

Skyscapes

By Trudy E. Bell

Crashing surf with wheeling gulls' cries of salt and freedom...purple mountain majesties with gasping high-altitude climbs and exhilarating sweeping descents...vast golden wheat fields, ripe with August...such are images that crowd memories and slide trays after a satisfying bicycle adventure.

How sadly earthbound.

Could you have missed fully half the joys of the trip?

Next time you swing your leg over the saddle, look up! And continue glancing upward throughout your ride.

Fully half your environment is the dome of the sky arching over your head. And just as landscapes are so much more than vertical feet of climb, skyscapes are far richer than merely wind direction and chances of precipitation.

The star-spangled nighttime sky began enriching my life when I was but 14 and passionate about whirling galaxies and creation's primeval fireball. The daytime sky became a love only in later years—because of the bicycle.



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It started as quite an earthbound affection. As a rain-or-shine bicycle commuter in midtown Manhattan in the 1980s, it stole upon me that I had come simply to love weather in all its varieties—the soft moistness of humid air against cheeks, the steady heat of the sun on back and forearms, the icy razor of the wind slicing off the river across legs and steed. On the bicycle, I gradually also came to notice meteorological

curiosities, such as the surprising blast of cool air that always enveloped me as I crossed Fifth Avenue on 59th Street, pedaling out of the asphalt city's summer heat into the microclimate dominated by the trees breathing in Central Park.

But weather per se is not a skyscape.

A skyscape, I've discovered in

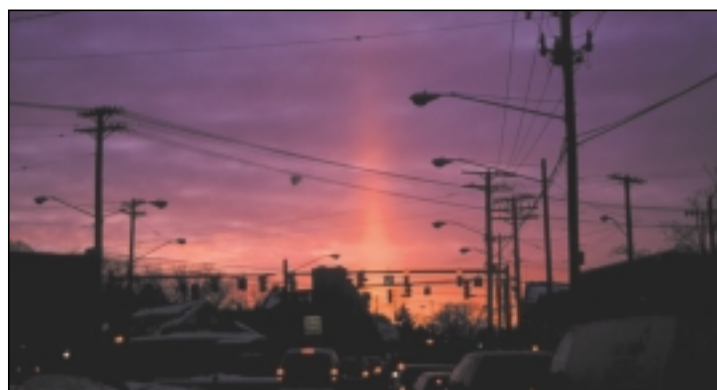


Fig. 2. Sun pillars are vertical pillars of scarlet at dawn or dusk, which may greet a vigilant winter cyclist on either a sunrise or sunset commute. The photo was taken in December 2000 from Lakewood, Ohio—caught sight of it in my rear view mirror and jumped into the middle of a 4-lane road to photograph it!



Fig. 1. Crepuscular rays—sunbeams and shadow beams cast by the sun partially blocked by clouds—were seen on a tandem tour in the summer of 2000 through Wabasha (top) and Winona (bottom), Minn. The beams dramatically swept from horizon to zenith during sunsets, because of the presence in the upper atmosphere of smoke particles from huge forest fires raging in Montana and New Mexico.

only the last few years, is pure visual spectacle—gorgeous, sweeping, dramatic—and in our self-absorbed down-facing busyness, all too often wholly unobserved.

Sunbeams and sun pillars

Take sunsets—an everyday occurrence. Most every touring cyclist has ridden in one’s golden glow, perhaps in a race to reach camp or home before dark.

But did you pause simply to watch the sky—and catch that magical “purple moment” when rose gives way to midnight blue and both colors blend in a true lavender? Have you seen the dark curve of the earth’s shadow rising like a shoulder in the east as the sun itself sinks below the horizon in the west? Have you compared dusk’s blood-red glow overspreading the dry Southwestern deserts with the softer blues and creams of sunsets in the more humid Midwest?

And have you seen sunsets’ and

sunrises’ less common wonders of crepuscular rays and sun pillars?

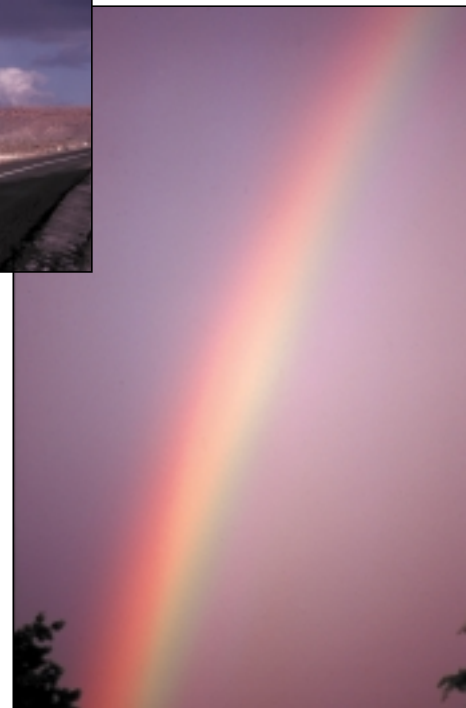
Crepuscular rays—the technical term for sunbeams and shadow beams cast by the sun partially blocked by clouds (commonly cumulus)—are most dramatic when the upper atmosphere is humid or dusty. During the summer of 2000, when my daughter and I were on a summer-long tandem trip through

(among other places) Minnesota and Iowa, microscopic smoke particles from forest fires raging in faraway Montana and New Mexico were borne high in the atmosphere thousands of miles east. On this insubstantial canvas of motes, the setting sun swept bold paintbrush swaths of beams and shadows from the horizon to past the zenith in a spectacle deserving to be accompanied by heaven’s own organ music [Fig. 1].

Sun pillars are just what their name implies: vertical pillars of scarlet or gold at dawn or dusk created when the sun’s light is reflected upward and downward through the air by mirror-flat ice crystals drifting horizontally. A

Fig. 3. Rainbows can surprise a touring cyclist even in desert climes, as this one did me on a bicycle tour the length of Baja California in December 1986. The whole arch over the American flag (an image I’ve dubbed “The new covenant”) and the close-up are of another rainbow seen about 8 PM in Sebring, Ohio in June, 2001. Note that the inside of the arch is lighter than the

surrounding sky—that’s because sunlight is scattered preferentially inside a rainbow.



chilly phenomenon, they may greet a vigilant winter cyclist on either a sunrise or sunset commute [Fig. 2].

Stalking the elusive parhelia

Then there are rainbows and “icebows” in all their breathtaking manifestations.

Genuine rainbows can surprise a cyclist even in desert climes, as I discovered on a bicycle trip the length of Baja California in December, 1986 [Fig. 3]—a season when cacti were slaking their thirst and bursting into a celebration of bloom in winter’s annual few inches of rain. Despite their fame, genuine rainbows are fairly uncommon—have you seen more than half a dozen in your life?

Indeed, the most common “rainbows” are not rainbows at all—they’re “icebows,” if you will, caused by hexagonal ice crystals in cirrus clouds that reflect sunlight preferentially to create bits of the rainbow-like spectrum left and right of the early morning or late afternoon sun. Called sun dogs, mock suns, or (technically) parhelia, these eye-squintingly bright glows may be brilliant white or multicolored. Although scarcely anyone notices them, in Ohio autumns, winters, and springs I’ve seen them as often as three times a week, conveniently at the very time I’m pedaling the tandem to my daughter’s school to pick her up.



Fig. 4 Parhelia—colloquially known as sun dogs or mock suns—which may be brilliant white or rainbow colored, are created by mirror-reflective ice crystals in high, wispy cirrus clouds. Sun dogs that extend vertically, as they did in this late-afternoon December 1999 photo taken from Alliance, Ohio, suggest that you may see a sun pillar at sunset.

Sometimes sun dogs are seen as the brightest left and right portions of an entire halo around the sun. But

How to watch for skiescapes

Many atmospheric optical phenomena are far more common than people realize, and their reputation for exceptional rarity is undeserved. Most people haven’t seen skiescapes because they simply haven’t looked—not because the phenomena are intrinsically rare. For example, although I’ve seen perhaps only half a dozen traditional rainbows in my life, I’ve seen sun dogs as often as three times a week, crepuscular rays a couple of times a month, and the circumzenithal arc oftener than four times a year.

To maximize your chances of seeing something, follow one simple rule: keep glancing up every few minutes (every time you’re stopped by a red light) whenever both the sun and clouds are in the sky together—especially when the sun is lower than halfway up the sky from horizon to zenith.

Crepuscular rays are more common in puffer lower-altitude clouds (such as cumulus) while the many ice crystal displays are more common in wispy high-altitude clouds (such as cirrus). Crepuscular rays can be seen any time of year; genuine rainbows are more common in warmer weather (when

precipitation is liquid) while sun pillars, sun dogs, and the circumzenithal arc are colder-weather phenomena (when high-altitude moisture can freeze into ice crystals). Nonetheless, temperatures aloft can still reach freezing even when it’s shirtsleeves weather below—and I’ve seen sun dogs from Ohio as late as early May and as early as late August.

Photographing these phenomena is much tougher than seeing them. Although I’ve seen sun dogs at least a hundred times, I’ve yet to capture them on film to my satisfaction. After much trial and error, here are my current rules of thumb. First, you must be armed with a decent camera at all times. I now carry everywhere a 35-mm single-lens reflex, stashed in a camera bag that buckles around my hips like a fanny pack. Second, point-and-shoot cameras don’t work: they inevitably overexpose the phenomena, and don’t have a field of view wide enough to capture two sun dogs if there happen to be ones on both sides of the sun; my 35-mm is thus armed with a 19-28 mm zoom wide-angle lens as well as a more standard 28–80-mm zoom. Third, print film never captures the true hues and subtle structure of these phenomena in full glory; I shoot only professional photographers’ color slide film (usually Fuji Provia ISO 100 or Velvia ISO 50 or good old

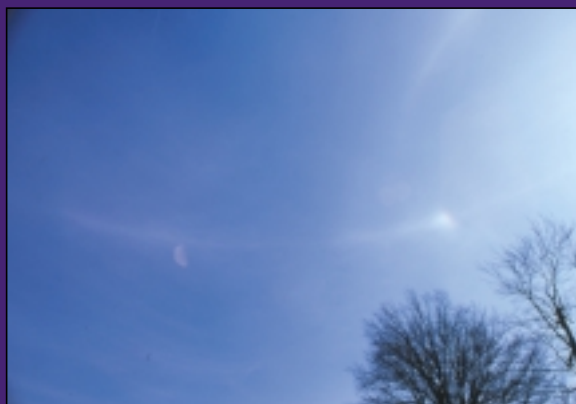


Fig. 5. A sun dog with a horizontal extension, as seen below in a November 2000 photo from Lakewood, Ohio, is actually bisected by part of the parhelic circle—which, rarely, can encircle the entire horizon. A fainter but longer arc of the parhelic circle appeared in February 2001 (looks like a faint contrail horizontally across the photo, bisected by lens flare that looks like the crescent moon).



look carefully. Not all sun dogs are alike. On some afternoons, you may see each sun dog stretched vertically—a good indication that the sunset a bit later may include a sun pillar [Fig. 4]. Or through the middle of each sun dog, you may see a brilliant white horizontal streak [Fig. 5]—part of the so-called parhelic circle that, with exceptional rarity, can encircle the full 360 degrees of the entire horizon. The entire parhelic circle I've never seen in person, but of a brilliant winter's day I keep a weather eye ever alert.

Whether or not you see sun dogs, throw your head 'way back and look straight up. A few times per year, you may be lucky enough to behold what looks like a breathtaking rainbow partly encircling the zenith, like a smile suspended aloft. Sometimes it is fuzzily lost in drifting high cirrus; other times it blazes in such glory that its hues put the larger traditional rainbow into the shade. This is the elusive circumzenithal arc—gorgeous, full-bodied, and scarcely ever seen [Fig. 6].

For who among us usually walks (or cycles) with nostrils skyward? Well, start now.

Start looking up as well as around yourself on tomorrow morning's commute, this weekend's day ride, and next summer's vacation.

For on a bicycle, you are under the sky without windows or walls. So glory in the skylscapes above your head as well as the landscapes under your wheels. 🚲

*Trudy E. Bell is a science journalist who writes often about astronomy and physics. Life member #1146 of the League of American Bicyclists, she is also the author of *Bicycling With Children: A Complete How-To Guide* (The Mountaineers Press, 1999) and *The Essential Bicycle Commuter* (Ragged Mountain Press, 1998); she lives with her daughter Roxana in Lakewood (Cleveland), Ohio. She invites readers to contact her at t.e.bell@ieee.org or <http://home.att.net/~trudy.bell>.*

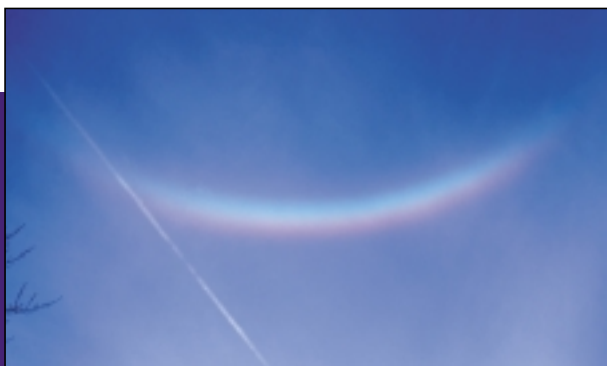


Fig. 6. Circumzenithal arc is a breathtaking "icebow" half-circling the zenith, like a multicolored smile suspended aloft in the wispy cirrus clouds. The wide-angle photo, taken from Lakewood, Ohio, in November 2000 (left), also shows a sun dog at the bottom center. The second photo below—a close-up of this same circumzenithal arc (including jet contrail)—shows the brilliant, saturated colors of the beautiful phenomenon.

Kodachrome 64; many other slide films just wash out the image), and send it away to a professional lab for development.

Additional tips: Move quickly—the phenomena can be transient, disappearing in a few seconds (although I have seen crepuscular rays persist for 10 minutes, a circumzenithal arc last for 20, and sun dogs remain for 45—and one unusual ice-crystal halo display for a full seven hours). Stand in a position to block the sun itself with a street lamp or tree to avoid lens flare (hexagonal artifacts on the film). Make sure the camera is focused on infinity. Shoot as many photos as you can, widely bracketing the exposures—underexposing is often the key.

Last, the more you know, the more you'll appreciate what you'll see—or know all you



can see. Several books are particularly wonderful. First is *The Color of Nature* by Pat Murphy and Paul Doherty (Chronicle Books/Exploratorium, 1996), written for complete novices by authors in love with sky and other gorgeous natural phenomena. A longer and more thorough handbook is the classic *Rainbows, Halos, and Glories* by Robert Greenler (Cambridge University Press, 1980)—which includes detailed descriptive physical explanations and scores of valuable photos to help identify what you see. M. G. J. Minnaert's delightful *Light and Color in the Outdoors* (translated and revised by Len Seymour; New York, Springer-Verlag, 1993) additionally will open your eyes to other common phenomena not necessarily in the sky alone. Last, for skyscape aficionados unafraid of some he-man physics, check out the special March 20, 1998 issue of *Applied Optics* called "Light and Color in the Open Air," which is entirely on the Web at http://www.osa.org/pub_svc/journals/ao/feature/aov37n9.htm.

Happy sky-watching! – T.E.B.

Fig. 7. Lightning photographed at Bowling Green, Ohio, while on tandem bike trip, in early August 2000. Actually, I was trying to get a picture of the mustard sky and its reflection in the slick pavement—but just as the camera shutter opened, boom! I got lucky with two blue flashes!