CHAPTER 11
THE IRREPRESSIBLE SKY

April 22, 1915 began as a beautiful spring day on the battlefield near Ypres, Belgium. It would not end that way. At 5:00 PM, the Germans launched cannisters of poison chlorine gas into Allied territory. The deadly fumes, guided by the gentle afternoon breeze, drifted into the trenches, killing many unprepared soldiers on the spot and stampeding the gasping survivors out onto the open fields where they were mowed down. Suddenly, gas warfare became serious business. The French, expressing great indignation at this flagrant violation of international law, lost no time in retaliating. Other nations quickly followed suit. Before long, a poisonous pall hovered over the battlefields of Europe. For a while it seemed as if Europe might exterminate itself.

World War I was the inevitable product of the collective hysteria that had gripped Europe from the closing years of the nineteenth century. Europe's mainstream artists reflected this sickness unto death in their creations. The real world was no longer their world. They chose a variety of alternatives. Many retreated into abstract worlds of their own making where they were undisputed rulers, while others (e.g. Picasso) sought to recapture the lost innocence of childhood through the art and life styles of primitive cultures. In these efforts, European artists abandoned the sky just as the future had abandoned them. And the Great War did create such an inferno on the land and in the sky it almost confirmed their most pessimistic predictions.

Eventually, the War ended and rain washed the soluble poison gases from the battle-worn skies. Europe had managed to survive but the ordeal had exhausted her. Gone was her sense of adventure. She became a continent of the past in an Age of the Future. European sky art, which had seemed to be dying on the eve of the War, also managed to survive, but only as a faded ember of its past glories.

Consider the case of Oscar Kokoschka. In The Tempest (Fig. 10-24) he used nature as a vehicle to express his heightened fears and fantasies. During the Russian campaign of 1916, Kokoschka was shot in the head and bayonetted in the lung. For a year he was totally disabled and for some time after that was regarded as nearly insane. When he finally recovered, the wanton element of impending violence had been excised from his highly colored landscapes. Still, his horizon line remained high and he had little new to say about the sky. Kokoschka was grateful to have survived the ordeal but he had lost his wanton sense of adventure.

Tempest-tossed Kokoschka chose to remain in Europe, but for years many other tempest-tossed Europeans had viewed their continent as a dead end and had set out for a new land of opportunity and fresh ideas across the seas, a land that opened its arms to them and called out to their governments to,

Give me your tired, your poor,
Your huddled masses yearning to breathe free,
The wretched refuse of your teeming shore.
Send these, the homeless, tempest-tost to me
I lift my lamp beside the golden door!


After World War I, European painters might still find an occasional interesting wrinkle in the sky, but it was under the wide open spaces of America that sky painting gained a new birth of freedom.

The Slender Thread of Reality
During her darkest hour, sky painting held tenaciously to life by a slender thread, for there were always a few painters who continued to revel in nature. Nevertheless, it became increasingly difficult for artists to paint realistically, for they were forced to come to terms with the strengthening abstract movements.

Fig. 11-1. Death, from the Triptych of Nature. Giovanni Segantini. 1896-1899. Musee Segantini, St. Moritz.

Giovanni Segantini revered nature up to the moment of his premature death in 1899, feeling that its ennobling force held our only hope for salvation. Even so, he did not record nature faithfully in his later works, but used a variant of pointillism to incorporate spiritual images from the depths of his soul. In Death (1896-9), from The Triptych of Nature (Fig. 11-1), Segantini used a mid-winter setting in the high Alpine valleys of Switzerland's Engadin Region to convey a mood. Here a horse and sleigh wait to take a casket to the lowlands while the sky receives the rising soul of the departed. The massive but relatively undifferentiated cap cloud resembles a body with diaphanous wings. Cap clouds form when stable air is forced to surmount a mountain peak. The flat, shelllike base results from the forced ascent of air above its condensation level. In this respect, Segantini's rendition is quite convincing. Even the smooth cumuliform top is possible, particularly in winter, but it is less likely. It usually results when the rising air suddenly becomes buoyant and surges upward through the otherwise stable atmosphere. But in such a case it would be more corrugated, as in Fig. 11-2.

Fig. 11-2 Cap type cumulus cloud over the hills north of Ouro Preto, Brazil.

Segantini deliberately smoothed the cloud outlines. He was, it seems, a co-conspirator in a surreptitious movement to replace the convoluted complexities of real clouds with the smoothed and simplified but ponderous dirigibles of the artists' minds. This trend began with the Impressionists, was advanced by Seurat, van Gogh, and especially Gauguin, and culminated in cartoon style flat-colored, amoeboid masses of a number of Art Nouveau illustrators or painters in loosely formed ideological groups such as the Fauves in France and die Brücke in Germany shortly after 1900.

Following the lead of Matisse, many of the painters in these groups used strident but arbitrary color schemes for a few years, and then gradually returned to palettes that conformed more closely to nature. A beautiful example of the end product of this cartoonizing trend is Max Pechstein’s The Harbor (1922) (Fig. 11-3). The spectral block colors are appropriate when a deep twilight sky is laced by parallel bands of altocumulus. The flaming clouds and incandescent sky are reflected in the smooth waters below while the boats and
houses of the port are tinted by the deep purple of dusk.

Fig. 11-3. Max Pechstein. The Harbor (1922) Stedelijk Museum, Amsterdam.

Expressionist paintings return us to a more primitive time of medieval stylization with more mature insight regarding nature but without an embracing Church to comfort and guide life. The troubled neuroses and psychoses portrayed by die Brücke artists prompted the kindred spirit, Edvard Munch to say “May God protect us; evil times are coming.” And indeed, they were, for a generation later the Nazis persecuted members of die Brücke for holding up their psychic mirrors.

Even before World War I a few artists began to react against the increasing abstraction in art. These isolatos felt that pure imagination without the guidance of the real world must quickly end in sterility. In 1911, Giorgio de Chirico, who had been deeply moved by the art of Arnold Böcklin, realized that a painting can be made to appear starkly realistic and still be profoundly disturbing. Although none of Chirico's paintings contain any new meteorology they helped give birth to Surrealism, and a few of the Surrealists turned out to be outstanding meteorologists.

Surrealism was officially baptized by Andre Breton in his Surrealist Manifesto (1924). Breton was initially inspired by reflecting on some of the images that ran through his mind at the moment of falling asleep. Such images can be quite realistic yet are often placed in totally absurd settings. Surrealism is the dreamlike juxtaposition of the real and the absurd. Its direct roots are often traced back to Hippolyte Taine and Sigmund Freud, but one look at a painting by Bosch shows that now and again through the centuries there were painters who had toyed with surrealistic notions.

Curiously, the Surrealist Manifesto appeared the same year Louis de Broglie proposed his revolutionary hypothesis regarding particle waves, namely, that solid matter, such as electrons, possess properties previously associated only with waves. De Broglie's idea constituted a crucial piece in one of nature's jigsaw puzzles. One year before, in 1923, A. E. Compton demonstrated that x-rays, which were long thought to be waves, also exhibited certain properties of solid objects. In 1905, Albert Einstein had posited that the photoelectric effect indicated that all forms of electromagnetic waves occasionally exhibited a corpuscular or particle-like nature as well. In that same year, Einstein also derived the equation, $E = mc^2$, showing that mass and energy are interchangeable. Finally, scientists were demonstrating that duality in the primitive world of our dreams is mirrored by similar dualities in the physical universe. De Broglie's hypothesis quickly led to the formulation of quantum mechanics. From that point we learned that we live in a world where there are definite limits to certainty.

Shortly before experiments verified De Broglie's hypothesis on the elusive, wavelike nature of electrons, a fellow Frenchman, Yves Tanguy, began to put some surrealistic ideas onto canvas. After his release from the armed services in 1922, Tanguy began sketching for fun. He continued treating art as a hobby until a fateful day in 1923 when he was riding on the platform of a bus in Paris. As he passed by Paul Guillaume's art gallery he was struck by a
painting of Chirico hanging in the window. The story we are told is that he jumped from that moving bus into another quantum state - a confirmed surrealist painter.

Like many of the surrealists, Tanguy's method was to paint objects with meticulous care and then place them in impossible situations so as to produce a hallucinatory or disorienting reaction. Tanguy did this by integrating geological and meteorological effects within a quantum mechanical universe, in works such as *Great Nacre Butterfly* (Fig. 11-4).

Wavelike undulations propagate through the fibre of the quantum mechanical earth and sky of the *Great Nacre Butterfly* while oddly shaped objects cast distinct shadows on the ground. These elements first appeared in Tanguy's art in 1927. Three years later he took a trip to North Africa and was deeply impressed by its rock formations, its intense sunlight and its endless repetition of rolling dunes disappearing in the distance. After his return from Africa, the sharp distinction between earth and sky in his paintings melted away. All objects are seen as if the atmosphere has infinite visibility, yet all hints of the horizon line have been purposely obliterated. In fact, it is quite unsettling to find some object presumably above the horizon line casting a very distinct shadow. Tanguy made an artistic principle of uncertainty.

While Tanguy remained preoccupied with the elusive nature of the universe, Manuel Radnitsky (Man Ray) had a decidedly more earthly use for meteorology in his one and only atmospheric masterpiece, *Observatory Time - The Lovers*, (Fig. 11-5). An enormous pair of lips spreads across a sky filled with an almost photographic field of aligned altocumulus
cells. The lips belong to his former lover, who had deserted and devastated him. The twin domes of the Paris Observatory at the horizon fix the geographic setting but are also rife with sexual symbolism. The painting was executed in a period of great emotional pain and was the only way Man Ray could reunite with his former lover - as he put it,

Your mouth becomes two bodies separated by a long, undulating horizon. Like the earth and sky, like you and me.

But above the darkened row of townhouses and deciduous trees is a bright, milky blue daytime sky filled with the most pleasant cumulus humilis. Here is surrealism at its gentlest and most persuasive. Most surrealist works almost bludgeon the viewer with their blatant impossibilities. The *Empire of Lights* produces a slight, vague sense of disorientation that is quickly resolved once the paradoxical element is identified.

**Casting off the Yoke of Europe**

Europe exported its absurdities and abstractions free of charge to the far ends of the Earth. For the most part, the world willingly swallowed this meagre fare, humbly acquiescing to Europe's presumed cultural superiority. In America, it would take a great social upheaval to help artists rid themselves of the European incubus and relearn to paint the sky.

In 1906, Edward Hopper arrived in Paris. His first European tour lasted almost a year and left him with mostly positive feelings. He was particularly taken with Rembrandt's *Nightwatch*, which he described as "past belief in its reality - it almost amounts to deception". Hopper's second trip to Europe lasted slightly longer - from May 1909 to July 1910 - and only increased his admiration for European art and culture. Nevertheless, this was Hopper's last trip abroad. Although he may not have revered America, America was the place where his genius could develop. Much later Hopper described his feelings on this matter, "[America] seemed awfully crude and raw when I got back. It took me ten years to get over Europe".

Hopper's fully evolved style emerged over a decade later and does indeed show America as a rather stark land. His human figures tend to be rather static, and are often solitary. Strident contrasts of light and shadow add to the overall effect of barren flatness. These are, of course, well known characteristics of...
Hopper's art. They are so striking that it is easy to overlook the great touch of delicacy that began to adorn many of Hopper's landscapes after about 1925.

The normally shy and withdrawn Hopper seems to have reserved his greatest artistic displays of tenderness for the sky. He is without doubt the greatest painter of the gossamer cirrus clouds. These can be seen in a number of works, mainly from the 1930's. One of the finest examples of cirrus uncinus appears in *Ground Swell* (Fig. 11-7).

In *Ground Swell*, several long parallel rows of cirrus stretch diagonally across a limpid sky. Each row occupies the crest of a wave in the jet stream produced by wind shear. Hopper even showed that the trails of falling ice crystals (and therefore the wind shear) line up at right angles to the rows. The frothy ocean swell below has probably been aligned with the clouds above for purely artistic reasons but the sky is based on one Hopper had to have seen, for it is a textbook example of cirrus.

Hopper readily acknowledged nature as an essential source of his inspiration. When asked to express his opinion on the direction of modern art, he observed, Great art is the outward expression of an inner life in the artist, and this inner life will result in his personal vision of the world. No amount of skillful invention can replace the essential element of imagination. One of the weaknesses of much abstract painting is the attempt to substitute the inventions of the intellect for a pristine imaginative conception.... Painting will have to deal more fully and less obliquely with life and nature's phenomena before it can again become great.
Some inner force kept Hopper from painting clouds for over a decade following his return from Europe and thereafter dictated the type of clouds he would focus his attentions on. Guy du Bois recalled Hopper telling him that "it had taken him years to bring himself into the painting of a cloud in the sky." When Hopper finally began to paint clouds, he would have almost nothing to do with the typical cozy but lowly European cumulus `effects' he had once slavishly imitated. No, only the higher clouds allowed him a sufficient feeling of spaciousness! Hopper therefore painted mainly cirrus, but was also attentive to altostratus and several varieties of altocumulus. Some of his altocumulus are cellular, as in his Route 6, Eastham (1941, Sheldon Swope Art Gallery, Terre Haute Indiana), while he painted cigar-shaped mountain wave clouds on several occasions.

Hopper painted clouds discriminatingly, for he knew them intimately. For years he spent hours on many days sketching outdoors, particularly around his summer home on Cape Cod. But around 1944, Hopper grew tired of the constant assaults of insects during his outings and retreated to his studio. Within two years his clouds had lost their sense of immediacy. They no longer exhibited the pristine beauty and vital structure he had lavished on them for two decades. Even the best photographic memory fades once it is cut off from the visual source.

For 20 years, Hopper's precisely drafted clouds bore little resemblance to the broad cumulus brushstrokes of the Impressionists. It may therefore seem strange that, near the end of his life, Hopper said that he had always considered himself to be an Impressionist. Then again, much like the Impressionists, Hopper restricted himself to storm-free worlds.

Canadian artists used their country's stormy, harsh weather as a staunch ally in their stand against Europe's cultural sovereignty. In 1911, an exhibition of sketches of the Canadian landscape by British born J. E. H. MacDonald riveted the attention of some budding Canadian painters on the aesthetic value of their own land and sky. United by a common purpose, they headed out into the Canadian wilderness for new inspiration. The weather did not always cooperate. Too old to fight in World War I, Tom Thompson drowned when his canoe overturned on a dreary day on Canoe Lake in Algonquin Park in July 1917 after a brief but extraordinary career as a meteorological artist.

Thompson began painting rather late in life but became an ardent convert to the cause of Canada's land and sky. His career was even shorter than van Gogh's, but into the few years between 1911 and 1917 he represented weather and skies of all the seasons from stratus or flattened stratocumulus overseeing snow covered ground, to summer thunderstorms with lightning and a rainbow. At night the stars came out for Thompson and even the Aurora Borealis posed for him.

Fig. 11-8. J. E. H. MacDonald. The Solemn Land. 1921. National Gallery of Canada, Ottawa.

World War I interrupted the careers of all Thompson's Canadian artist friends. When they regrouped after the War, they formed the Group of Seven to represent Canadian themes with a Canadian flavor. J. E. H. MacDonald's The Solemn Land (Fig. 11-8) represents one of the high points of their meteorological efforts. Set in the Algoma Region north of Lakes Superior and Huron, it portrays the first bite of
winter that always arrives before the autumnal equinox. The forest is a mix of deciduous trees that have already begun to acquire autumnal colors and dark evergreens that comprise Canada's vast boreal forest. Visibility is unlimited under a covering of boldly outlined, flat-based cumulus that often forms when crisp, polar air is drawn southward in the wake of a low pressure area. A few small turquoise openings in the cloud field (that should lighten toward the horizon) allow invisible sunbeams through to tease the chilling land and waters.

Lawren Harris's world view was too stark to keep sunbeams invisible. Intellectually and spiritually restless, Harris was perhaps the prime mover in the formation of the Group of Seven. In the fall of 1904, Harris went to Berlin to study art. There he was exposed to the design of Art Nouveau illustrators and doubtless encountered the starkly colored paintings of die Brücke. This exposure would help define his mature style some two decades later. But following his return to Canada Harris showed nature's gentle side. There are few odes to snow as delicately touching as his *Snow II* (1915, National Gallery of Canada, Ottawa). Beneath a turquoise sky banded by smooth, horizontal lines of altocumulus, snow assumes all of its many possible colors.

![Fig. 11-9. Lawren Harris. North Shore, Lake Superior. 1926. National Gallery of Canada, Ottawa.](image)

The comic book simplicity hinted at in the clouds of *Snow II* reemerged in Harris's art suddenly and in full force almost a decade later. In a series of works including *North Shore, Lake Superior* (Fig. 11-9) Harris wedded two experiences that influenced him profoundly. A series of eye opening trips beginning in 1921 to the stark country north of Lake Superior and later as far north as Baffin Island, provided the material of these works while the European influence revived by Kandinsky's essay, *Concerning the Spiritual in Art* freed Harris to create a new mode of meteorological expression. For more than a decade, Harris depicted striking cloud forms under stark northern landscapes. Mountain wave clouds abounded in his works and even late morning remnants of valley fog were depicted in crystal clear air.

*North Shore, Lake Superior* is a case in point. It overlooks the Lake Superior from a bare, elevated promontory. A bleached and stripped tree trunk gives a single, defiant sign that life can indeed exist in such a forbidding place. Visibility is infinite in the brisk polar air but a fan of crepuscular rays beams down, presumably through a large opening in the cloud field at upper left. The beams match with purely human design crevasses in the cumulus below.

Harris molded his carefully planned geometrical designs to the dictates of unruly Nature. His cumulus cloud field has a flat base. The directly illuminated sides of the clouds reflect the sunlight while the shaded sides and bottoms are dark. The cloud fringes at upper right, illuminated by transmitted sunlight, properly darken toward their optically thick centers. Even the light on the water obeys Nature's dictates, shining bright white on the left where it specularly reflects the sunlight, but glowing deep blue in the shaded recesses opposite the sun on the right.

A sexual scandal sent Harris to temporary exile in Santa Fe, New Mexico in 1938. There he met Georgia O'Keefe, who had vested her painted skies with a similar stark sense of geometrical design.
Red Hills and the Sun, Lake George (Fig. 11-10) is one of the revolutionary pieces of sky painting. The white sun is the principal character in this visionary landscape. When it touches the shaded hills at the edge of Lake George, it sets them ablaze with a blood red transfusion. It also surrounds itself with a voluptuous, properly colored, multiringed corona that almost fills the sky.

Fig. 11-10. Georgia O'Keefe. Red Hills and the Sun, Lake George. 1927.

Lawren Harris and Georgia O'Keefe seemed quite at ease when adapting their own versions of European abstractionism into their North American landscapes. Marsden Hartley seemed to have a much stormier time finding his artistic identity and never did sever the umbilical cord that tied him to Europe's cultural placenta. During his many European stays, Hartley's art would grow more abstract. Then he would return home and pump some new blood into Europe's anemic cultural mold with a fresh infusion of American realism. Earth Cooling, Mexico (Fig. 11-11), is such a work.

In Earth Cooling, Mexico, the setting sun casts its red light only on the upper slopes of the mountains. The flattened, ellipsoidal blobs of golden stratocumulus are the shrunken vestiges of the day's glorious cumulus. They will soon evaporate, for as soon as the sun goes down the dry desert air begins cooling and sinking. A thin, golden strip of sky just above the horizon serves as a backdrop for the mountains. Immediately above this strip is a deep blue twilight sky tinged with rosy highlights from some higher (cirrus?) clouds.

Fig. 11-11. Marsden Hartley. Earth Cooling, Mexico. 1932. Amon Carter Museum of Western Art, Fort Worth, Texas.

The lighting on the mountainsides and the deeper red color of the cirrus suggest that the sun is behind the viewer. If that is the case, Hartley committed a meteorological faux pas, for the golden strip of sky at the horizon does not belong opposite the sun.

But meteorology served only as Hartley's launching pad in this landscape of the spirit. The mesas in Earth Cooling, Mexico do more than reflect the fading sunlight, they actually glow. Perhaps it is the dying glow of a landscape that had been heated white hot by the brutal midday desert sun. The clouds and horizon sky are still almost white hot while the truncated, volcanic mountain tops have cooled somewhat and so are only red hot. The shaded lowlands have cooled even further and only emit a few patches of dull red light. Then again, rivers of incandescent lava may be flowing from active volcanoes and slowly cooling and darkening as they inundate the playa.
No matter how you look at it, *Earth Cooling, Mexico* is a compelling statement of the starkness of the Wild West's land and sky.

**Wide Open Skies of the Wild West**

The starkness of the Mexican sky overwhelmed Hartley's hypersensitive constitution. In his autobiography, he said of it,

The light will wear you down, the air will fatigue - height will oppress.... Perhaps you can learn the secret of all the dark living but you will change your whole being to do it.

But most American painters went west to escape the dark living of the congested cities and to revel in the light of open skies. There they learned to paint skies that Europeans could not have conceived in their wildest dreams, for Europe seldom offers even a glimpse of the towering summer thunderstorms that proudly display their burgeoning form day after day in Western skies.

They also came to a region with its own long history of sky art. The towering thunderstorms of Mexico and the southwest United States gave birth to aerial art in America long before transplanted Europeans ever showed up on the scene. Some time between 1100 and 700 BC, an Olmec artist carved a meteorological petroglyph (Fig. 11-12) in the Mexican highlands at Chalcatzingo.

Rainstreaks fall from three tiered and scalloped but flat-based cumulus, possibly the first flat-based cumulus in the history of art. Several large bullet-shaped raindrops and a few even larger round concentric circles that may represent hailstones with growth rings appear beneath the cumulus. These all fall amidst corn stalks that betray the farmer's eternal preoccupation with the weather. Near the bottom of the petroglyph a meteorological deity sits in an alcove and blows the breath of life from the bowels of the earth to the surrounding atmosphere. The vortex patterns of his breath closely resemble the ancient Chinese cloud forms. Apparently, the Olmecs watched the air motions with Oriental patience.

The Chalcatzingo petroglyph represents one more example of the ancient tie between an active commercial spirit and sky art. The Olmecs may have created America's first advanced civilization. The main Olmec centers were located in the lowland river plains south and east of Veracruz, Mexico. Chalcatzingo lies far from these, on a strategic setting in the highlands, over 150 miles to the west and about 60 miles southeast of Mexico City. Remains of an extensive system of dams and terraces reveal a highly advanced agricultural technology. But Chalcatzingo was probably established to serve as a major Olmec trading post, because of its location at the gateway to the country further west where jade and other minerals for the Olmec carvings and artifacts were mined.

The Chalcatzingo petroglyph contains landscape elements but is not a landscape because it gives no hint of the third dimension.
All native American pre-Columbian rock art lacks a feeling of the third dimension, but what it lacks in depth it almost makes up for in height.

Thousands of rock surfaces in the southwest United States are covered by petroglyphs (carvings) or pictographs (paintings), and many of these include fine examples of sky art. Most sky art of the petroglyphs and pictographs deals with celestial themes and usually emphasizes the sun or moon. There are many astronomical calendars, which consist of spiral figures placed strategically on rock surfaces to coincide exactly with the sun's shadow on the equinoxes or solstices. There is even a convincing representation of the supernova that produced the Crab Nebula in 1054 with hatch marks indicating the number of days the phenomenon was visible.

The rock surfaces also contain hundreds of meteorological murals. Ken Sassen has scoured the Southwest in search of meteorological art. Rainbows were the most common aerial subject, sometimes appearing with rain streaks, lightning bolts, and cumulonimbus clouds consisting of pyramidal piles of blocks.

Fig. 11-13. Rainbow petroglyph. c. 0 AD. Utah. Kenneth Sassen, photographer.

One rainbow petroglyph in central Utah appears directly beneath a cloudlike discontinuity in a rock surface (Fig. 11-13). The bow is almost semicircular and consists of eight stripes. Only the two inner stripes (which are inside the blue stripe) do not reach the ground. This raises the intriguing possibility that the artist was attempting to represent supernumerary bows. Hatched lines indicating rainstreaks extend downward at the bow's top while curving lines suggesting lightning bolts also extend groundward. One of the bow's stripes continues off to the right to reach a rectangular object and finally end in a coiling snake-like form. Perhaps this is the electrical fuse that ignited the rainbow, or perhaps it shows that the artist, living about 2000 years ago amidst some of the most breathtaking scenery on Earth, really did find the pot of gold at the end of the rainbow.

All of these meteorological elements were vested with great symbolic significance to the peoples of the arid Great Basin, where water from a few brief thunderstorms can mean the difference between life and death. But, symbolism aside, the Southwest's summer thunderstorms tower overhead in clear skies with such regularity that it would be difficult not to pay them due attention and reverence.

Fig. 11-14. George Caleb Bingham. Fur Traders Descending the Missouri. c. 1845. Metropolitan Museum of Art, NY.
When the European immigrant painters first crossed the Mississippi, they did not immediately paint the thunderstorms because they needed some time to get used to the glare of the wide open spaces of the Wild West. Beginning in the 1840's, George Caleb Bingham painted a number of scenes such as Fur Traders Descending the Missouri (Fig. 11-14). In these works he was sure to protect his unaccustomed eyes with the misty cumulus filled skies that are more characteristic of the eastern United States. This mist would soon be discarded as excess baggage.

Anyone who crossed the Mississippi did not have to wait very long for the wind to come sweeping out across the Great Plains and reveal an infinite panorama. Here is how the immigrant Ole Edvart Rölvaag described it in the opening lines of *Giants in the Earth*.

Bright, clear sky over a plain so wide that the heavens cut down on it around the entire horizon....Bright, clear sky, to-day, to-morrow, and for all time to come.

And sun! And still more sun! It set the heavens afire every morning; it grew with the day to quivering golden light - then softened into all the shades of red and purple as evening fell....Pure colour everywhere. A gust of wind, sweeping across the plain, threw into life waves of yellow and blue and green. Now and then a dead black wave would race over the scene...a cloud's gliding shadow...now and then


But Rölvaag and all residents of the Great Plains knew that the sky is not always clear. With spring comes the towering thunderstorms that threaten death by hail, fire, brimstone, lightning and tornado, and leave behind only an ephemeral rainbow as pitiful consolation for the victims of their fury. Then, autumn's shorter days and lower sun bring on a chill closely followed by winter's unrelieved cold and unrelenting blizzards.

All winters on the northern Great Plains are brutal but some are worse than others. The winter of 1880-1881 introduced a decade of severe winter weather felt not only on the Great Plains, but also across the Northern Hemisphere.

They say it rained forty days and forty nights once in the old days, and that was terrible; but during the winter of 1880-81 is snowed twice forty days; that was more terrible. From the 15th of October, when it began, until after the middle of April, it seldom ceased. From the four corners of the earth it flew; but of all the winds that brought it, the south wind was the worst; for that whisked and matted the flakes into huge grey discs, which fell to the ground in clinging, wooly folds....And all winter the sun stayed in his house; he crept out only now and then to pack down the snow; that was to make room for more.


"The sun stayed in his house"! This is taken from an old Indian expression meaning there was a halo around the sun. At other times, Rölvaag pointed out,

If it cleared off for an afternoon, the sundogs were on constant guard. Everyone knew what that meant!

It meant that cirrostratus clouds were warning of one more winter storm. With such ominous signs in the sky it is no wonder that painters would quickly pack up their easels for the winter and leave the scene without recording a trace of the shimmering halo displays or of the winter weather that followed.
Newell Convers (N. C.) Wyeth, one of America’s great illustrators, stayed outdoors long enough to view and portray art’s first 22º halo in 400 years in his version of Winter - Death (Fig. 11-15) (1909). The figure of the Indian is based on George de Forest Brush’s illustration, Mourning Her Brave (1883) but the halo is all Wyeth’s. The halo surrounds the Indian, who stands at the edge of a cliff in a strong wind. The Indian blocks the sun, which marks the center of the halo. The sky has the translucent, pale milky blue color typical of cirrostratus. The halo has a slight yellow tint. Indeed, most 22º halos are almost monochromatic with a reddish inside. The unfortunate symbolic association of the halo with death is likely motivated by the bad weather that often follows halos.

![Image of N. C. Wyeth's Winter Death]

The religious associations and negative symbolism have made atmospheric halos rather scarce critters in art. Two exceptions are St. Lawrence River Barn by Franklin Arbuckle (1954, exhibited Art Gallery of Toronto) and La Cita (1962 private collection) by Peter Hurd (N. C. Wyeth’s son-in-law). In both paintings only the bottom half of the halo fits on the canvas and both halos are slightly yellow. In the St. Louis River Barn, the halo appears over the snow-covered Canadian ground and promises more snow. But in La Cita the weather is warm enough to allow two lovers to rendezvous under the moonlit sky for in the American Southwest, halos tend to foretell rain rather than snow. Hopefully it will be a light rain so the hopes and dreams of the lovers will not be washed away. But I am afraid that stormy times lie ahead.

Some American artists relished harsh weather. With pioneer and cowboy blood racing through his veins, sixteen year old Charles Russell could hardly wait for the halos to fade and the snow to begin. Charlie's parents shipped him out to Montana territory in the summer of 1880 thinking that a sober dose of reality would cool his ardor for the wilds and prepare him to enter the family business. Life was tough out there, but Charlie stayed and became a cowboy who loved to draw and paint.

For a few years Charlie remained a painting cowboy because no one would pay much for his work. Then came the winter of 1886-7. Montana was treated to the worst blizzard in its history and many of the cattle under Russell's care were lost. In an attempt to justify this financial disaster to his employers he decided to paint his defense. Waiting for the Chinook (1887, Buffalo Bill Historical Center, Cody, Wyoming) proved to be such an eloquent summation, it found Russell a patron and freed him to be a painter of cowboys.

Waiting for the Chinook shows the Montana prairie buried under snow. A solitary, emaciated steer is surrounded by a pack of hungry wolves. For this unfortunate steer, the snow-eating chinook’s warm winds would arrive too late. The chinook, like the foehn north of the Alps, is a warm and dry downslope wind that melts and evaporates snow like magic and gets grass growing.
During winter on the High Plains, people and animals alike wait impatiently for the chinook to bring its breath of life from the Rockies.

Russell was on the scene in Montana territory when the 'schoolchildren's storm' struck unexpectedly shortly after the children had been dismissed from school on January 12, 1888. Following an unseasonably warm morning the blizzard came on so quickly that dozens of the unprepared schoolchildren never made it home. Russell's *Lost in a Snowstorm - We Are Friends* (Fig. 11-16), does not replay the tragedy. Instead, it describes a scene from the same storm in which a group of Indians helped some lost cowboys. The snow is not yet deep but the wind is driving it into growing drifts that will soon bury the lowly clumps of grass. Blowing snow so reduces visibility that it is difficult to decipher up the horizon line. Despite this there is no difficulty making out the two buzzards circling above.

Fig. 11-16. Charles M Russell. Lost in a Snowstorm - We Are Friends. 1888.

After a day or so of intense, driving snow, the blizzard begins to sputter out. Clearings of increasing duration may alternate with weakening snow showers for several hours until finally the showers are gone. The sky then assumes an incredibly deep coat of azure, as Dale Nichols has shown in *Company for Supper* (Fig. 11-17).

Departing blizzards open the floodgates that allow huge mounds of frigid polar air from Canada or even Siberia to march unopposed across the flat prairie. High pressure and clear skies then dominate the weather scene for several days. On the northern Great Plains, the air directly over the snow covered ground remains so cold that ice crystals may condense and fall out of a clear sky. These polar outbreaks can produce some of the best halo displays; As a result the cold alone sometimes keeps the sun in his house.

Ultimately, spring approaches and the sun breaks out of its house in the south to warm the Plains. Overnight it seems, the grasses burst through the rich prairie soils and invites all who might think to farm the land. Here, much of the rejected and hungry refuse of Europe put
down its roots. Soon these immigrants would learn to feed the world.

Fig. 11-17. Dale Nichols. Company for Supper. 1934.

Their approach was strictly American. Everything was done to subdue the land as rapidly as possible. When the wandering native Indian population got in the way, they along with their chief source of food, the buffalo, were almost exterminated. By 1880 the Plains were effectively cleared, and huts hacked from the Plains’ own rich sod sprang up everywhere.

A belated, ineffectual wave of sentimental regret swept across the nation like a grass fire. Americans bemoaned the crimes they had committed against man and beast alike in their greed for land. They then offered the Plains Indian paternal advice on how to tame the land as they were doing. But the Indians refused to see the light and learn the new tricks of modern agriculture. Instead they responded,

You ask me to plough the ground. Shall I take a knife and tear my mother's bosom? You ask me to dig for stone. Shall I dig under her skin for her bones? You ask me to cut the grass and make hay and sell it and be rich like white men. But dare I cut off my mother's hair?


This was part of the eloquent ballad of a disappearing people. It was also far more prophetic than anyone could have realized. Why didn't the Indian plough the Plains? Perhaps the climate provided the answer. The Great Plains now contains thick deposits of loess, the fertile, wind driven desert dust that still blows into China from the wastes of the Gobi. That loess tells of severe times when glaciers still covered Canada and a desiccating west wind held sway over the Plains. Agriculture then would have been unthinkable.

But in time the icecaps vanished and the watered Plains were transformed into a fertile grassland. By 1000 AD, Indians were growing corn all across the Plains. In Cahokia, Illinois, near St. Louis, there was a city of 40,000 people who thrived largely on a diet of grain. But after 1200, when the soil's fertility may have been wasted by overuse, the west wind also strengthened and a more persistent drought once again reared her ugly head. By 1300, Cahokia was abandoned; so too were the cliff dwellings at and around Mesa Verde. Mother Earth was letting the Indian know how she resented having her skin cut and her hair torn out. Her winds turned the Indian back into a wandering hunter and gatherer.

The 1880’s saw the last official onslaught of the ravages of the Little Ice Age. After that, the climate on the Plains grew distinctly more favorable for agriculture. The west wind weakened and temperatures rose. This led to a longer and wetter growing season across the Plains. Everywhere men busted and overturned the ancient sod, the very cement that absorbed the cutting edge of the rains and wove the Plains together. The Plains were roiled into amber waves of grain.

This merciless transformation was accelerated during World War I. It was then that the United States became the granary for
Europe. The Food Control Act of 1917 guaranteed farmers over $2.00 for each bushel of wheat. Farmers set out on their tractors and plowed their way into the sunset. There were, to be sure, a few voices in the wilderness that decried the wanton rape of the land. John Wesley Powell, explorer of the Colorado River and the Grand Canyon, and later director of the U. S. Geological Survey had warned in the 1890's that the High Plains were too dry to support more than sparse grazing. But Wesley's wise counsel was drowned out in the frenzy to squeeze every last grain of wheat and every last cent of profit from the gasping earth.

This madness continued throughout the 1920's, for the weather graciously baptised each new harvest with ample rains and Europe, still reeling from the effects of World War I, paid well to be fed. Eventually, however, agriculture in Europe was restored and grain prices began to fall. When the Great Depression struck the bottom fell out from under the grain markets. The worried farmer sat on his tractor, plowing even more land and wondered if he could ever produce enough grain to pay off his mounting debts.

In 1930 the rains began to fail. That year they failed in the Eastern United States. The next year the drought shifted west to the Great Plains, where it remained until 1941. The 1930's were also brutally hot years on the Plains, for there was almost no groundwater to evaporate and cool the parched earth. The little rain that did fall never had a chance to soak into the ground but quickly evaporated back into the scorched air. Then the dried out and exposed soil of the High Plains crumbled into dust and awaited the calling of the winds.

The wind took a year or two to marshal her forces. Dust storms began on a modest scale in 1932 and became an almost familiar nuisance during the growing season of 1933. But it was on May 9-11, 1934 that the dust finally assumed the proportions of a Biblical plague. The wind swept up the dry, brown soil of Montana and Wyoming, creating a wall of dust and sand-filled air that advanced across the countryside, casting it into darkness at noon. Tons of the dust were lifted into the jet stream and transported eastward across the country at speeds of 100 miles per hour. In the east, from Maine to Georgia, it rained dust for two days.

From 1934 onward, "black blizzards" raged across the Dust Bowl - the High Plains of Kansas, Oklahoma, Texas, Colorado and New Mexico. After 1934, the storms seldom bothered to send their messages to the nation's cultural capitals in the Northeast, but there arose from the dust a new, homegrown breed of American writers and artists, often called Regionalists, to document and dramatize the effect of the Dustbowl and the Depression on the local folk and on the land.

Regionalism had its cultural roots in World War I. Initially, America did not want to have anything to do with the War. An unprecedented program of anti-German propaganda was then promul-gated by the government to propel us overseas. Nationalistic, and often anti-German passions were whipped up to a maniacal level. Still, it took quite some time to convince the American public that its mission was to save democracy and even civilization by uniting to "smash the Hun".

After World War I, things did not work out the way the idealistic Americans had envisioned. The pettily vengeful European victors ignored Wilson's 14 points and demanded impossible and humiliating reparations of the Germans. In Russia, the Communist menace became a terrifying reality. It seemed as if everything the United States had fought for was lost.

Thus it was a disgusted and somewhat paranoid America that turned away from Europe in the decade following the War. She certainly had enough work to keep busy. Propelled to the economic forefront by Europe's debilitation from the War, America only strengthened her position as the world's premier economic power during the Roaring
20's. The expansion of agriculture during this period was matched by the breathtaking growth of industry.

America really began to `feel her oats' during the Roaring 20's. Not only did she work hard, she played hard, creating heroes like Babe Ruth. In such an atmosphere, it is not surprising that the call went out for America to free herself of cultural subservience to Europe, and to establish new, American forms of art. But the immense emotional efforts it took painters like Hartley and Hopper to wean themselves from European teat showed that this was no easy job.

Art critics eased the way. The first thing painters had to do, Thomas Craven repeatedly proselytized, was to cut out the cancer of European abstractionism and replace it with a healthy dose of American scenery and heroism. Craven pointed to the Mexican muralists, Diego Rivera, Jose Clemente Orozco, and David Siqueiros, as role models. In 1927, New York born and bred Lewis Mumford echoed this cry, insisting that each region of the country stop aping New York and begin to produce its own valid art forms.

These cries helped to fertilize the cultural soil of America. Even so, it still took the Depression and changed climate of the Dust Bowl to water that soil.

Nature ensured that the message of the Regionalists of the Midwest had a significant meteorological component. The Regionalist style may seem a bit hokey but don't let that home-grown farm flavor distract you for a single instant. The Regionalists were out to create an epic of life on the Great Plains. They wanted to show the heroism of the Plains' unassuming residents in the face of the unleashed forces of nature. Seldom has an art form dealt more intimately with the power of the climate and weather and their impact on people. The opening lines from John Steinbeck's, The Grapes of Wrath, sets the dramatic stage for the epic scenes of the Regionalists.

To the red country and part of the gray country of Oklahoma, the last rains came gently, and they did not cut the scarred earth. The plows crossed and recrossed the rivulet marks. The last rains lifted the corn quickly and scattered weed colonies and grass along the sides of the roads so that the gray country and the dark red country began to disappear under a green cover. In the last part of May the sky grew pale and the clouds that had hung in high puffs for so long in the spring were dissipated. The sun flared down on the growing corn each day until a line of brown spread along the edge of each green bayonet. The clouds appeared, and went away, and in a while they did not try any more. The weeds grew darker green to protect themselves, and they did not spread any more. The surface of the earth crusted, a thin hard crust, and as the sky became pale, so the earth became pale, pink in the red country and white in the gray country....

In the roads where the teams moved, where the wheels milled the ground and the hooves of the horses beat the ground, the dirt crust broke and the dust formed. Every moving thing lifted the dust into the air....The dust was long in settling back again.

When June was half gone, the big clouds moved up out of Texas and the Gulf, high heavy clouds, rain-heads....The rain-heads dropped a little spattering and hurried on to some other country...A gentle wind followed the rain clouds, driving them on northward, a wind that softly clashed the drying corn. A day went by and the wind increased, steady, unbroken by gusts. The dust from the roads fluffed up and spread out and fell
on the weeds besides the fields, and fell into the fields a little way. Now the wind grew strong and hard and it worked at the rain crust in the corn fields. Little by little the sky was darkened by the mixing dust, and the wind felt over the earth, loosened the dust and carried it away. The wind grew stronger....

The dawn came, but no day. In the gray sky a red sun appeared, a dim red circle that gave a little light, like dusk; and as that day advanced, the dusk slipped back toward darkness, and the wind cried and whimpered over the fallen corn.

Men and women huddled in their houses, and they tied handkerchiefs over their noses when they went out, and wore goggles to protect their eyes.

After a while the faces of the watching men lost their bemused perplexity and became hard and angry and resistant. Then the women knew that they were safe...


Alexandre Hogue depopulated the land to emphasize its desolation, but otherwise painted the Dust Bowl (Fig. 11-18) much as Steinbeck described it. The sky is brown up to a considerable height except where the sun has burned a triangular wedge known as Bishop's ring through the dust veil. The sun is white but is fringed by an orange ring embedded in a white disc. Above this, the cloudless sky is blue. The barbed wire fences have not been maintained for they were not designed to keep out shifting sands.

No one dramatized the effects of erosion more vividly than did Alexandre Hogue. One of his paintings, entitled Mother Earth Laid Bare (1936, Philbrook Art Center, Tulsa, Oklahoma) shows the gullied landscape carved in the shape of a woman's body. Another, called Drought Survivors (1933), depicts a rattlesnake and prairie dog as the drought's sole survivors. This painting so incensed a group of locals from Dalhart, Texas that they set out for Dallas to buy it and give it a public burning. Fortunately, they didn't have anywhere enough money, because Hogue was then in vogue.

These angry locals were sure that Hogue was "some upstart sent down from New York." Hogue wasn't, of course. He was born in Missouri and lived in Texas when he painted his Dust Bowl scenes. Most of the other painters of the midwestern scene in the 1930's were also proud native sons.

William C. Palmer, born in Iowa, caught the winds red handedly lifting the dust. It is a hot and windy day in Dust, Draught, and Destruction (Fig. 11-19). At least half a dozen dust devils are whirling across the landscape, like dervishes and genies in the deserts of the Arabian Nights.

Dust devils are right at home in a Dust Bowl scene. They are small and intense but usually harmless whirlwinds that form on almost calm days when the ground is baked by the sun (Fig. 11-20). If the ground is wet, some of the sun's heat is "wasted" by evaporating
water and the ground does not get quite so hot. For this reason, dust devils form most readily over very dry ground. Then, the buoyant, superheated air swirls upward. If dust happens to cover the dry ground, it will be swept aloft and will fill all but the inner core of the devil, which, like all intense vortices, consists of sinking air.

In Dust, Draught and Destruction, Palmer tried to mislead us. As culpable as the dust devils seem, they did not topple the tree or the windmill and certainly did not destroy the farmhouse, for they are seldom violent. But the Plains are traversed by the dust devil's far larger and more violent cousin, the tornado, nature's most destructive whirlwind.

![Fig. 11-19. William C. Palmer. Dust, Draught and Destruction. 1934. Whitney Museum of American Art, New York.](image1)

Even in the driest years, severe thunderstorms sprout up across the Plains to spawn tornadoes. A severe Great Plains thunderstorm is not your typical run-of-the-mill thunderstorm. It is carefully cultivated by the larger scale atmospheric setting and the peculiar geography of the Midwest United States. The stage for severe weather is set several days in advance. A large ‘tongue’ of warm, moist air in the lowest mile of the atmosphere begins to drive northward from the Gulf of Mexico. The moist tongue is often bounded on its western edge by dry air from Mexico to form what is known as a dry line. At the same time, cold dry air at jet stream levels comes racing in from the west or southwest. Once the cold jet stream layer covers the moist tongue, severe thunderstorms begin to pop up, particularly if the sun has added its own input. The warm, moist air is highly buoyant and rushes upward, forming cumulonimbus that pierce the cold dry air layer above. The cold, dry and dense air aloft embraces the cloud and gets soaked for its effort. Rain evaporates in this air, cooling it further and sending it hurtling earthward as the thunderstorm downdraft.

![Fig. 11-20. A dust devil with hollow core in an otherwise placid sky of cumulus humilis in Australia. John Roenfeldt and Ira Fehlberg, photographers.](image2)

Once a thunderstorm has formed in this environment it serves as a springboard for further thunderstorm activity. When the almost
interminable supply of warm, moist air encounters the frigid air spreading from a thunderstorm downdraft it is forced upward. This can lead either to the formation of a wedgelike shelf or arc cloud or to a tornado. Arc clouds and lines of thunderstorms known as squall lines tend to occur when the wind direction in the surrounding atmosphere does not change much with height. Supercell thunderstorms that spawn tornadoes tend to occur when the wind in the surrounding atmosphere turns sharply clockwise from south near the ground to almost west aloft and increases in speed with height. Squall line thunderstorms with their shelf clouds and supercell thunderstorms with their tornadoes are almost mutually exclusive.

The shelf cloud is one of the squall line thunderstorm's classical signatures and was rendered masterfully by John Steuart Curry in *The Line Storm* (Fig. 11-21). Millet had already depicted a shelf or arc cloud in his *Coming Storm* (see Fig. 9-19) but on a much humbler, European scale. In *The Line Storm*, flashes of forked lightning emerge from pitch blackness under the huge arc cloud. Ahead of the arc cloud, a few tattered fractocumulus or scud form in the gently rising warm air just before getting sucked violently inward and upward to join the main cloud.

The tornado forms along the supercell thunderstorm's flanking southern edge beneath cloud base at the boundary between the warm updraft and the cold downdraft. It often appears in the clear air as a sign for all to behold while rain or hail can be seen falling further north. Often, the pressure around the tornado is so reduced that cloud base is lowered and the tornado is fixed to a pendant wall cloud (Fig. 11-22). The tornado funnel narrows toward the ground where its immense winds disperse a whirling cloud of debris.

This is exactly how Curry depicted the tornado in *John Brown* (Fig. 11-23). Never mind that John Brown's towering, bearded form dominates the foreground. He is only there to relay God's sacred commandment that there will be no slavery in the Promised Land of Kansas. It is not by chance that Curry modeled John Brown after Michelangelo's Moses, for with outstretched arms, windswept
beard and hair raised by the electrical spirit of the storm John Brown is the Moses of the Great Plains. Behind him whirls the tornado, the pillar of cloud in which God reveals himself to his chosen people of the prairie.

When the fierce thunderstorms of the Regionalists finally rolled overhead, they opened their floodgates and interred the Dust Bowl under a sea of green. At about the same time, World War II roused the nation from its lethargy. These changes doomed the Regionalist Movement, which died a quiet death shortly after 1940. Artists would need new vantage point to view thunderstorms.

World War II provided a new perspective on the atmosphere by accelerating our conquest of the sky. Today, of course, millions of people fly and are able to see clouds from both sides, but this was not the case prior to World War II. Thousands of pilots were trained during World War II. Meteorology was an integral part of their training, and as they filled the skies they added greatly to our knowledge of the weather. American pilots, making no headway against fierce westerly winds on a bombing mission to Japan were forced to jettison their loads and turn back east. Whisked home by the wind in record time, the pilots brought first word of the jet stream.

One of the military pilots later became an artist. During a post-war stint around Indonesia, Wilson Hurley looked down and saw many scenes like the one he painted in the Isle in the Molucca Sea (Fig. 11-24). The island, crowned by a volcanic peak and ringed by coral reefs, appears as an emerald amidst a sea of turquoise and sapphire. The color of the water depends on its depth, which increases in a convoluted manner away from the island's center.

A small cumulus, the crown of so many tropical island jewels grows over the island's volcanic peak. Such clouds form almost every day when the intense equatorial sun heats the humid, tropical air on the sunlit mountainsides and forces it to rise. Later in the day the cumulus may grow large enough to send rain down upon the island. Such rain is a mixed blessing, for although it brings life to the island, it also gullies the slopes in its downward rush and helps the waves slowly wash the island back into the sea.

Wilson Hurley took many years to return to his true calling. Even at the age of three, he was mesmerized by the entrancing colors of an Oklahoma thunderstorm, but a career as an artist seemed out of the question. After his military stint, Hurley passed the bar and moved to New Mexico, where he spent years as a successful, but not particularly fulfilled lawyer. What finally determined him to forsake his profession and become an artist was an experience with a young, terminally ill doctor who asked him to formulate a will. When Hurley finally decided to become a professional painter he merely had to walk outside on a summer day to find a nubile Anvil Top (Fig. 11-25), posing for him free of charge in the sky above, for New Mexico offers as grand a view of thunderstorms as we get anywhere on earth. The heated surface air contains just enough water vapor to kindle a thunderstorm, while the air surrounding the cloud at all higher levels is very dry and crystal clear. As Hurley noted,
In New Mexico when our summer thunderstorms arrive, it is common to see a cloud such as this in the early afternoon isolated from other clouds and showing its complete anatomy in the clear air. In lower lands the storms are more massive, but the thickness of the air hides most of them from view.

Wilson Hurley: *An Exhibition of Oil Paintings*.

Although thunderstorms are an almost daily treat during the brief summer monsoon of late July and August in New Mexico the climate is still arid. Anvil Top faithfully shows the open patches of light, desert soil and the sparse, pale green or golden vegetation of New Mexico. The dry air that allows such magnificent views of the thunderstorms begrudges the Earth every drop of water by taking its toll on the rain falling beneath the cloud. Quite often, a shower will evaporate without a drop reaching the ground.

The spreading anvil top has a diffuse, veil-like appearance that contrasts sharply with the massive, highly corrugated cauliflower shaped outlines of the brightly sunlit, burgeoning cumulus cells below. The swelling cumulus cells give the impression of solidity because they contain a multitude of minute water droplets with tremendous optical thickness that increases upward almost to the growing edges. By contrast, the spreading anvil appears diffuse because it contains much lower concentrations of large ice crystals that thin out and evaporate near the anvil's sinking fringe and allow light to penetrate much deeper into the cloud.

Hurley has shown this disintegration process at work in Anvil Top. The spreading air at the anvil's edge turns downward and then loops back inward, forming a vortex ring that carries with it long, evaporating streamers of cirrus. The cirrus streamer on the right of Anvil Top is easy to see, but look carefully all around the underside of anvil and you will be able to decipher many other cirrus streamers in a similar state of decay.

**Conclusion: New Skies to Conquer**

The anvil-topped cumulonimbus is the monarch of all clouds, yet for some mysterious reason artists have virtually excluded it from their works. Surely, most painters must have glimpsed its noble and unforgettable outlines at some time in their lives no matter where they lived. But, as with the halo and a few other aerial phenomena of stupefying beauty, the cumulonimbus has been something artists have either chosen not to reveal or failed to see.

For several centuries now artists are learning to see new phenomena using eyes trained by science and technology. Wherever science has thrived, it has provided art with a fertile breeding ground of raw material for new vistas and fresh outlooks. Whenever science has failed, art's naturalistic sources have invariably withered away at the root.

Recently, direct links have been forged between art and science. The opportunity for employment as 'lowly' scientific illustrators has tempted more than a few hungry or curious
painters. Artists serving as scientific illustrators have been introduced to everything from the minute world of the electron microscope to the vastness of the cosmos. They have also accompanied explorers and scientists on their voyages of discovery around the globe.

One group of exploring artists including William Leigh, Matthew Kalmanoff, and James Perry Wilson were commissioned by New York's American Museum of Natural History to paint backgrounds for environmental groupings of plants and animals from selected sites around the world. During the expeditions scientists collected samples of the local fauna, flora, rocks and soil while artists photographed and sketched the landscape and sky so as to most faithfully represent the background scenery.

The painted backgrounds of the dioramas in the American Museum of Natural History are triumphs of tromp l'oeil and constitute some of the best sky art of the twentieth century, and indeed of all time. They carry the viewer's eye far into the imagined distance with a minimum of disturbance, faithfully recreating the entire panorama from ground up. In the Hall of Asian Mammals, Mt. Fuji, with its snow line tilting upward on the north slope, emerges from a well-defined layer of misty marine air into the clear, dry upper atmosphere while lazy cumulus remain trapped below the discontinuity. Even Hokusai, who showed a sloping tree line in *Fuji in Fine Weather* (Fig. 9-37), neglected to show this marine layer.

A short walk away, In the Hall of African Mammals, the tropical skies above Zaire's Upper Vele River basin are filled with towering cumulus congestus. The clouds' spreading mushroom-shaped tops are still white but the setting sun has tinted the clouds' lower sides pink, much as in Fig 11-2 and August Schaeffer's *Sunset in Hungarian Forest*. Further south, along the banks of the Zambezi River in Mozambique, cheetahs play under a sky of cumulus much like the one that Magritte later used in his Empire of Lights (Fig 11-6).

Some of the best clouds appear in the Hall of North American Mammals. Delicate cirrus streamers fall through the crystal clear skies of Wyoming above the extinct volcanic plug now called Devil's Tower. Prior to this, only Jan van Eyck, John Constable and Edward Hopper had painted such perfect cirrus. Steam fog that might have be lifted from a Turner rises from a lake in Ontario's Algonquin Park while further west, cellular altocumulus that Cole or Courbet would have gladly painted supervise squirrels playing in the trees above Oregon's Rogue River on a warm summer day.

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A more serious drama is played out high in the Shickshock Mountains of Quebec's Gaspe Peninsula. Under the skies of a departing storm in James Perry Wilson's, Canada Lynx and Varying Hare (Fig. 11-26) a lynx is about to flush a varying hare from its hiding place beneath the dwarf vegetation. The hunt temporarily distracts the eye from the panoramic view seen from an elevation of 3500 feet on Mount Albert. The Saint Lawrence River appears in the distance to the north or far left, while Mount Jacques Cartier appears to the right in the east.

The scene represents a precise meteorological moment. The time is late in the afternoon on October 26, 1950. The weather map shows that on the 26th a low pressure area

![Image](image.png)
passed to the east, drawing cold northerly winds and stratocumulus clouds in its wake. Indeed, the sky is filled with a thin, evaporating veneer of stratocumulus. In the smooth gaps between the clouds, patches of pristine sky grade from deep blue above to turquoise and finally to orange at the distant horizon.

A coating of snow topped by glaze covers all features at the higher elevations as a result of the season's first snowstorm, while the warmer lowlands got only rain. The temperature near sea level hovered around the freezing point, but was -5ºC one mile up. The legend accompanying the Group states that after the snow, a dense fog consisting of supercooled water droplets swept up the mountain from the north and coated the north side of all exposed rocks and vegetation with a layer of rime ice. The fog was probably a low-lying cloud produced by ascent of the rain-soaked air up the slope.

A far more deeply frozen world was depicted by Adolph Schaller, in his illustration, *Hunters and Floaters* (Fig. 11-27) from Carl Sagan's *Cosmos*. Here the gaseous Jovian planet is home to an impressive array of cloud forms - corrugated cumulus, smooth lenticular waves, fibrous cirrus, a tornado-like funnel, and even the swirling clouds of an extraterrestrial hurricane. But perhaps the painting's most remarkable feature is the ice crystal halo produced by a cloud so optically thin that the sky remains deep blue. The halo is touched at its bottom by a lower tangent arc, while a sun dog stands guard just outside the circle in a manner consistent with a sun 30º above the horizon. Ironically, this grand appearance of art's first accurate halo complex has been displaced from Earth to an icy Jovian planet whose clouds consist of ammonia crystals. A very similar scene by Shigemi Numazawa, *The Upper Atmosphere of Jupiter* (1989) is displayed in the American Museum's Hayden Planetarium.

The beautiful but almost documentary skies of the murals in the American Museum of Natural History are invariably classified as 'mere' scientific illustration and are never mentioned in the same breath as the 'fine' art so proudly displayed across Central Park in New York's Metropolitan Museum of Art. This is the result of an unfortunate but all too prevalent attitude that fine art must consist of some elusively defined creation of the imagination or intellect that transcends a 'mere' transcription of mundane reality. In far too many cases, such judgements amount to little more than subjective incantations that can not stand the test of any objective criterion.

The role of science and mathematics in art is winning increasing acceptance and is transforming the art world. Scientists and mathematicians have created whole new branches of computer art. Using the fractal geometry of natural forms discovered by Benoit Mandelbrot vibrant landscape vistas of mountains topped with cloud-filled skies (Fig. 11-28) generated by computer have become almost indistinguishable from the real thing.
The intrusion of science and computers into art is symptomatic of the changes that have taken place in the world of art and is but one of the factors that has led to better and more varied sky art. The flood of ideas in the world today compels art to transcend any limited set of ideologies. The materials and equipment available to the artist can be used to overcome any technical difficulties.

Sky art has also been broadened by the greatly increased number of professional and amateur artists. Thousands of people wade through lifetimes of business or busyness to emerge metamorphosed from their corporate cocoons as passionate painters. No one can tell these retirees what to paint - they paint for their own pleasure.

One of these retirees lived long enough to make art a second career. Anna Marie Moses was born in upstate New York where, year round, the seasons splash you in the eyes. Her childhood idyll ended at the age of twelve when she was sent off to work. At the age of twenty six she married and thereafter remained busy, giving birth to ten children and raising the five that survived infancy. She had only a few brief spare moments to paint. Finally, when her children were grown with children of their own, Grandma Moses returned home to upstate New York, free at last to recreate her visions of a childhood world of benevolent innocence. Snow-whitened sugaring skies, storm-darkened skies or placid, deep blue heavens with fair weather cumulus all met her `naive' approval.

Grandma Moses continued painting the sky until June of 1961. In that month she began her final work, entitled simply Rainbow (Fig. 11-29). Rainbow is unfinished, just like its springtime setting when life returns to the earth. The trees are just coming into leaf for another fruitful year. But Grandma Moses would shortly pass on to another vista. She added the pastel colored bow at the last moment, perhaps as her right of passage, for even if we reach the age of 101, there will always be new skies to conquer.