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Dedication to the 70th birthday of Prof. Elgene O. Box

– Kazue Fujiwara, Yokohama –

Elgene was born on 16 December 1945 to Capt. and Mrs. E O Box jr, at the Naval Air Station in Corpus Christi, Texas. The next August, though, they moved to Oklahoma, which 40 years earlier was still the Indian Territory. After skipping the 4th grade, Elgene became the youngest boy in his class, graduating in 1963 from College High School (Bartlesville). Along the way, he learned to play baseball, to ride a horse, to make color aerial fireworks, to play the piano and sing rock 'n' roll, and to love the woods. Since his mother was a Latin teacher, he also picked up four year of Latin and was ready in college to start learning modern languages.

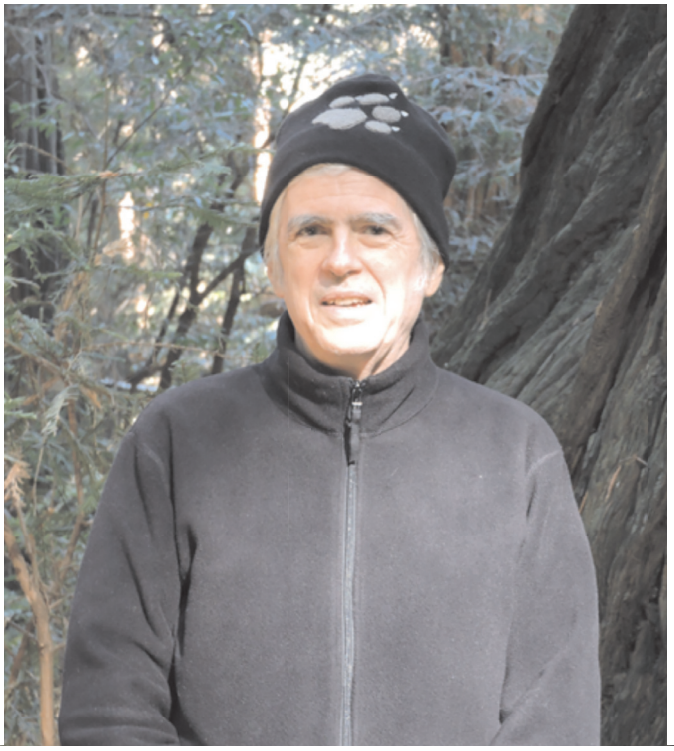

Photo 1: Elgene Owen Box at Muir Woods National Monument in California, in November, 2015.

At the University of Texas Elgene studied mathematics and history, sang classical choral music, and learned to program computers. At Duke University (North Carolina) he received a Masters degree (mathematics) and discovered the holistic thinking of ecology and the environmental movement. While working in 1970 at the University of North Carolina Computer Center, he was thus in just the right place to be discovered by Helmut Lieth, who needed a programmer to help make the first model-driven world computer maps, in particular the "Miami Model" of net primary productivity (see LIETH 1975).

In those days computing was done on mainframe computers, which cost money, even at universities. So Lieth sent Elgene to the Kernforschungsanlage in Jülich, where he had unlimited computer access. There he was able to compile a detailed world climatic data-base, program the complete climatic water budget (SOLWAT, with global estimates of soil texture), and write a proto-GIS for world mapping and map quantification (MAPCOUNT, BOX 1975). Using data from the International Biological Program, LIETH and BOX (1977) also made a first global model of gross primary productivity, which Elgene mapped and quantified, providing the basis for the often stated rule-of-thumb that terrestrial net production is about 50% of gross production (BOX 1978). In 1977 Elgene lived for two months with the famous Prof. Heinrich Walter, where he translated the Eurasian portion of the "Ecosystems of the World" volume on Temperate Deserts and Semi-Deserts (WALTER and BOX 1983). Finally, also during the 1970s, he wrote the basic computer processors for climatic envelope modeling (ECOSIEVE), which were used for his doctoral research to demonstrate that the main natural vegetation types and regions of the world could be predicted and mapped reasonably from climatic data alone. He received his doctorate from the University of North Carolina in 1978.

Beginning at the University of Georgia in 1979, Elgene was confronted immediately with an unexpected teaching load of six courses per year, 50% more than at most US universities. Before his global modeling program was slowed, however, he was able to extend the climatic envelope work to model basic ecological plant types and their global distributions. The resulting book, appropriately subtitled "an introduction to predictive modeling in phytogeography" (BOX 1981), introduced the idea of combining a large global data-base (climate), envelope modeling, and basic plant types for more detailed predictions of world vegetation composition, patterns and eventually dynamics. The original 90 plant types grew to about 125 (BOX 1987, 1995a, 1996) and were the forerunners of what are today called plant functional types (cf CRAMER 1997, PENG 2000).

After predicting world vegetation patterns, it was time to see more of the world. In 1981-82 Elgene managed to get a year's leave (Georgia has no sabbatical program) to study vegetation ecology in France and come home via tropical Asia, Australia and Hawaii. This was followed in 1983 by his first IAVS symposium and excursion, in Argentina, where he met Prof. Akira Miyawaki, host of the next year's IAVS meeting. Prof. Miyawaki said that Elgene always sat in the back seat of the [German-speaking] bus and was very quiet. When people were in the field, though, he translated both ways between German (language of the field commentary) and English (language of the other busload of participants). The next year Elgene came to Japan for the IAVS symposium and excursions. He has worked with us ever since then and has visited Japan more than 30 times.

During the 1980s, Vernon Meentemeyer and Elgene gathered literature data, made geographically representative statistical models, projected the results globally, and quantified the totals, offering first quantitative estimates of additional components of the global carbon budget, including litterfall, decomposition rates, equilibrium litter accumulations, soil carbon, soil CO_2, and soil CO_2 evolution. These models permitted the development of MONTHLYC, a model of the seasonal carbon dynamics of the terrestrial vegetation cover, which provided inputs to global atmospheric models (e.g. GILLETTE & BOX 1986, BOX 1988). During the 1980s Elgene worked also with NASA, to do the first rigorous evaluation of the newly available NDVI "greenness index" as an estimator of primary productivity, leaf area, and standing biomass (BOX et al. 1989). He has always stressed that geographic models should be validated geographically (not just statistically; see BOX & MEENTEMEYER 1991) and was cited favorably for this in PETERS' (1991) book *A Critique for Ecology*.

For 1992-94, Elgene was invited to spend three years as Guest Research Professor at Tokyo

University, in a remote-sensing laboratory for global-scale work. There he had his first PC (and minicomputer access), learned new computer techniques such as color pixel mapping, and produced a world map of actual net productivity, based on satellite data rather than climate (BOX & BAI 1993). He also produced a geographically complete world classification and "benchmark" map of 50 pheno-physiognomic 'potential dominant vegetation' types (BOX 1995b) and a first large-area attempt to estimate actual standing biomass amounts from satellite data (HU et al. 1996).

During his first trips to Japan (1984) and China (1985), Elgene could see that East Asia was that part of the world most similar to eastern North America. Eventually he saw that the infrequent but lower minimum temperatures in eastern North America caused it to have deciduous forests at latitudes that in East Asia have evergreen broad-leaved forests. Work with us also produced various field descriptions of East Asian vegetation, treatments of Asian climates, and wider comparisons (e.g. BOX et al. 1995; KOLBEK et al. 2003).

Work in Japan also led to more fieldwork in North America, including the Eastern North American Vegetation Survey (1988-90, funded by Japan; see MIYAWAKI et al. 1994), which collected an extensive data-base from eastern Canada to south Florida and Louisiana (BOX 1994, BOX & FUJIWARA 2010). Work under an EPA grant used climatic envelopes to look at potential effects of global warming on the ranges of major woody plant species in Florida, suggesting unexpected sensitivity (BOX et al. 1993, 1999; CRUMPACKER et al. 2001a). Work with Michael Manthey compared eastern North American and European deciduous forests and cross-projected major species to study limiting factors (BOX & MANTHEY 2005, 2006). Finally, some results from this and newer work were brought together in the IAVS symposium on "Warm-Temperate Deciduous Forests" (Lyon 2011) and subsequent book (BOX & FUJIWARA 2015). Other work on bioclimatic zonation has focused on the subtropical transition (CRUMPACKER et al. 2001b), northeast Asia (BOX & FUJIWARA 2012), upland zonation (BOX 2014), summarization (BOX & FUJIWARA 2013, 2005), and a more detailed global system (BOX 2016). Recently he described the *Fagus* and *Quercus* forests of Eastern North America for our Tüxen-meeting series (BOX 2015).

Elgene has been an IAVS member since 1983, once attended 20 consecutive annual meetings, and was President from 1994 to 2007 (three terms). He has also organized or co-organized various special sessions for meetings of the IAVS, the International Botanical Congress, the International Society for Ecology (INTECOL), and the International Society for Biometeorology.

Elgene has long had an interest in the effects of global warming on vegetation, beginning with an early estimate that net primary productivity might change by about 5% for each [Celsius] degree of temperature change (with moisture balance remaining constant, see LIETH 1976). The global envelope model (BOX 1981) suggested which plant forms might decrease or increase with climate change. His pessimistic view of the future came out in his portion of an otherwise upbeat book on *The Healing Power of Forests* (MIYAWAKI & BOX 2006). At age 70 he is still teaching, writing and editing (e.g. BOX ed., 2016), and claims to have no intention to retire any time soon.

Elgene Owen Box is one of the well known early biosphere modelers and still works on classification of plant life forms and modeling plant function, world vegetation, and potential changes with global climate change. But he is also a field scientist, with experience in about 75 countries. When traveling he usually carries printed climate data and modeling results with him, for use in the field. His memories are still sharp and he does not forget Latin plant names or important numbers, such as historical and conference dates. He loves history, not only of the United States but of all parts of the world. He can still calculate numbers and dates without

a calculator. He also still likes to sing and sang until recently in a chorus at his University of Georgia. When people at meetings gather to sing, he will be in the group.

Throughout his career, Elgene's work has been global and often mathematical in nature, like his life history in general. He has also edited books, translated one and a half books (so far), reviewed books written in German and French, and reviewed and edited many papers. Recently he translated Franco Pedrotti's book *Cartografia Geobotanica* from Italian into *Plant and Vegetation Mapping* in English. (See more complete list of Elgene's publications in GRELLER et al., in press). He is very proud of the English language, tries to write and speak it correctly, and his English is easy for foreign people to understand, perhaps because he has worked with people from so many countries. But he is greatly distressed by the rapid deterioration of spoken and written English, since about 2004, and the fashionable disdain that so many Americans and their followers have for its basic spirit and logic.

Elgene has programmed mainframe computers, mini-computers and personal computers since the mid-1960s. On the other hand, he hates the increasingly coercive nature of commercial software and is always fighting with the unnecessary new versions of Windows and other web-ware. These contrasts make us think that Elgene is not only very sharp but also quite familiar.

We say thank-you very much, sincerely, that he reviews and edits so much English for others. At this time we would like to celebrate his 70th birthday. We hope that he will have the longevity that has blessed his father, who reached 100 in 2014, is still clear-headed, and was still driving a car in 2016. We like to work together to move toward clear theoretical vegetation systems and to help solve green-environment problems in the world.

We, friends and collegues, prepared a commemorative volume to be presented to Elgene at the 2016 Tüxen meeting. But unfortunately it needs a little bit more time to be finished.

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