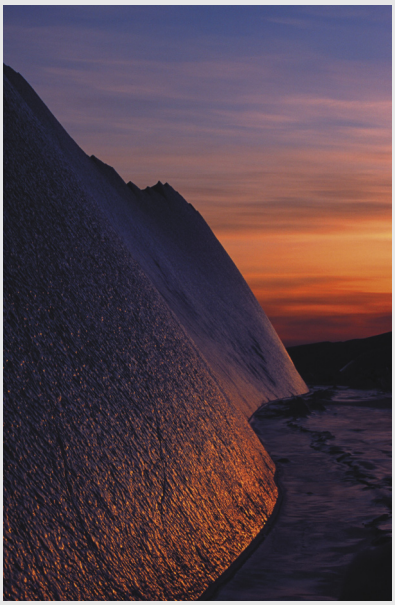
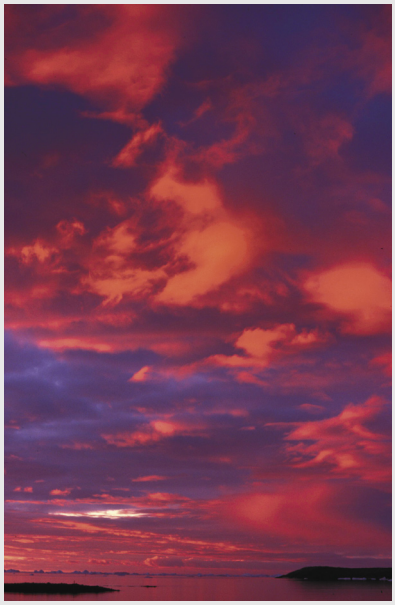
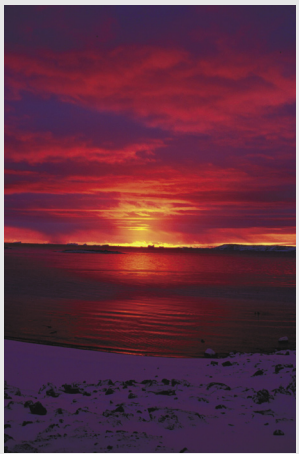
Portfolio

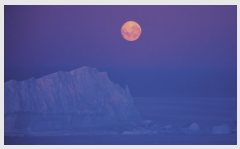


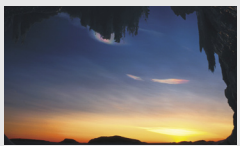


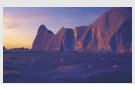
COLOURS OF ANTARCTICA

Photographer Sean Wicks









Antarctica is a photographer's delight. Not simply because of the array of amazing and diverse natural objects that are unfamiliar to those of us living at lower latitudes, but because of the special optical properties of the cold and clean Antarctic atmosphere.

The beautiful colours photographed by Sean Wicks are largely due to the clarity of the Antarctic atmosphere near the surface. The lack of atmospheric aerosols combined with Rayleigh scattering of light by molecular gases enhances the colour contrast in the images, particularly at the blue and red ends of the spectrum.

Rayleigh scattering causes the daytime sky to be blue – atmospheric gases preferentially scatter blue and violet light away from the direction of the sun and to other parts of the sky. This processes causes the sun's disc to take on a yellowish hue, which becomes more pronounced and redder when the path traversed by the light through the atmosphere lengthens, as it does when the sun is lower in the sky. Similar effects occur for light from the moon and other distant sources. Rayleigh scattering also gives bodies of water and icebergs a bluish colour.

The coating of snow on the icebergs and sea ice in Sean's photographs have taken on the colours of the sky. The vivid oranges and pinks seen when the sun is near the horizon arise from a combination of scattering by tiny ice crystals in the clouds and the absence of blue light in the direction of the sun.

Why is the Antarctic atmosphere so clear? This is due to the extreme cold and dryness of the atmosphere, the isolation of the air over the continent afforded by circulation patterns, and the predominance of ice covering the surface. These factors result in low aerosol concentrations, particularly over the interior of Antarctica.

And what are aerosols? They encompass a diverse range of particles that exist at all levels of the atmosphere. The particles are all generally microscopic, ranging in size from the wavelength of visible light (about two-thousandth of a millimetre) upwards, and include smoke, dust, salt and a variety of large molecules. Aerosols scatter and absorb light, and produce the phenomenon we call haze, reducing the brightness and washing out the colours of distant objects. The smaller aerosols provide sites where water molecules can cluster, creating clouds and various other forms of atmospheric water. In the Antarctic, the clouds are generally comprised of icy particles, from tiny crystals through to snow. The light scattering from these particles provides some of the most spectacular colour effects.

Also photographed by Sean is the aurora australis, a natural emission often seen in the polar regions. The aurora occurs when gases above at high altitudes are energised through collision with charged particles guided into the atmosphere by the Earth's magnetic field. The green and red colours arise from the excitation of oxygen atoms.

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