QUESTION & ANSWER

MICHAEL BENSON, CURATOR (AND EXPLORER) OF SPACE PHOTOGRAPHY

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Writer, photographer and filmmaker Michael Benson has just compiled his third book of space photography, called *Planetfall: New Solar System Visions*. Published by Abrams, it features spectacular close-range landscape images of planets, planetary moons, asteroids and the sun, which Benson has culled and processed from the image databases of various space probe missions. Hasted Kraeutler gallery in New York City will exhibit the work in December. As Curiosity, the Mars rover, was beginning to send images of the planet's surface back to Earth, we asked Benson about technological advances in space photography, and his fascination with digging in photographic archives. Interview by David Walker

PDN: **What does "planetfall" mean?**

MICHAEL BENSON: My using that term dates back to my experience of sailing across the Atlantic in a 38-foot sailboat in the summer of 1989. I experienced landfall after a month at sea, and that stayed with me: That visceral sensation of getting back to land after a long, dangerous trip. The origins of the term "planetfall" came from my feeling of what landfall means existentially, even spiritually.

[Another] definition of planetfall has to do with the decline of a biosphere. I've looked at thousands of images from space over the last few months, and many images show evidence of planetary distress. For instance you can see smoke filling the air of the entire continent of South America due to the burn off of jungles. My view is that an honest look at the early twenty-first century solar system needs to include visual evidence of climate change here on the third planet.

PDN: **What inspired your interest in space photography?**

MB: I've always been fascinated by space. I was born in 1962. I remember watching Neil Armstrong set foot on the moon on a black-and-white TV. But even before that, [what] set me on a trajectory of being completely fascinated with the question of our place in space and time was seeing *2001: A Space Odyssey*. My mom took me to see it when I was 6 years old. I was utterly amazed and fascinated and confused. It was my first real exposure to a masterpiece of art, and I've viewed space through the lens of art ever since.

PDN: **What distinguishes *Planetfall* from your two previous books?**

MB: It is in some ways an extension of *Beyond: Visions of the Interplanetary Probes*, which came out in 2003. *Beyond* is a survey of the entire genre of robotic space flight over 50 years. *Planetfall* is a look at twenty-first century images of planets, picking up where *Beyond* left off, but picking up at a very fruitful moment.

In the last 12 years we've seen an exponential increase in the power of imaging systems sent to the planets. It has included most [of] the entire story of the two [Mars] rovers—Spirit and Opportunity. Of course, as of three weeks ago, we have a much bigger and more capable rover, Curiosity, on the surface of Mars, which will open a still newer chapter. But regarding *Planetfall*, there have been so many extraordinary visual achievements during that 12-year period.

PDN: **For instance?**

MB: With Spirit and Opportunity, for the first time, we had mobile landscape photographers [rovers] on the surface of another planet, able to climb mountains and document all manner of phenomena, including dust devils whipping by. The Cassini spacecraft has arrived at Saturn since *Beyond* came out. Cassini has produced an incredible bounty of images of all types of phenomenon, from Saturn's rings to its moons to shadow play of the rings across the surface of Saturn.

and-white images in RAW form, but they have been taken through red, green and blue filters. Those can be composited in Photoshop to make an RGB color shot.

PDN: **So you put the three layers on top of each other and voilà, there it is?**

MB: It's a little more complicated than that. They have to be aligned. The spacecraft is going faster than a rifle bullet, and so the geometries are changing. There are various hoops you have to jump through in order to get everything to work correctly. And in many cases the filter combinations are less than ideal, requiring various techniques to get them to produce a reasonable true color shot.

PDN: **Can you describe the curating process? It would seem like there are thousands of images to comb through.**

MB: There are and it's a lot of fun. There's a lot of panning for gold in the archives, which I really enjoy. And if you're lucky, you get something really unusual. You just sort of know it when you see it.

PDN: **Have you seen anything spectacular yet from Curiosity, the latest mission to Mars?**

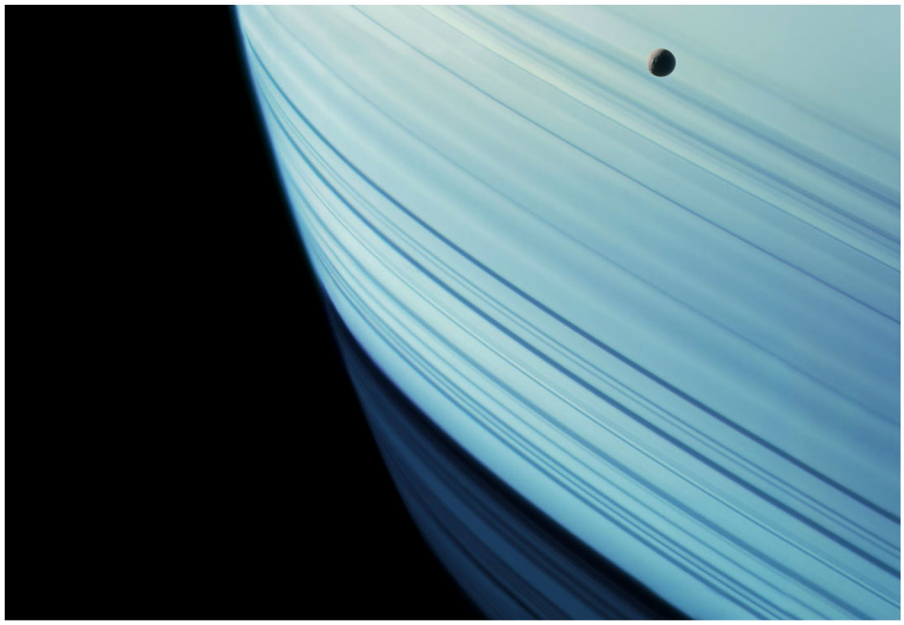
MB: It's just getting its bearings. What's exciting about what we've received so far is the very high quality of the images.

PDN: **Can you tell me about the cameras on the probes?**

MB: They're CCD cameras, totally custom made. For a mission like Cassini, they have in effect telescopes attached to them. Curiosity has so many cameras on it, it's like a panopticon. I can't tell you in great detail how they assemble the cameras, because I'm not really a tech-head.

PDN: **How smart are the cameras? Do they point in only one direction?**

MB: There's a high degree of control over most of the cameras, but no real-time control. Curiosity was nine minutes away when it comes to light travel time, though this changes all the time as the distance between the planets change. So [the probes] will be ordered to document this, that or the other thing well in advance.



PDN: **How do you go about finding these images?**
MB: By digging in archives of various missions. A major chapter in the history of photography ... [which] has been unfolding over the last 50 years ... is the visual legacy of robotic space flight. In the absence of human photographers, what's left is a staggering number of RAW image data frames and thus a lot of curating, color correcting, mosaicking and so forth.

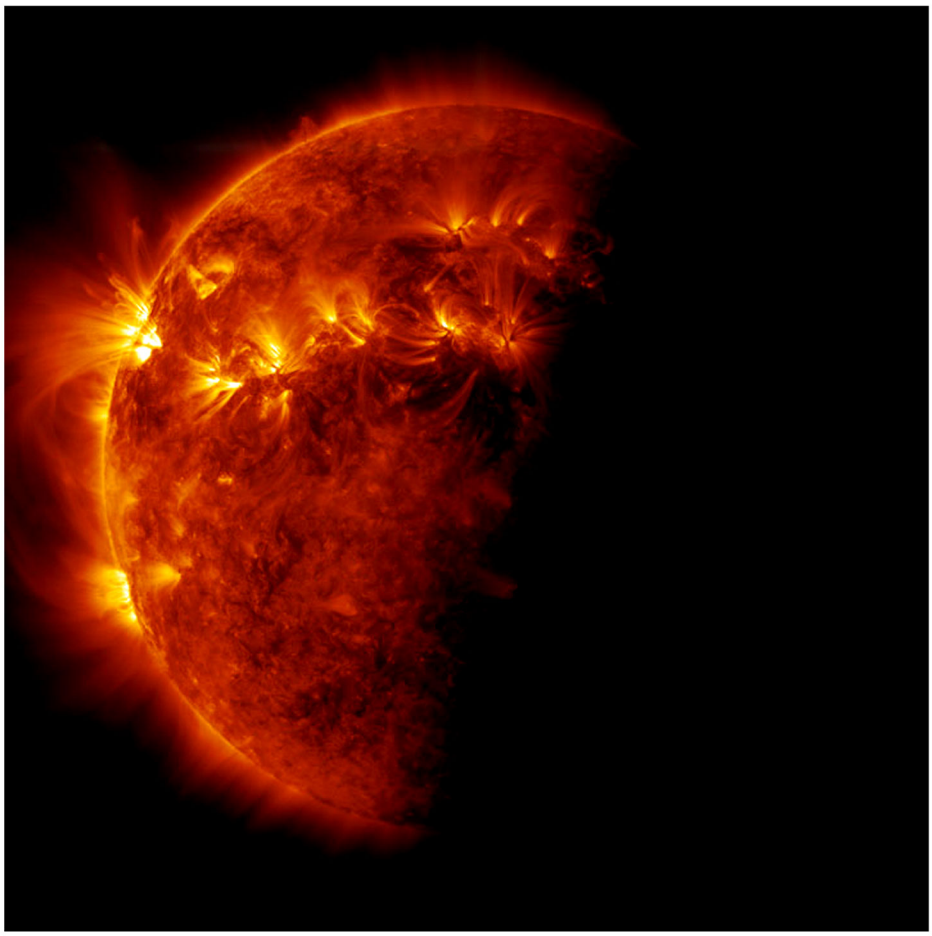
PDN: **Do you have to physically go to archives and sit down in front of a computer screen?**
MB: No, it's all online. I browse from home. I dig out RAW frames, and sometimes there's a very complex image-processing chain.

PDN: **Can you describe that?**
MB: In order to get a true color image of a planet, the spacecraft has to have taken, at minimum, two images of the target area, through two filters—let's say red and blue. In that case, the green filter can be interpolated. But ideally, three images are taken. They look like black-

PDN: ***Planetfall*** **is different from** ***Beyond*** **in that it showcases the images, with captions and explanatory text moved to the back of the book. Why?**
MB: I wanted this to be a non-verbal trip through space. I'm not producing a textbook. In *2001: A Space Odyssey*, [director Stanley] Kubrick did not provide the viewers with lots of information explaining at every stage what was going on. He wanted them to get engrossed in the mystery and glory of the trip. I think I used that principle as a guide. I don't always want to have a voice saying, "The reason the clouds are that color is because of ammonia in the atmosphere." I wanted people to look at the images [in *Planetfall*] and try to figure out what was going on. A lot of what I do is to try to trigger a sense of awe or amazement.

PDN: **What technology do you anticipate will enable space probes to get images that they can't get now?**
MB: We're getting to higher and higher resolutions. Mars Global Surveyor has been orbiting around Mars with a camera system that has the power of spy satellites orbiting Earth. Also, I think we're heading toward very high quality three-dimensional imaging.

PDN: **Politicians are in a cost-cutting mood, which doesn't bode well for these programs.**
MB: The Planetary Science division of NASA has been asked to accept a 20 percent cut in funding, or $300 million. It's a gloomy prognosis. I like to think the success of Curiosity will create sufficient interest that people will be advocating that funding continue for these efforts.



PDN: **What comes after this series of space books?**
MB: I'm going to be doing a book called *Nanocosmos*, which is electron microscope photography of various phenomenon, various aspects of natural design. I'm going to the opposite end of the size scale.