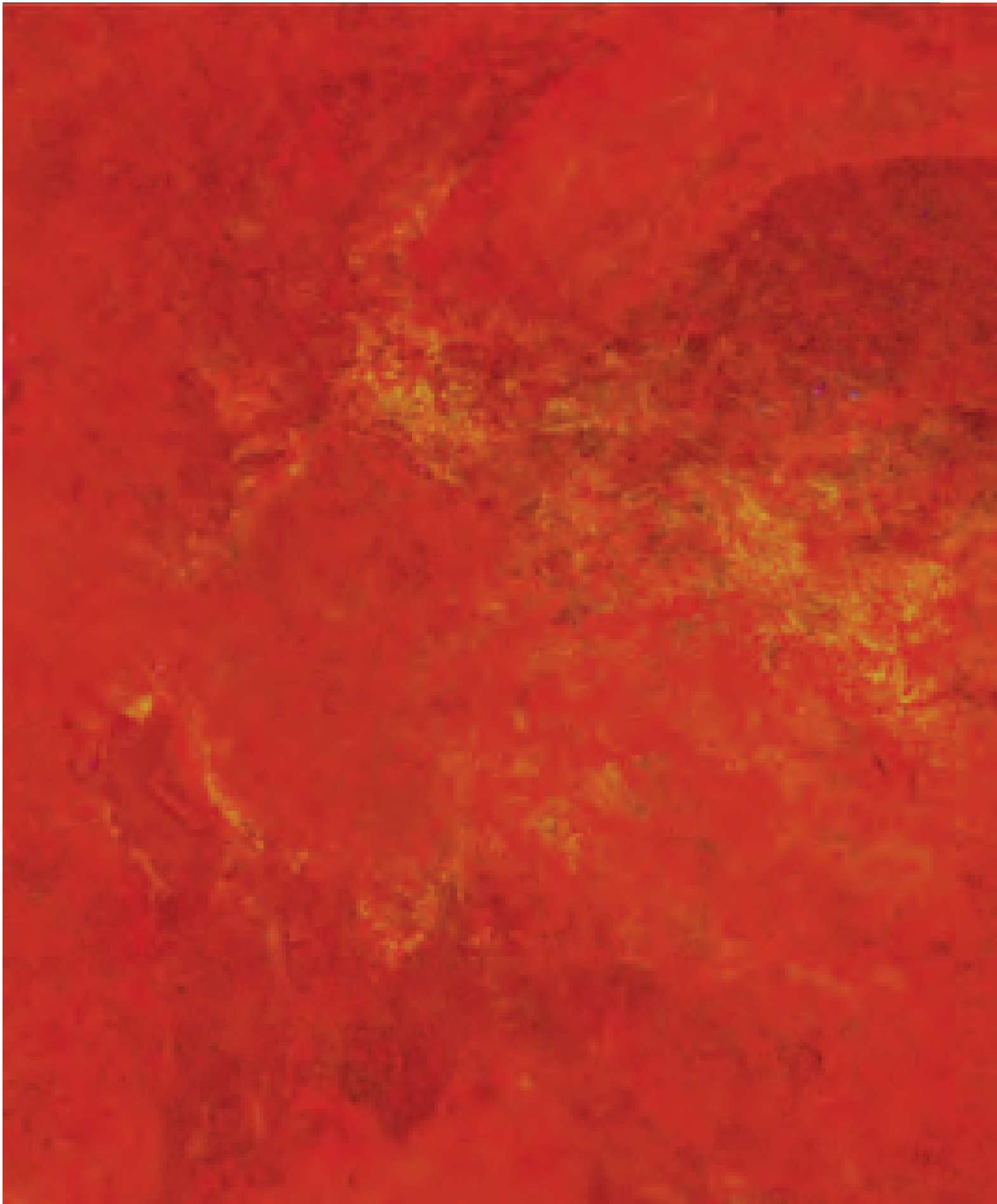


Land, sea and air



HIGH ART

Sprites are a recently discovered atmospheric phenomenon—
a colourful electrical charge that threatens aircraft.

Peter McLeish is an artist who has devoted his time to understanding
sprites so that he can represent them on video and canvas.

He tells Viel Richardson how art and science can work together to
help better understand the world

High art

While the world of the scientist, with its cutting edge techniques and exotic ideas, would seem to be fertile ground for the artist's imagination, art and science tend to exist in spheres seen by many as unconnected, if not entirely mutually exclusive. But this does not always have to be the case—Canadian born artist Peter McLeish has combined his fine art background with a deep interest in science to create a series of work exploring the relatively recently discovered atmospheric phenomenon of red sprites.

"I actually developed my reputation as a painter painting portraits," Peter tells me. "There is this idea that a person's face can become a mask that they present to the rest of the world. My portraits try to show the persona behind the mask, so these 'mask portraits' were a bit more abstract."

It was while studying for his master's degree in fine arts at the University of Guelph in Montreal that Peter's took the direction that has defined his career to date. *"I had started painting deep sea divers and tried to express through the paint the science of how a beam of light was reflected and refracted as it went through the combination of water and bubbles," he says. "At the university I started talking to some physics professors. They thought that my work was very atmospheric and started talking to me about atmospheric phenomena, and that is what led me to my first large-scale art and science installation, titled the Glory Project, in the Planetarium de Montreal."*

A glory is a circular rainbow often seen in clouds shrouding high mountains. Peter's project involved projecting 13 digitally enhanced slides of paintings of a glory on the 20-metre-wide dome ceiling in the planetarium to the music of Ava Maria. *"I had actually studied science before I became an artist," Peter tells me. "With Glory I realised the direction that I wanted to go in."*

Peter had found his voice by combining his love of art and his fascination for science. It was while looking for a subject with which to move forward that he first heard about the recently discovered phenomenon of red sprites. *"I thought at first that this must be some kind of scientific joke, as I had never heard of a new atmospheric phenomenon being discovered," Peter recalls. "At the time there was only this fuzzy black and white picture of this column in the darkness."*

His work on the Glory project meant that Peter was not a stranger to the meteorological community, so he contacted one of the primary scientists studying this new phenomenon, Dr David Sentman at the University of Alaska.

"He confirmed that these things did exist and that he was doing some research on them," says Peter. "They tended to be vertical with several tendrils emerging from the bottom and they tended to be red or blue, though other colours have been seen. He said they had been discovered in 1998 by John Winckler at the University of Minnesota. He had recorded the red sprites by accident while testing a low light camera. Dr Sentman said that if I was really interested I should contact Walter A Lyons."

Getting hold of Dr Lyons proved a difficult proposition. He is a former president of the American Meteorological Society—a high profile figure who had continued his meteorological research with a special interest in gathering information about sprites.

"I contacted him and explained my idea of combining scientific data and artist's creativity to

try and understand more about sprites. He was polite but not much more."

It seemed that Dr Lyons was not ready to throw in his lot—and reputation—with some random artist about whom he knew next to nothing. Peter remembers writing again and again explaining his ideas and approaches to the project. Eventually Dr Lyons saw enough to pique his interest and he started a correspondence that has grown into a full blown collaboration.

It seems a lot of trouble to go through, but Peter had been captivated by the red sprite. *"Firstly it was because it is a new science, and something new is always interesting. Then when I saw the first colour pictures of them I couldn't believe my eyes. They had a certain kind of beauty. It's very hard to explain. When you first see a video of a red sprite you think, wow, what is that?" Peter enthuses. "The thing is that they last for less than a tenth of a second. If you see one at all with the naked eye you will see several of them. They tend to occur in bursts in the same region so it will be quite a complex sighting which is very difficult to quantify if you don't know what they are. Dozens and dozens will occur within a couple of seconds. The only way to capture them on film is to use a special low light, high speed camera and then slow them right down when playing them back."*

Red flashing glow above the clouds

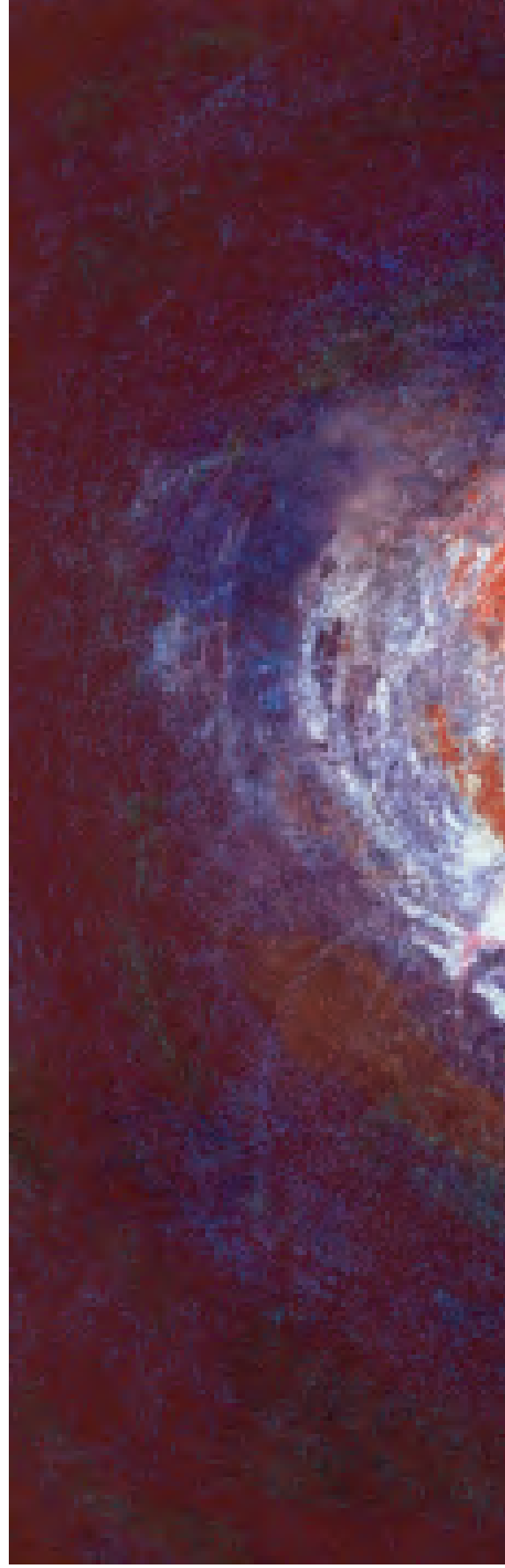
The earliest reports of sprite-like sightings going back almost 100 years. They have been seen by both military and commercial pilots as well as people on the ground, but for various reasons people have been shy about reporting them. We even have reports going back the 19th century with people saying that they have seen some sort of red flashing glow high above the clouds.

They occur in a part of the atmosphere called the ionosphere, which is where the atmosphere starts to end and outer space begins, so they are a very high level phenomenon. We don't know how powerful they are. Since the science of red sprites is very new, there is much we just don't know. One thing we do know is that although they occur high in the atmosphere, their tendrils can reach down far enough to hit a plane.

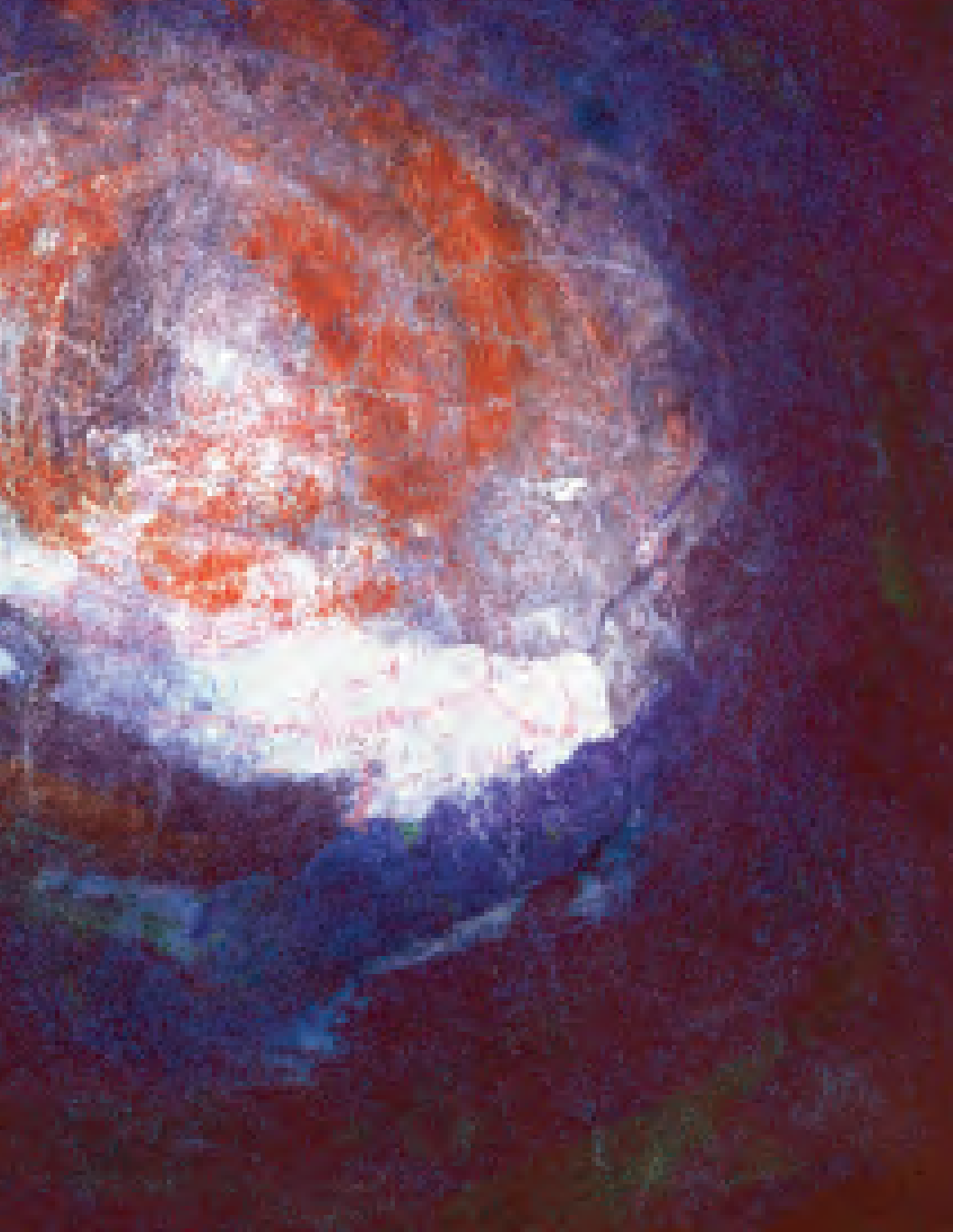
"We know that it is a certain type of very powerful high altitude lightning that produces red sprites. The lightning shoots a positive electrical charge towards the earth and temporarily unbalances the middle atmosphere, igniting this high altitude spark. This charge could hit a plane. This makes them potentially dangerous. It turns out that NASA has been studying them for many years because it is not known whether they were a threat to the space shuttles."

Research is on-going but we do know that sprites are caused by a positive electrical charge moving towards the earth. The different hues arise from electrons being energised by electrical fields caused by this super lightning. When the electrical charge in this lightning collides with the upper atmosphere, this is what creates the colours. The blue hues tend to be lower down in the atmosphere and the reds tend to be further up. This could well be related to the thinness of the atmosphere at the different altitudes, which means that the electrical charge will have less electrical charge to work with.

Peter's style of painting is one which is especially suited to trying to capture this particularly ethereal atmospheric phenomenon. It is known as 'encaustic' painting, which uses a mixture of beeswax, mineral spirits and oil paints.



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"The medium has a physical depth and a certain transparency and that makes it the best way for me to paint atmospheres. I can put on layer after layer which really builds up a sense of depth in the work, and a sense of three-dimensions."

Peter's work has evolved into a rich collection of different experiences. There are the paintings themselves. Then there are animated films set to music where Peter has taken scans of his paintings and combined them, creating animations that hint at the processes going on within sprites.

"Lightning's Angels shows views of a red sprite that cannot currently be seen, such as inside a red sprite or at its formation," Peter explains. *"I use my imagination and some of the science behind red sprites to create these images."*

What has been particularly interesting has been the science world's reaction to Peter's work. *"It turns out that the more of a scientific understanding people have about red sprites the more intrigued they are when they see my work. I showed my films to a group of atmospheric research scientists in Melbourne a few years ago. They asked how did I take the images in Lightning's Angels,"* Peter recalls. *"When I explained they became very interested. They were really interested in how I made images out of scientific data, because to them this data had no visual existence, it didn't 'look' like anything. They were very intrigued by the idea and said that maybe that was what the inside of a red sprite would look like. They had never thought what it would look like from above or from the inside."*

Peter's work excited a similar response at a meeting in Denmark last year. As his scientific understanding of sprites has grown through his work with Dr Lyons, and his reputation for the depth of his research has spread, the scientific community is looking more closely at his work.

A visual species

"I had a presentation last year in Denmark and somebody from the Danish space organisation came to my presentation," Peter remembers. *"He was particularly interested in Lightning's Angels and asked how I went about painting the view as seen from above. I told him that a lot of it came from looking at the existing images and thinking about the processes, but the final structures come from my imagination. He said that his team had been working on what a sprite might look like from above and could not get to the grips with the problem. But my video sparked some new ways of looking at the problem which might prove useful. The thing is that we are a visual species and often a visual representation of a subject is a very good way of getting to grips with it. These scientists have told me that because the starting point for my imaginings are firmly based in the world of physics and guided by the processes that may be actually involved, my work can be a springboard for looking at ideas."*

It is a vindication of an approach that would have been viewed with suspicion by many. After all, what can an artist contribute to the world of atmospheric physics? It turns out that the answer might be more than was initially thought.

"I firmly believe that art and science can combine in order to further understand the natural world," Peter says. *"That is essentially my project. Though these paintings have a lot of my imagination in them, I firmly believe that they can help with the further understanding of this still little understood phenomenon."*