Thank you again for recognizing the efforts of KARE-TV and staff and for your support.

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Dear Editor:

I read with interest the climatology note by Pielke and Waage (1) when it appeared. Accordingly, I used a late 100 year period of record for the precipitation recorded in the downtown Sacramento rain gage, and using a packaged mean and standard deviation floppy disk, came up with, only approximately for the purpose here, of 18 inches for the mean and 6 inches for the standard deviation.

I next arrayed the 138 to 139 years of precipitation data as published in NWS WR-65, January 1988, Climate of Sacramento. From these data I obtained the median for each month of the year for Sacramento.

I had been planning to raise the question of whether we are using the best statistical data available when planning water storage and use in the West. While the 30 year annual and monthly rainfall normals are admirable tools, they may not be the best for planning water use.

The climatology note by Faiers (2) persuaded me to use the arrays developed for WSO Sacramento and find the 1st and 3rd quartile for each of the 12 months during the year. To that data I have added the WSO Sacramento period of record average and the published current (1951–1980) normals. For a comparison, as the rooftop locations of WSO Sacramento have, at times, not been considered "best evidence," the published 30 year normals for the Sacramento Executive Airport (about 6 miles south of downtown) and the 30 year normal median precipitation values from the appropriate Monthly Seasonal Weather Outlook published by the NWS have been added.

These data follow and I invite comments, criticism, suggestions, and boos. I continue to recall, more frequently as the years pass, Phil Church's comment to his meteorology classes at the University of Washington in the late 1940's that the "last man has come to the West" when discussions turned to water availability.

WSO Sacramento (downtown)
Precipitation Data (Inches)

Period of Record (138 or 139 yrs)

Month	1st Quartile	Median	3rd Quartile	Average	Normal #
JAN	1.54	3.19	4.84	3.64	4.18
FEB	1.13	2.44	4.31	3.04	2.94
MAR	1.14	2.21	3.58	2.64	2.18
APR	0.40	1.05	1.83	1.50	1.44
MAY	0.06	0.35	0.75	0.60	0.35
JUN	0.00	0.01	0.13	0.13	0.13
JUL	0.00	0.00	0.00	0.02	0.05
AUG	0.00	0.00	0.00	0.02	0.09
SEP	0.00	0.02	0.30	0.25	0.30
OCT	0.12	0.55	1.29	0.87	0.90
NOV	0.59	1.32	3.03	2.08	2.31
DEC	1.38	2.63	4.42	3.48	3.00
ANN	6.41	13.77	24.48	18.27	17.87

#: 1951–1980

Sacramento Executive Airport
Precipitation Data (Inches)

1951–1980

MONTH	NORMAL	MEDIAN
JAN	4.03	3.38
FEB	2.88	2.20
MAR	2.06	1.66
APR	1.31	1.00
MAY	0.33	0.21
JUN	0.11	0.21
JUL	0.05	0.00
AUG	0.07	0.00
SEP	0.27	0.01
OCT	0.86	0.43
NOV	2.23	1.49
DEC	2.90	2.25
ANN	17.10	12.64

A final assessment may be that, in the case of Sacramento, there is, in my opinion, a "shortfall" of around 4–5 inches less than the 30 year normal. It may, indeed, be time to use another measure of central tendency as we seek to better manage water resources, as well as to educate the public on the limits of this resource. "Human vanity can best be served by a reminder that, whatever his accomplishments, his sophistication, his artistic pretension, man owes his very existence to a six inch layer of topsoil—and the fact that it rains" . . . author unknown.

REFERENCES

1. Pielke, R. A., and N. Waage 1987: "Note on a Definition of Normal Weather," Nat. Wea. Dig. Vol 12, No. 3, 20–22.
2. Faires, G. E. 1988: "Defining Normal Precipitation," Nat. Wea. Dig. Vol 13, No. 1, 20–21.

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BOOK REPORT

Title: Clouds in a Glass of Beer;
Simple Experiments in Atmospheric Physics
By: Craig F. Bohren
Publisher: Stephen Kippur: 1987
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New York, New York 10158-0012
QC 861.2.B64 1987 551.5 87-13375
ISBN 0-471-62482-9
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Atmospheric physics is probably one topic in which few people are concerned or even interested. The majority of us go about our daily business without so much as a glance toward the clouds, coronas, halos, rainbows, fog or haze, or even a sunrise and sunset. Yet, Bohren's book with its unique attention-getting title, CLOUDS IN A GLASS OF BEER, illustrates to its readers what they have been missing all these years!

The subject of atmospheric physics becomes quite alive and interesting in the manner which Bohren approaches it. Even this reviewer has, through the reading of this book, grown to appreciate more the atmospheric phenomena which surrounds all of us.

Twenty-two chapters, each one dedicated to a different aspect of atmospheric physics, are packed with information concerning experiments, which can be performed by almost anyone, that prove the validity of Bohren's discussions and conclusions! The equipment and apparatus required may be found in any home. Such items as mirrors, glasses, mugs, pans, orange juice cans, cameras, a bath tub, a fish tank, and yes, even a glass of beer, are generally available.

Take for example the book title's object, a glass of beer. Bohren uses this item to infer and illustrate the principle of nucleation or cloud formation. Or examine and consider the value of a bath tub. If the observer is sitting in a tub of water with his legs submerged, and if he should lower his eyes to near the water's surface, he may note that his legs will appear to become magnified, a prime example of water's effect upon light transmission from water to air. And finally consider your own two eyes, they are, no doubt, two very useful tools, and two which we hope we will never have to relinquish. We can see nearby and far away objects; but can "we see forever on a clear day?" No! Why? Because distant objects are eventually obscured from our sight by light scattering from the intervening molecules and particles in the atmosphere along our line of sight.

These three examples and many more intriguing concepts of atmospheric physics are lucidly described and well illustrated in this book by Bohren. Why does the sea appear in different shades of blue? Can rainbows be seen during the winter? What are aureoles and what causes them? What makes some clouds appear black? Is skylight really polarized and how can one tell? Exactly why is the sky blue? What is an iridescent cloud and what causes it? How about the green flash, and how often does a blue moon occur? These are but a few of the additional questions that are answered, and which hopefully will pique the reader's interest.

Bohren also goes to great lengths to correct commonly held misconceptions regarding some atmospheric phenomena. Does warm air really hold more water vapor than cold air? Why is there no frost under a tree? Does the tree shield the grass or is there another mechanism operating? Does the sunlight really heat the air around us? And does a greenhouse actually grow warm because it traps the infrared radiation? Other concepts are treated similarly thorughout the book; these are but a few.

After completing this book, the reader will have gained a greater appreciation and deeper insight into the wonders of the atmosphere. Besides sustaining our lives, the atmosphere has many beautiful aspects of which we are unaware if it weren't for astute observers and writers such as Bohren. And the price is reasonable too!

The book is well organized and free of typographical errors. The science is excellent, and Bohren's conversational style is such that the reader actually believes that the author is personally addressing him or her. The photographs and diagrams are well constructed and sufficiently explained. It is difficult to find fault with this book.

The reviewer highly recommends Bohren's CLOUDS IN A GLASS OF BEER to anyone who seriously desires to learn more about the atmosphere. Not only that, he gives the readers a chance to duplicate the experiments in the comfort and privacy of one's home; this leads to the following and closing thought: Bohren's book would indeed be a fine workbook or a laboratory guide for a course in physical meteorology, or even atmospheric physics, for that matter!

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