets inserted by author.

chairman) and Cedomir ("Cheddy") Sliepcevich (a renowned chemical engineer, expert in fire, and associate dean of the Engineering School), both out of University of Michigan and possessed of university vision and energy. Interests by OU in meteorology had been stimulated by NSF's 1959 consideration of Norman, OK, as the site of the National Institute for Atmospheric Research.[5] OU offered the North Campus of the University for the national site. This North Campus including Westheimer Field was the site of US Navy training during WWII, and segments of this land eventually became the home of the meteorology program and National Severe Storms Laboratory (NSSL) (Long and Hart 1980).

The program took off exponentially – funding from NSF for mesoscale meteorology research and explosion in AFIT students (two post-B.S. groups/year and undergraduates). The NSF support for a faculty position was delayed "due to uncertainties about OU's extent of commitment to meteorology" (Saucier 1998, personal communication).

3. Saucier's View of Meteorology

One of my favorite movies is *Twelve O'clock High*, the story of a bomber squadron stationed in England during WWII — Gregory Peck the bomber pilot and commander of the base and Dean Jaeger the personnel officer. Saucier briefed pilots in the 303rd Bomber Squadron on their missions over Germany. He served for the Eighth Weather Region, Eighteenth Weather Squadron at Molesworth (303rd Bomb Group) and at Deenethorp (401st Bomb Group) on D-Day.

[5] Boulder, Colorado (and University of Colorado) was eventually chosen as the site —the now famous National Center for Atmospheric Research (NCAR) where Walter Orr Roberts' High Altitude Observatory (HAO) held the 'winning hand'.

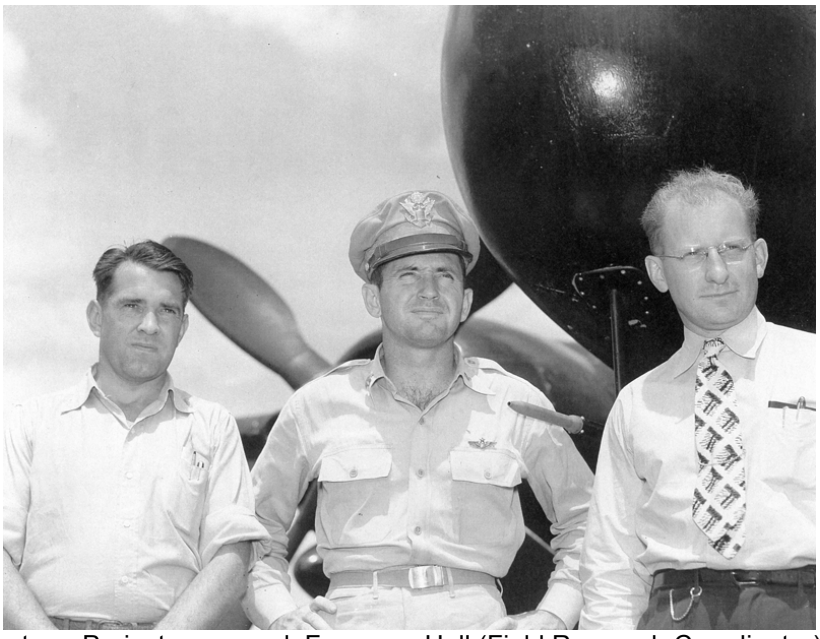


Figure 8. Thunderstorm Project personnel: Ferguson Hall (Field Research Coordinator), Col. Lewis Meng (Air Force Operations), and Professor Horace Byers (Project Leader). The P-61 ("Black Widow") in the background was used for flights through thunderstorms [ca. 1948]. (Courtesy of Douglas Allen).

His training in meteorology began on August 4, 1942 as a member of the 4th Cadet Class at UofC. Nine months later he was in England as a Junior Weather Officer learning how to forecast in the company of those invaluable enlisted weathermen with a wealth of experience compared to the "3x90-day wonders". Although most modest, it was clear from my interview with him that his performance was exceptional and he gained the respect of those enlisted forecasters (Saucier 1992, personal communication).

He left service as a Captain, US Army Air Corps in 1946 and returned to UofC on the G.I. Bill with the intension of obtaining the Sc.M. and then heading back south with his growing family (Walt and his wife Helen would eventually have 7 children). He supplemented this G.I. Bill support by serving as instructor in the synoptic labs under the supervision of Horace Byers (Fig. 8). Saucier worked in this capacity for 5 years (1948 – 1952). These labs met 4 – 5 times per week, three quarters per year, where one group of students numbered 63 (Saucier, 1992, personal communication). Upon completion of his Sc.M. in August 1947 ["Texas – West

Cyclone", Saucier (1949)], Byers asked him to stay on as the principal lab instructor with a sizeable increase in pay[6]. WJS decided to remain and begin work on his PhD. With such large lab classes, Byers suggested that he cut down his workload by writing a lab manual. As he recalled,

> "… as I developed the proposed 'manual' it became dominantly book…GWP then took much interest in the book and devoted much time (days and evenings) to editing, guidance, discussions…One day Byers comes into my office and says, 'Let's go to the Press [University of Chicago Press]'. There we sat down and the plans for publishing the book took place ("Principles of Meteorological Analysis", Saucier 1955). Before the book was published, I left for A&M.
>
> (Saucier 1992, personal communication)

Saucier's view of meteorology is concisely expressed in the preface of his book:

> …it is believed that both science and the profession of meteorology have been retarded by the lack of integration [between]…the empiricism and art …of weather analysis and the logic and theory of meteorological education…an attempt here is made to narrow the gap.
>
> (Saucier, 1955)

In a retrospective moment, he recounted his experiences at UofC and it serves as a meaningful definition of his approach to science:

> While I was honored to have been a product of the "Rossby School" at UC---resident education there Aug 1942 — May 1943 [Cadet Class] and (after away for 3+ years) June 1946 — August

[6] This thesis work led to the well-known synoptic rule that came to be known as "Henry's Rule" — the triggering exodus of the upper-level SW low. The process was named after Keith Henry, an Sc. M. student under Saucier's supervision in 1949 and later a professor at Texas A&M. The author (JML) used this rule while weather briefing at Fleet Numerical Weather Center in 1970 – 1972.

1952 – I was not a first-hand student of Rossby in the mold of Fultz, Platzman, V Starr, Hess, Phillips, etc. As in cases of many other students there, my mentors/advisors/teachers were students, graduates, and associates of Rossby (e. g., Byers, Platzman, Fultz, Starr, Riehl, Palmén, and Biel). I'm forever grateful for having been exposed to that breadth of talents, even if it meant obtaining the broad-brush education at some sacrifice to in-depthness…My odd interests, slants…produced what I became, more teacher-academic than scientist, more pragmatic than philosophical (Fig. 9).

(Saucier 1991, personal communication)

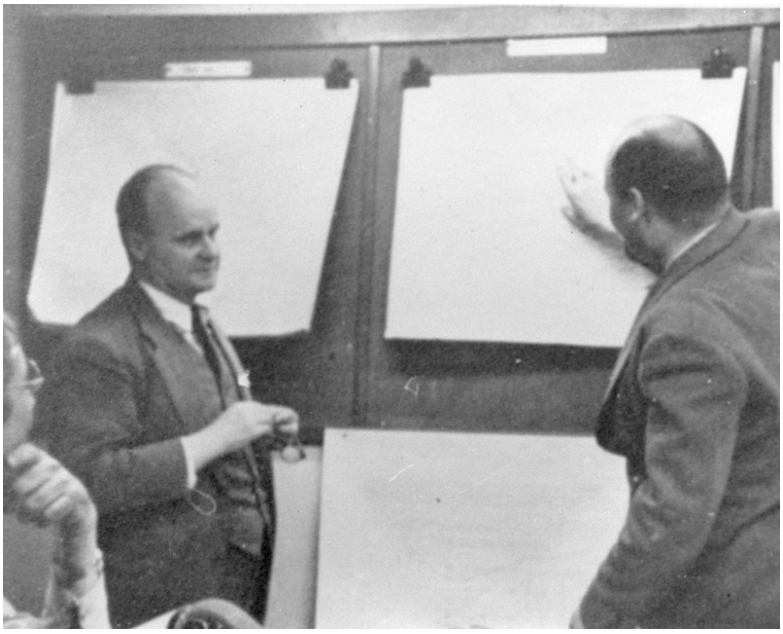


Figure 9. Weather map discussion at University of Chicago [ca. 1948]. Eric Palmén standing on left, Carl Rossby on the right, and Tor Bergeron seated. (Courtesy of George Cressman).

4. Premier Researcher: Yoshi Sasaki

Through the efforts of Platzman at UofC, Saucier found that a promising young researcher from the University of Tokyo named Yoshikazu Sasaki was considering a move to the USA (Fig. 9). Upon contact, Sasaki said he would consider the position. But the decision would not be made on academic grounds alone. As remembered by Sasaki:

> Koko [Yoshi's wife] and I chose to go to Texas because of our first baby [Okko] born disabled…We received some excellent advice from the Vice Chief of Staff of the Prime Minister. He recommended that it could be easier to live in Texas because we could take Okko to the Houston Medical Center. He also told us that the Texas-born Nisei had great respect because of heroic actions in Italy during WWII and that made Texas a good place for Japanese immigrant.
>
> (Sasaki 2007, personal communication)

Figure 10a. Faculty, students, and staff of the Geophysical Institute, University of Tokyo [ca. 1955]. Yoshi Sasaki kneeling, second from right (Courtesy of Akira Kasahara).

Prior to his arrival at Texas A&M in 1956, Sasaki made three monumental contributions related to numerical weather prediction (NWP) (Fig. 10a). And he made these contributions without the use of a digital computer, the basis for NWP! He basically satisfied one of the principals espoused by noted British historian Arnold Toynbee in his monumental treatise *A Study of History* (Toynbee 1934 – 1961) — he experienced the *virtues of adversity*. That is, in

the presence of austere circumstances — including limited financial support for education, poor living conditions, and lack of educational resources, Sasaki viewed these problems in their most severe theoretical framework. The three contributions, listed chronologically, are the following:

(1) Sasaki and fellow student Kikuro Miyakoda made the first track predictions of typhoons (24-hour track predictions) by inserting an idealized circular vortex in the large-scale steering current where evolution of the steering current was governed by the barotropic vorticity constraint— an approach that was adopted at operational prediction centers worldwide within the next decade (Sasaki and Miyakoda 1954; a review of track prediction in the Atlantic Ocean region is found in DeMaria 1996),

(2) In his D. Sc. dissertation (Sasaki 1955), he formulated NWP as a problem in variational mechanics — based on the Lagrange-Hamiltonian Principle. Five years later, the noted quantum physicist turned physical oceanographer Carl Eckart developed a similar theory for the atmosphere-ocean system without knowledge of Sasaki's dissertation (Eckart 1960 a, b). History of science is replete with similar instances of cross-cultural unawareness where language or information barriers lead to a disconnection – disconnections that are especially apparent when the country of origin lies outside the mainstream of science (reviewed in Lewis 2003), and

(3) Sasaki's development of the variational method of weather map analysis that has become the cornerstone of modern-day four-dimensional data assimilation (4DDA) used at operational weather prediction centers worldwide (Sasaki 1958; reviewed in Lewis and Lakshmivarahan 2008).[7]

Besides these three seminal contributions, Sasaki made another monumental contribution within a year of coming to the United States. In this instance he had access to a digital computer

[7] Although this contribution was published in 1958, two years after Sasaki's emigration to the USA, he indicated that the idea and major work was completed prior to his arrival in the USA (Sasaki, 2007, personal communication).

and executed a numerical experiment that helped unravel the feedback of rainfall on the development of a mesoscale disturbance (Sasaki 1960). This contribution had major impact on dynamicists who were seeking to design mesoscale prediction models (Hovermale 1970, personal communication)[8].

In short, Saucier had found a gem in Yoshikazu Sasaki and when Saucier considered his move to OU, he asked Sasaki to join him. Yoshi, Koko, and Okko came to Norman in October, 1960, where Yoshi assumed the position of Adjunct Research Professor of Meteorology initially funded by Saucier's research contract but soon by Sasaki's own funding from National Science Foundation (Fig. 10b).

Figure 10b. Sasaki at OU in 1965 on walkway between Carson Engineering Center (left) and Felgar Hall. Sasaki's Nash Rambler station wagon is shown directly behind the blossoming trees aside the parking lot.

[8] Revealed in conversation between the author and John Hovermale, an operational modeler in the Development Division of the National Meteorological Center (NMC). The conversation took place at the AMS Conference on Motion and Dynamics of the Atmosphere, Houston, TX, March 1970.

Sasaki was gifted at advising graduate students in their thesis and dissertation work. He had the knack of knowing the various talents of his students and finding a project that suited each one of them. In my case, I began working on a variant of Akio Arakawa's research related to finite-difference schemes that conserved entropy, enthalpy, and kinetic energy in 1963. Arakawa's work, accomplished at UCLA, would not be published until 1966, but Yoshi knew of it because of his connections with other Japanese meteorologists who had immigrated to the USA. I was hooked "for life" in meteorological research. Several of us would often accompany Yoshi in his Nash Rambler to Ponca City on Friday nights where he made arrangements for us to use Conoco Oil Company's computers – IBM 7090 and later the 7094, the high-speed scientific computers of that day whereas OU's IBM 1401 could not be stretched to handle our forecasting codes. Those were wonderful outings not only for the use of these powerful computers (in the 1960s!), but also for the personal connection with Yoshi and the other students. We'd return to Norman in the wee hours of Saturday morning and not sleep much in anticipation of our early Saturday morning football games [sometimes with only the four regulars: Jess Charba, John Lewis, Bob Mitchell, and Bill Parton].

Sasaki first taught during the 1963-1964 academic year. The course he offered was simply called "Convection". It was an exceptional course attended by all PhD candidates, about 8 of us. With the survey book by Barry Saltzman serving as underpinning (Saltzman 1962), we examined the fundamental contributions to convection starting with Lord Rayleigh's classic theoretical study of the experimental work of Henri Bénard (Bénard 1900; Rayleigh 1916). Yoshi made the work come to life as we followed Rayleigh and his development of the famous non-dimensional number that told when the fluid would break down into cellular motions (Fig. 11.) He followed with the more recent development of the Morton-Taylor-Turner theory (Morton et al. 1956).

Figure 11. Bénard convection cells in the atmosphere as viewed from space (Courtesy of Stan Barnes).

The beauty of Sasaki's approach to teaching was that he let us know how he viewed the research contributions, their strengths and weaknesses. He made it clear that these contributions were steps along the way to understanding, but much more would be required for full understanding. I had never seen this approach to teaching and I was simply ecstatic to realize that I might be able to contribute. He inspired all of us (Figs. 12 and 13).

Figure 12. Sasaki in his Engineering Lab office (1969).

(Courtesy of J. Heimbach)

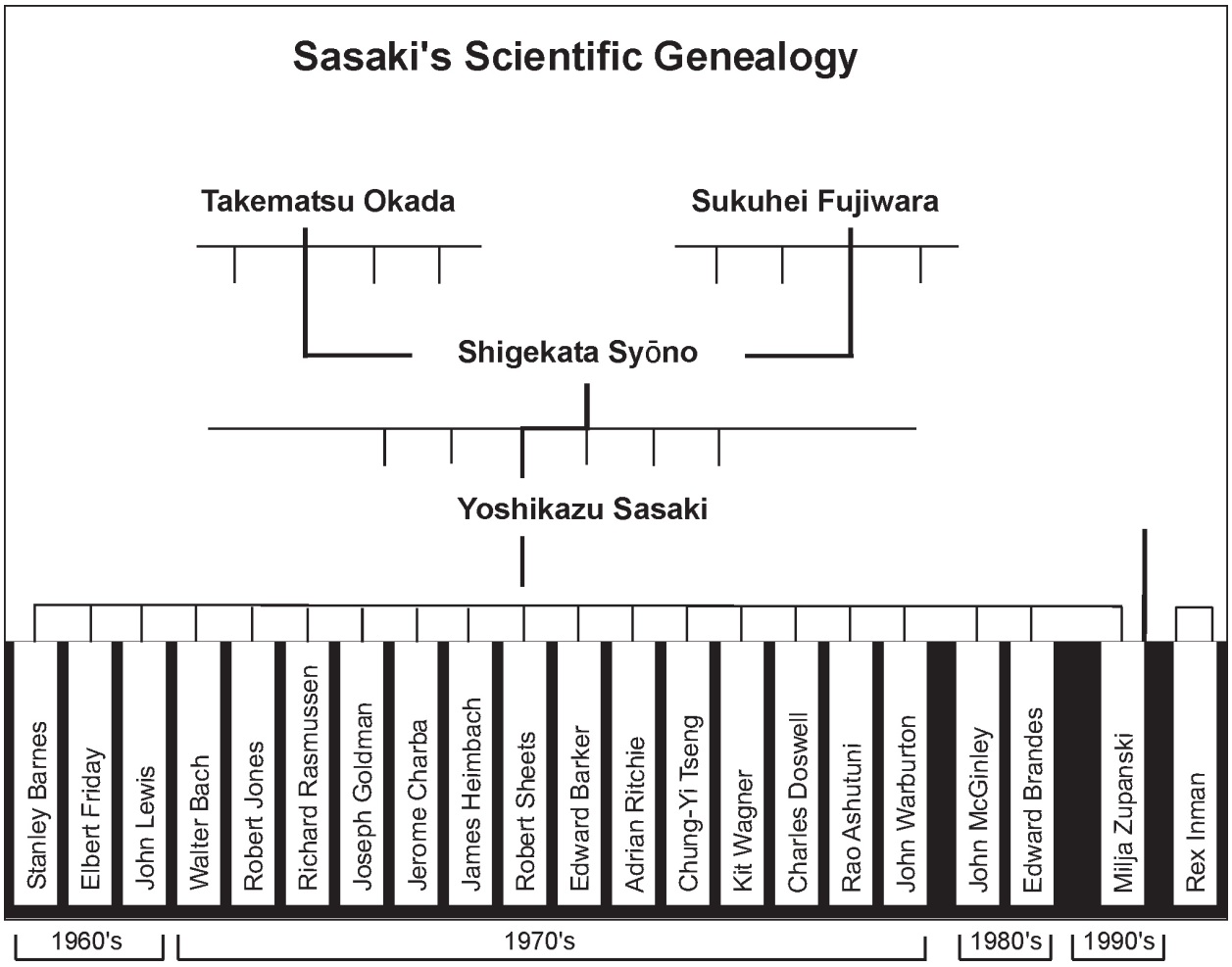


Figure 13. Sasaki's scientific family tree. Doctoral students listed along bottom line in chronological order. Rex Inman, PhD from Texas A&M (1967), and Edward Barker, PhD from Naval Postgraduate School (1975), were the only protégés from institutions other than OU. Inman's *de jure* advisor was Professor Robert Reid at A&M, but Sasaki was his *de facto* advisor (Thus Inman is placed to the right).

5. The Instructors

Walter Saucier could never have started the OU meteorology program so quickly without the loyal and talented group of doctoral candidates that followed him from Texas A&M. They all had experience as military weathermen and had made progress toward their PhD's at A&M. Sam Hall, Rex Inman, and Vic Whitehead had served as weather officers in the U. S. Air Force (USAF), and Stan Barnes served as an enlisted aerographer in the U. S. Navy (USN). They were talented teachers and they served as "intermediate advisors" to the graduate students. We felt comfortable with them and they typically had more experience than us. Barnes and Hall were

experienced with instruments and analysis of observations. Inman was a dynamicist and NWP scholar who was demanding but exceptional in teaching dynamical meteorology. He demanded much from the students but gave much in return. He was also a "scratch" golfer and top-notch bridge player. He would challenge a group of us on the OU links nearly every Saturday afternoon and invite us to play bridge on weekend nights at the Skirvin, the largest hotel in Oklahoma City. Bob Jones, my roommate and hurricane forecaster *par excellence* would often team with Rex at the bridge matches and they were a hard team to beat. Vic was a premier forecaster and he'd give us clues on how to view the sky — youthful lessons he'd learned in the hills of Arkansas. They added a spirit and flavor to the program that enriched it immensely (Figs. 14 and 15).

Figure 14. Master's degree recipients in meteorology and oceanography from Texas A&M College in 1959: Stan Barnes (with bow tie) and Rex Inman (top row, second from left). (Courtesy of Stan Barnes).

Figure 15. Rex Inman and Yoshi Sasaki enjoying a drink at Sasaki's home [ca. 1965].

6. The National Severe Storms Laboratory (NSSL) comes to Norman

Justification for the NSSL stemmed from concern over aircraft accidents attributed to severe convective storms (Brown and Lewis 2005). The last Chief of the Weather Bureau, Robert M. White, a protégé of Victor Starr at MIT, in concert with his top scientific advisors, Harry Wexler and Robert Simpson, offered the directorship of the lab to Edwin Kessler. The lab would be located in Norman, Oklahoma for two reasons: (1) National Severe Storms Project (NSSP) working out of Kansas City, MO, had conducted successful field programs in Oklahoma, and (2) OU had a successful meteorology program.

Figure 16. NSSL staff picture in 1967 (Courtesy of NSSL).

Would Kessler accept the job? He certainly had the scientific qualifications: a product of the MIT School of Meteorology and an exemplary record at Travelers Research Center (TRC) where used radar to quantify the distribution and continuity of water substance in storms (Kessler 1969). On the other hand, he received little support from colleagues at TRC. As Kessler recalls:

> A few friends at TRC who had hardly heard of Oklahoma or who had a poor perception of this place [said]: 'Why would I want to go there?' Well the answer was clear. How could a meteorologist turn down an opportunity to lead the U. S. national effort in severe storm research? Especially a meteorologist who had experienced the amazing thunderstorm phenomena that occasionally visited south Texas [where I had spent part of my youth]. The clear answer was "No way" !!
>
> (Kessler 2004)

Figure 17. View of the NSSL Building on North Campus, OU, surrounded by several radars where the newly designed Doppler radar is in the foreground (ca. 1969) (Courtesy of Rodger Brown).

The Lab was a vital force in Norman (Figs 16 and 17). From my vantage point as a graduate student, it offered the opportunity to view radar reflectivity of storms from the WSR-57 [Weather Surveillance Radar – 57]. It also gave me a chance to work with Roger Lhermitte, if only for a short while. I assisted him in programming the Fast Fourier Transform (FFT) used in signal processing. He was a character — a brilliant researcher who worked diligently to develop Doppler radar. Kit Wagner also had the opportunity to work with Dale Sanders to access data from the instrumented WKY-TV tower. Kessler taught a course in cloud physics that also served to couple the Lab with the meteorology program, and Kessler served on the committees of doctoral students.

Although we students had interest in the tornado by virtue of their frequency in Oklahoma, research and seminars at NSSL fueled this interest. Neil Ward built a hydrodynamics lab model of the tornado and offered help and advice to doctoral students Gene Wilkins and Joe Friday with their hydro experiments (Fig. 18). Further, Neil started the tornado chase effort at NSSL, and Bob Davies-Jones joined the Lab in 1969 and became the community's resident theoretician on the dynamics of vortices. The team of Neil Ward, Bob D-J and Don Burgess formed the "brain trust" on tornadic storms by the early 1970s. Neil worked with Lhermitte to help define the radar resolution necessary to detect the mesocyclone, and this brain trust later worked with Lhermitte's protégés: Dale Sirmans and John Carter on this same problem. Engineering in service to science became a trademark of NSSL, and remains so to this day.

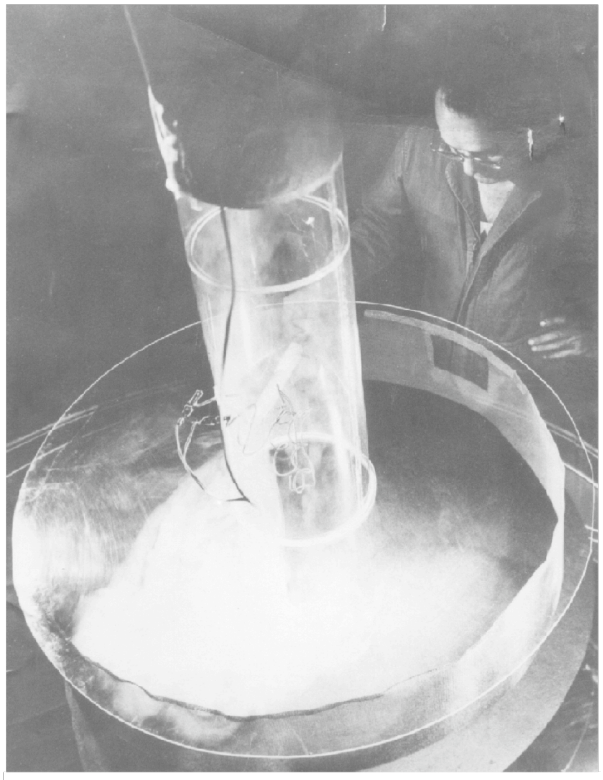


Figure 18. Neil Ward at his tornado machine (ca. 1965). (Courtesy of NSSL)

7. Fitful growth and regime change

I'd left the university in 1968 to work at the National Meteorological Center. I returned in fall of that year to complete work on my dissertation. Upon return, I immediately sensed a depression had fallen over the department [department status granted on July 1, 1966, within the College of Engineering]. We grad students were unaware of behind the scenes unrest. By May 1969, Walter Saucier was physically gone from Norman and Amos Eddy, a Canadian

meteorologist who had made his name in statistical objective analysis (Eddy 1967) and who had joined the faculty a year earlier, was announced as the new chairman of the department. These events were most surprising to me since the department had grown in both student body and faculty since about 1965. During the period 1965 – 1968, three new faculty members had been added (Ray Staley, J. J. Stephens, and Allen Weber) and Yoshi Sasaki was promoted to a tenure-track associate professorship. Further, experimental hydrodynamicist Lothar Koschmieder came to OU as a research associate in 1968.

With my assignment to review the history of the department from its inception until 1975, I found valuable information in OU's historical archive. With help from OU Professors Fred Carr and David Levy, I found important documentation, essentially interoffice memos and letters to and from Saucier, that give some idea of events that led to the regime change. The story is complex, and full understanding will never be achieved in the absence of key individuals involved in the saga. It is clear that problems commenced in the 1963 – 1964 academic year when the new Dean of the College of Engineering, Dr. Gene Nordby, terminated the Engineering Physics (EP) program. Without a connection to the College of Arts and Sciences as was the case when meteorology was a part of EP, and with confinement to the Civil Engineering and Environmental Science (CEES) along with sanitary science and public health components, problems immediately arose – problems of a cultural nature, a philosophy of technology vs. a scientific philosophy. This move also cost Saucier his "champion" within the university, Professor Richard Gildart Fowler of the physics faculty. As recalled by Saucier, "Our connection to physics might not have occurred had Fowler not been in Australia (on sabbatical leave) for two years (Saucier 1998, personal communication).

Factors that led to the regime change and Saucier's resignation in1968 are found in

Appendix A. After reflection on these troubling events, I found some solace in Rudyard Kipling's poem, *If*. The first few lines read:

If

If you can keep your head when all about you
Are losing theirs and blaming it on you;
If you can trust yourself when all men doubt you,
But make allowance for their doubting too…

And as stated earlier, Professor Amos Eddy assumed the chairmanship. Eddy encountered problems with Dean Nordby and Eddy's innovative view of coupling biology with meteorology (an ecological component of meteorology including issues such as sustainability) presented problems and challenges within the university. His tenure lasted 28 months. Rex Inman replaced him in September 1971.

8. Epilogue

As I think about my move from Chicago to Norman in 1963, there wells up within me joyfulness. The plains of central Oklahoma emancipated me — asphalt and grey buildings that pervaded the south side of Chicago no longer bound me. But beyond that, there was a kindness and friendliness among the students and faculty in the OU program of meteorology that was housed in that old building on North Campus. I was a hydrodynamicist who could quote chapter and verse from Lamb's classic book, but I was short on the practice of meteorology. They accepted me for my mathematical ability and worked to strengthen my weakness. And of course I swallowed whole the excitement of OU athletics.

Yoshi Sasaki was my mentor — he knew what I needed academically and he gently encouraged me. Walt knew my weakness and made sure I was aware of it when I failed my PhD

exam in synoptics (See Joe Friday, Vignettes).[9] But like a kind uncle, he invited me to sit in on his advanced synoptics course and take the exam after another year. This time I passed. And Ed Kessler had a way of pushing you in the right direction with that relaxed Bostonian accent. These men taught me how to think about meteorology.

And despite the near knockout blow dealt meteorology in the mid-to-late 1960s, it survived. Not only survived but flourished under the able guidance of Professor Rex Inman — as I like to call him, "the glue". He basically stood toe to toe with Sasaki and Saucier as that most valued dynamics instructor. If you never met him, you only need to go to the movie "The Fugitive" and observe Tommy Lee Jones, the federal agent in search of Harrison Ford, the fugitive from justice. That's Rex Inman personified in speech, action, and relentless pursuit. He was as much Oklahoman as the red dirt that surrounds us in this state. He knew how to persuade, to gain your confidence, and take risks. He used these skills to obtain support for three professorships and hired Jay Fein, Jeff Kimpel, and John McCarthy in 1973. He further interacted with NOAA and brought the Cooperative Institute to Norman. As I look at this magnificent structure that not only houses the School of Meteorology, the Cooperative Institute, the Storm Prediction Center, the Oklahoma Climate Center, I cannot help but think back to the humble beginnings of the program in the Navy Infirmary on North Campus. And as I re-read Walt Saucier's acceptance letter for the professorship at OU in 1960, I am impressed with the humility he exhibited. In his letter to President George Lynn Cross, he said: "This is an opportunity to assist the university in gaining national, and we hope worldwide, recognition in a new field. I pray that I may live up to the tasks ahead." And indeed Walt, you led the way.

[9] See Appendix B.

ACKNOWLEDGMENTS:

I am grateful to Professor Fred Carr and Emeritus Professor of History at OU, David Levy, for helping me access information in the OU Archives. Further, interviews with Professors Saucier, Sasaki, and Kessler over the past two decades have been most beneficial. The vignettes from former students and faculty complemented my knowledge of meteorology at OU and added a pleasant flavor to the study. Vicki Hall, graphic specialist at the Desert Research Institute, worked diligently to help produce the electronic version of the manuscript. Photo credit belongs to Douglas Allen, Stan Barnes, Rodger Brown, George Cressman, James Heimbach, Akira Kasahara, Gerald Saucier, and NSSL.

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Appendix A: Factors linked to Saucier's resignation in 1968

In Section 7 of this history, "Fitful growth and regime change", a brief summary of events that led to the resignation of Professor Saucier have been presented. It is appropriate to give a more complete list of factors involved in this decision. They follow:

1) A severe blow was leveled on the meteorology program during the academic year 1963-1964 when the new Dean of Engineering, Dr. Gene Nordby, eliminated Engineering Physics (EP) – the academic home of meteorology.

2) Saucier was unsuccessful in finding a new home for meteorology in the College of Arts and Sciences (where the Physics Department resided). Primary opposition came from Geology and Geography, departments that greatly benefitted and depended upon large enrollments in elective service courses for A&S students. Meteorology would be a threat in offering competitive service courses.

3) The meteorology program was absorbed into CEES (Civil Engineering and Environmental Science), a restructured component of the College of Engineering — an unusual linkage that proved problematical on scientific and financial grounds. The level of financial support for meteorology decreased in the presence of College of Engineering policies.

4) Meteorology became the Department of Meteorology on July 1, 1966, but remained in the College of Engineering. Two of three faculty appointments over the period 1965 – 1967 resulted in quick resignations. Ray Staley, a protégé of Phil Church at University of Washington, came as assistant professor in January 1965 and left five months later, indicating that problems with CEES were at the root of his decision to leave. Jerry Stephens, a meteorology-math doctoral recipient at University of Texas-Austin came in September 1966 and left nine months later for a position at Florida State University. Allen Weber, a PhD recipient at University of Utah, also

came in September 1966 and remained until May 1969 when he followed Saucier to North Carolina State University.

5) There was limited support (moral and financial) from the College of Engineering and the President's Office in helping to rebuild the Meteorology Department after the devastating fire on North Campus that essentially destroyed all properties (building and resources) related to the department. In essence, an indication that meteorology fell out of favor with the higher levels of administration within the university.

Based on my earlier studies of meteorology departments in the USA, what was obviously missing in the OU meteorology department's case was the absence of a "champion" — a high-level administrative official who serves as an advocate for a program. Rossby was unable to find a champion at MIT during the 12-year period (1928 -1939) he led the meteorology program at that prestigious institution. At MIT, meteorology was a component of the mechanical engineering department and the chair Jerome Hunsacker refused to advocate for a separate department of meteorology. In the early 1940s, when meteorology was under the leadership of Sverre Petterssen, departmental status was granted (Reviewed in Lewis 1996). On the other hand, despite the controversy and intrigue that surrounded Irving Krick and the meteorology program at CalTech in the late 1930s into the mid-1940s, the program and later department was protected by Robert Millikan, the chief executive to this highly acclaimed technical institute. When Lee DuBridge replaced Millikan shortly after the end of WWII, he abolished the entire department in concert with his philosophy of discouraging the gross entrepreneurial nature of the department (Reviewed in Lewis 1994).

Appendix B: Vignettes from students and faculty of the Oklahoma University (OU) meteorology program/department during the years 1960 – 1975. Available on the OU Meteorology website (50th Anniversary).

Contributors:

Stan Barnes	Bob Johns	Yoshi Sasaki
Fred Brock	Howard Johnson	Diane Saucier
Jess Charba	Bob Jones	Gerald Saucier
Ken Crawford	Bob Julian	Bob Sheets
Chuck Doswell	Jon Kahler	Dayton Vincent
Gary England	John Lewis	Kit Wagner
Joe Friday	Buddy Ritchie	Alan Weber
Jim Heimbach		