

DIGITAL FILMMAKING:

A Dialogue  
Between

# Head Heart

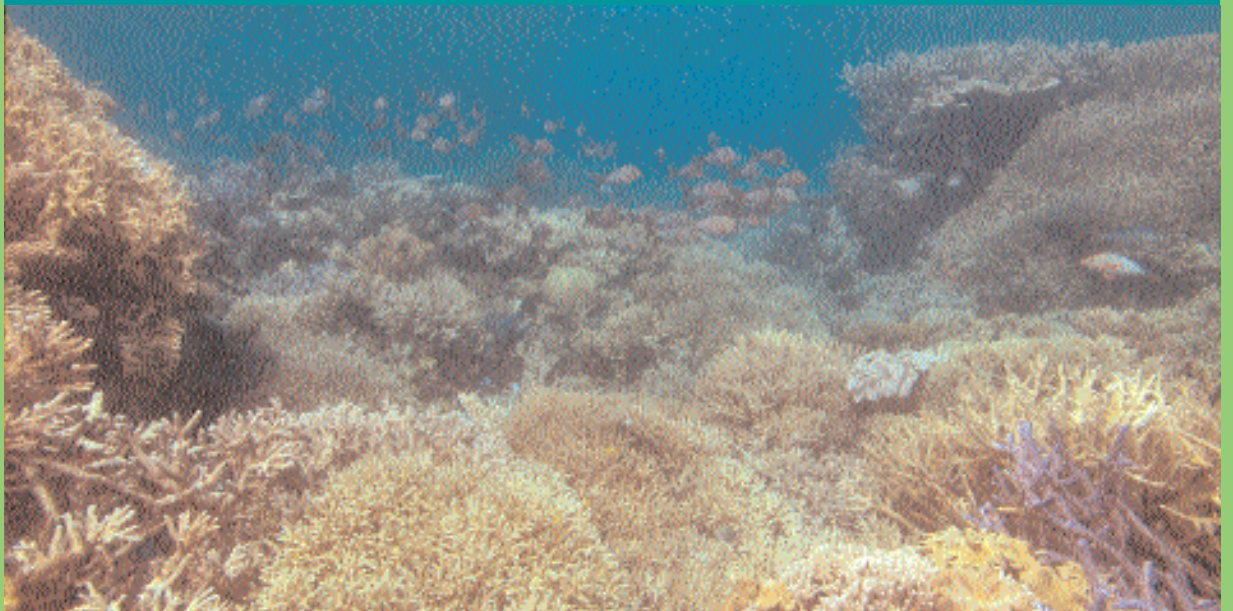
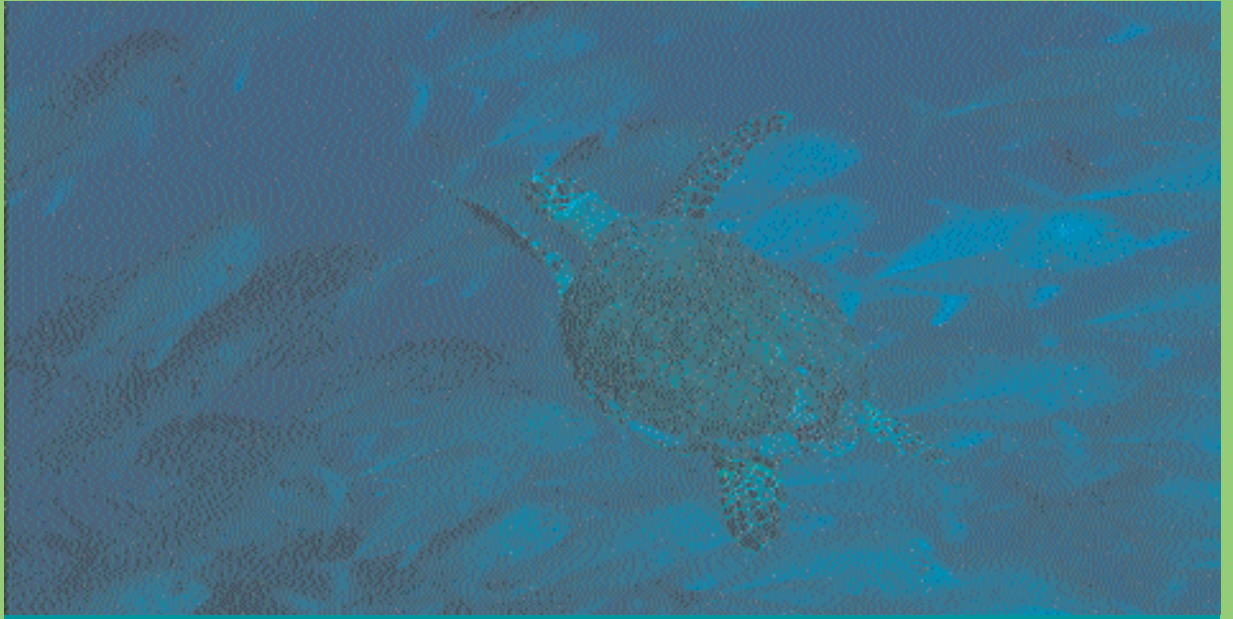
BY GORD HARRIS

New technology is changing the way giant screen films are made, but is newer necessarily better? A filmmaker ponders the pros and cons of filming digitally.

3:00 a.m.

A large format filmmaker tosses and turns in her sleep as she considers how to shoot her next film. Deep within, a raging debate flows back and forth—a dialogue between her head and her heart...

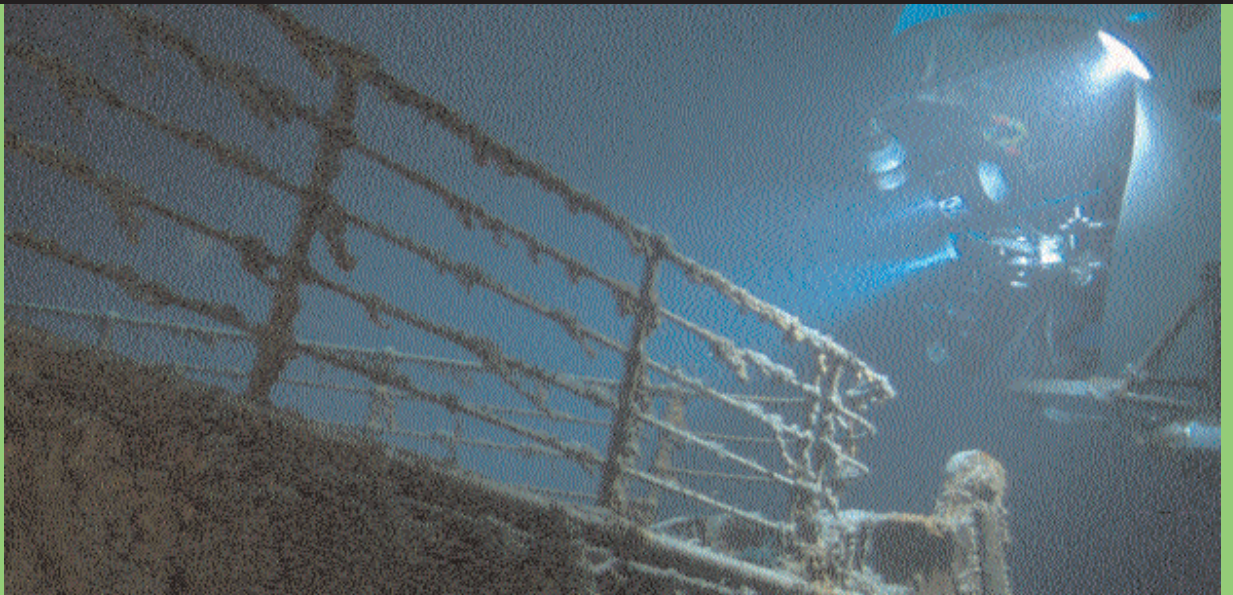
OCEAN WONDERLAND 3D PHOTOS COURTESY 3D ENTERTAINMENT



**(Above)** *Ocean Wonderland 3D*, the first giant screen film to be shot in 3D HDCAM, was produced by Francois Mantello and directed by Jean-Jacques Mantello of 3D Entertainment.

**(Below)** A *MIR* submersible observing the bow of the *Titanic* wreck in *Ghosts of the Abyss*. The film marked the maiden voyage for the Reality Camera System, which producer/director James Cameron invented in collaboration with his brother Mike Cameron, Sony, and director of photography Vince Pace.

GHOSTS OF THE ABYSS PHOTOS ©BUENA VISTA PICTURES DISTRIBUTION AND WALDEN MEDIA LLC. ALL RIGHTS RESERVED



**Head:** Look, you know how outrageously expensive it is to shoot 15 perf/70mm, especially 3D. Why don't you get with it and shoot digitally?

**Heart:** Yes, I know how much 15/70 costs, believe me—I hear the cash register ringing every time the camera rolls. At over \$1,000 a roll for three minutes of negative, we have to shoot very selectively.

**Head:** Sure, but that restricts you a lot. How many takes can you afford with a complex performance or unpredictable animal behavior? With HD you can get 45 minutes of footage for around \$100 a tape, so why wouldn't you shoot digitally?

**Heart:** Well, yes, HD may be cheaper up front, but there are hidden costs on the back end. First, you have to take the time in postproduction to transfer all those extra takes shot on tape, and then you need more time to evaluate and select them because the volume of your material is so much greater. But the real killer is when you transfer HD to film because film recording in 15/70 still costs dollars per frame. A 45-minute 3D film can cost almost half a million dollars to film record.<sup>1</sup> That's not so cheap after all, is it?

**Head:** No, but there are potential cost savings there. Some story films or character-driven films simply require a lot of takes, and shooting digital gives you that. You don't worry how many snapshots you take with your digital camera, but you don't take as many if shooting film, do you?

**Heart:** No, I don't, but making large format movies is not about taking snapshots. I am after the essence of the shot, so I care more about quality than quantity. Shooting a lot of takes can encourage sloppy thinking and work. I think it is better to plan more carefully and get exactly what you want on film in fewer takes. For most of my films, shooting selectively, being very conscious of my budget and limited film run-time, works just fine for me. And there is no free lunch—even if it is slightly cheaper to film digitally, I just don't think the quality is good enough yet for giant screen theaters.

**Head:** Maybe you don't think so, but lots of people do. If it is good enough for James Cameron and George Lucas, it is good enough for me. And in a test screening of Jean-Jacques and Francois Mantello's HD underwater film *Ocean Wonderland 3D*, the picture quality was rated "good" to "excellent" by 99 percent of the viewers, and 97 percent said they would definitely or probably recommend the film.<sup>2</sup> So maybe some purists think HDCAM isn't good enough yet for the big screen, but your average audience member won't notice and won't care.

**Heart:** I am not so sure about that. I

could easily see the quality difference between *Star Wars Episode II: The IMAX Experience*, which was shot in HD, and something like *Coral Reef Adventure* or any other MacGillivray Freeman film. I haven't seen Cameron's *Ghosts of the Abyss* yet, but I don't see how 1920 x 1080 pixels compressed 5:1 down to about 1.5K x 1K can ever look as sharp as film, no matter what you do to it. There is no free lunch in image quality, digital magic notwithstanding. And this is supposed to be an immersive medium, a "you-are-there" medium, and sharp, wide shots are important to that sense of being there. I just don't get that same impression of reality from HD blown up to large format.

**Head:** There is a lot more to film quality than just image quality, and a lot more to image quality than just resolution. The audience doesn't care how many "K" the film is if they aren't absorbed in the story and acting. They don't come to see the projector and don't care how many perforations or millions of pixels there are. They come to see a good story. If we shoot that digitally, we are more likely to get that. For one thing, your film cameras are so noisy it is almost impossible to act in front of them. And the noise can startle wildlife, too. For another thing, those large format cameras are so big and heavy it takes forever to move them, and you can't get many setups per day. Also, you simply might miss shots while taking all that time to reload.

**Heart:** Yes, you make some good points, but if you compare a full-up HD rig with a 15/70 camera, it actually isn't all that much smaller. In tests with James Neihouse we found we could usually set up and be ready to shoot 15/70 faster than HDCAM,



A chandelier in the opening that housed the grand staircase of *Titanic*, from *Ghosts of the Abyss*.

shooting side by side. Partly, this is because there are more cables and a separate color monitor needed to accurately set up color and exposure. There are so many options and decisions for video set up that it takes more time to make all the choices. With a known camera and known film stock, you know what you will get and can focus exclusively on the action being filmed. In terms of weight, we do have some 15/70 cameras light enough to film on Steadicam, or to get to the top of Mount Everest, for that matter. But you are right about camera noise—none of the 15/70 film cameras is very quiet without a sound blimp.

**Head:** Aha! Gotcha! But not only is digital quieter than film, the longer takes possible with videotape make it a lot easier to shoot long, contiguous shots for better performances, like music. And digital cameras don't suffer from vibration either—no film thrashing about—so they are steady as a rock on long telephoto shots.

**Heart:** Yes, that is true. I noticed that in the test we shot last week.

**Head:** And what about shadow detail? HD is phenomenally sensitive and good at pulling out shadow detail with a high effective exposure index around 320 to 400 for HDCAM.

**Heart:** Yes, that is true, too. It works pretty well underwater and under dark cliffs, I have to admit. But we can shoot low light, too, with fast stocks like the new Eastman Kodak Vision II 500 ASA film.

**Head:** But there is even more. With the small 2/3-inch chip size of HDCAM you tend to get phenomenal depth of field, which is especially helpful for 3D, as compared to film. So, more stuff stays sharp in the frame.

**Heart:** Yes, that is so, but while it is good for some things, it is horrible for others. As an artist and

cinematographer, I love to direct the attention of my audience in 2D films with shallow depth of field, so I can pull focus and throw backgrounds out of focus deliberately. That is hard to do with digital.



James Cameron and Bill Paxton in a *MIR* submersible in *Ghosts of the Abyss*.

**Head:** Not necessarily. You are talking as if shooting digital means only shooting with HDTV video. All the digital films we have been talking about have been filmed with Sony HDCAM 24p cameras. But there are other digital cameras emerging that are not limited to videotape, nor compression, nor small chip sets with large depth of field. Some of the newer digital cameras like the DALSA<sup>3</sup> or Lockheed Martin<sup>4</sup> achieve this by using larger-than-35mm CCDs. I have shot with a new digital camera with a chip larger than a 35mm frame that took fully interchangeable lenses for full control of depth of field. Some of these lab prototypes have 12–14 bits linear exposure range and up to 12 megapixels.

**Heart:** Okay, but that is kind of academic since no large format films have been shot that way yet, have they? These are still in the lab stage, not ready-to-rent production cameras.

**Head:** You're right, but nevertheless, HDCAM is not the only way of shooting digitally, and videotape is not the only way to store it. The new DALSA Origin 4KR camera captures directly to hard disk, uncompressed. But 24p is pretty good at keeping the motion characteristics of film cameras and is being used a lot these days in place of 35mm filming. A number of vendors have HDCAM cameras and 3D rigs for large format use. This is the 21st century, you know. You should get with the future and forget that old dinosaur film. Digital is where it's at. And it's only going to get better.

PHOTO COURTESY BILL HILL



The Lockheed Martin Digital Cine Experimental Camera. The 4K camera system features RGB channels at 12 megapixels each and a 24p frame rate.

## Head & Heart

**Heart:** Spare me the hype. I get enough of that from TV and Wall Street. Just because it is digital does not mean it is better than analog film. A lot more technology goes into making film stocks than you think, and film-stock technology is not standing still either. All of the major film vendors foresee ongoing developments and improvements in emulsion technology in the next 10 years, and film will continue to improve and evolve long after that, I think. In essence, they are involved in nanotechnology on the crystal and molecular level—pretty tricky stuff, although it is more chemistry and physics than electronics. And when I deal with a film stock I know and love, like Eastman 5245 color neg, I know exactly what to expect and what I will get, unlike the millions of variables and unknowns of how a compressed color digital image will be processed and output. We live in an analog world. Turning everything into digits does not always make things better. Frequently, it degrades things like dynamic range and color, as well as resolution. Just because film is over 100 years old does not make it passé or old. It is a mature, time-tested technology.

**Head:** You are hopelessly romantic and old-fashioned, you know. Hard disk storage and microelectronics are still generally following Moore's Law, and that means doubling power every 18 months or so. It won't take long before digital is both cheaper and better than film, even if film stocks continue to improve. I simply think digital is on a steeper improvement curve than film. Yes, film is a mature technology—too mature in my view. Let's capture and display large format films digitally. Think of the cost savings of an entirely digital chain.

**Heart:** Yeah, yeah, I've heard that all before, too. Digital projection is always just around the corner. It was five years away five years ago, and it is still five years away today. I am not against digital projection and, in fact, expect great things of it. But let's face it—it hardly can compete with small format 35mm film projectors today, let alone large format. The new 2K DLP projectors announced at NAB 03 (National Association of Broadcasters 2003 Conference) might help speed things up, but lack of standards, rapid obsolescence and high costs are still big problems. So don't divert me by saying all large format will be projected digitally by the time our film is released. No way.

**Head:** Well, maybe not, but you get some other nice stuff with shooting HDCAM digital. Cameron's 3D HD camera head was only 22 pounds. It also recorded sound and time code, which most 15/70 cameras don't. It was small enough to get a comfortable 3D interaxial of 69mm. It allowed for prolonged use on Steadicam, jib arm or handheld shooting, per director of photography Vince Pace.<sup>5</sup> Let's see you do all that with a 15/70 3D camera.

**Heart:** Yes, you're right, having easy, perfect

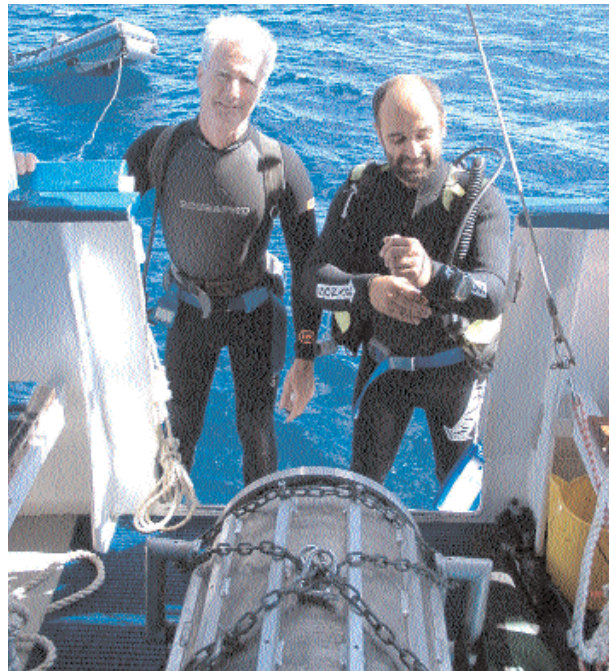
sound sync would be nice—multitrack, no less—and proper time code would make editing easier. But our methods of filming with 15/70 cameras work well, and a separate sound recorder is not a big deal. We can still use time code slates and stripe code in off-line editing for sound mixes and whatnot. The weight is a problem, but cameras like the new MSM 3D 30-perf single strip are lighter, if not exactly Steadicam ready. Smaller film cameras could be made for 3D use with better quality than HDCAM.

**Head:** Yes, but the small size of HD let the Mantellos and Cameron get their underwater camera housings and ROVs into really small places, getting shots that would be virtually impossible with large 15/70 underwater housings.

**Heart:** True enough. Someone needs to work harder at that for film cameras. But both these films compromise the 1.43:1 aspect ratio of 15/70, which is not as wide as 16/9. There are lots of small format underwater housings of similar size, though.

**Head:** Yes, but not many 3D, and all of them suffer from the need for frequent film reloads, which wastes lots of time and space. Nine cans of 15/70 film in a submersible takes up lots of room—one HDCAM tape could capture that many seconds and more. Stephen Low and Bill Reeve used it for *Volcanoes of the Deep Sea* animal close-ups from ALVIN.

**Heart:** True, but you are forgetting again about the



Gavin McKinney, *Ocean Wonderland 3D* director of photography, and director Jean-Jacques Mantello.

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## Head & Heart

price paid in image quality—not only resolution but also the greater color space of film and tolerance for under- and overexposure without blocking up blacks or clipping highlights. In side-by-side tests shooting waterfalls, we could clearly see the lower dynamic range of HD as compared to film. You have to control the lighting and expose very carefully to prevent blown out highlights. Often the three CCD chips will saturate at different levels, leading to color fringes on bright highlights. None of that happens on film. The prisms and lenses in

HD sometimes have color convergence problems, too—colored edges on bright white objects, if you look closely.

**Head:** You do go on and on about image quality, don't you? Give it a rest! I agree the color range of HDCAM is less than film, but what good are better-looking pictures if you don't get them in the camera? *Ghosts of the Abyss* DP Vince Pace reported 40 to 50 setups per day with HD at green screen Baja Studios.<sup>6</sup> Let's see you do that with large format film

cameras. And not only that, they could monitor results right after shooting with instant replay, which allowed the crew to see exactly what the director and DP had in mind.

**Heart:** I admit digital is great for compositing and effects work, such as the *Star Wars* franchise by Lucas. But we can do the same things with film by scanning selected segments—it just takes a little longer. Color is more natural and subtle on film. And we don't get any weird artifacts like you sometimes get with interlaced or compressed HD or frame rate conversions from 30 fps video to 24p with digital. And again, because we work more selectively, we don't have mountains of material to go through in post. Cameron reportedly had over 900 hours of material for *Ghosts of the Abyss*.

**Head:** Well, that means he had lots to choose from and could keep only the very best, so to me it is a plus, not a con.

**Heart:** Maybe, but I'm glad I didn't have to edit it or pay for postproduction. Let's see how it does in giant screen theaters. Cameron also is aiming for around 45 smaller format theaters, I hear. Those should be more tolerant of 2K images, I think. Two million pixels is not a lot for large format—5245 negative captures more than 66 million pixels.

**Head:** Well, I guess in the end it depends on where large format film is headed. If you really are passionate about ultimate picture quality for a "being there" documentary in some far-off location, maybe you are better off shooting on 15/70, or if you can't afford that, maybe 8/70 film. If you see repurposing Hollywood content as the death of the industry, you probably won't like digital HDCAM shooting of entire features, either. It likely even breaks down further as to whether you are more interested in commercial markets or educational and institutional markets. Release

windows are shorter, and large format filmmaker paybacks are less and less, so I see anything that gets more and better films out there as a good thing. HD might help, but even better new digital cameras might help more.

**Heart:** Maybe. I'm torn, too. I am not against newer hi-res digital cameras that more closely approximate the quality we have today from film. But I don't want to go to something digital that today is more suitable for small video monitors or home theaters than our giant screen large format theaters. Am I spoiled and elitist? Perhaps. I simply like seeing ultimate image quality, as this is inherently a wide-angle medium. I don't want to see large format films degrade from 15/70 quality pictures of over 8K horizontal pixels to video pictures of 2K or less. Sharpness and resolution do matter, no matter how fancy the new digital emperor's clothes or marketing campaigns are. Just because digital is newer than film

doesn't mean it is better. Everything has pros and cons. What we need to focus on is making digital better than film. Until it is, I am happier seeing it used for inserts or otherwise-hard-to-get sequences anchored within full 15/70 quality film images.

**Head:** I guess ultimately the large format market will decide. Enough debate, let's get some sleep. We'll decide tomorrow how to shoot our new film, okay? Goodnight, Heart.

**Heart:** Goodnight, Head. Peace. ■

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*Gord Harris of go-R&D Consulting is an independent technical consultant for large format education and entertainment with more than 25 years of 15/70 experience. Visit [www.go-rd.com](http://www.go-rd.com)*

## REFERENCES

1. Carolyn Ciardina, quoting James Cameron in "Return to the Deep," *Film and Video*, Oct. 2002, p. 30.
2. Francois Mantello, "Letter to the Editor," *LF Examiner*, Dec. 2002, p. 15. See also <http://www.oceanwonderland.com/>.
3. See <http://www.dalsa.com/dc/dc.asp> for 8 megapixel DALSA 4KR camera.
4. William Hill et al., "Twelve Megapixel 24p Electro-optic Cine Camera for Lockheed Martin Prototype," *SMPTE Motion Imaging Journal*, Apr. 2003, p. 110.
5. Carolyn Ciardina, "Return to the Deep," *Film and Video*, Oct. 2002, p. 30.
6. *Ibid*, p. 32.



Gord Harris uses DALSA's prototype 4K x 2K Origin digital camera to film the first NAB03 demo film.

## AN INTERVIEW WITH FRANCOIS MANTELLO, OCEAN WONDERLAND 3D EXECUTIVE PRODUCER

**Harris:** You were the first to shoot an entire large format movie in 3D HDCAM—Ocean Wonderland 3D. What were the main advantages that attracted you to shooting your underwater coral film digitally?

**Mantello:** Yes, we were the first to produce an entire large format 3D movie in HDCAM. In fact, when we started we did not even know about the Cameron project. As a producer, the main advantage is obviously the cost. But for the director, Jean-Jacques Mantello, and the underwater photographer, Gavin McKinney, it was both the ability to stay underwater longer, with 45 minutes of possible footage in one dive, and the freedom of movement thanks to a much smaller and lighter housing. It enabled us to achieve some underwater shots never seen before in large format, like following eagle rays for a whole sequence. But one of the most important issues is that we were able to check the result in 3D

on the boat after each dive. We were then able to decide if we needed to reshoot or not, on the spot. In film, you are often blind on this matter because you need to wait for the lab report.

**Harris:** Your film had a strong conservation message and showed a great variety of coral reef shots under natural lighting. While some critics complained that this limited color, the look is actually far closer to what you would see underwater without artificial lighting. How important was it to you to shoot this with HDCAM instead of with large format film?

**Mantello:** The choice of shooting with natural light was made after discussions with UNEP (United Nations Environment Program). In fact, we knew after some tests that the HD cameras would allow us to shoot with natural light, and we agreed upon this option because we wanted to show the underwater

world as it is. Usually, underwater films are shot with Hollywood-type lighting to give the maximum of colors in the picture, but in reality, five meters below the surface there are no more reds. All the divers who have seen the movie say it is the first time they really feel as if they were diving. It would not have been possible to shoot some of these images with large format cameras.

**Harris:** *As you know, the underwater housings for 15/70 3D large format cameras are typically very large, very heavy, and require a lot of time to launch and reload. How did shooting this film on videotape compare to shooting it on large format film directly?*

**Mantello:** With a 15/70 3D camera, you can only shoot three minutes before you have to come back to the boat. Then you need one hour to reload the cameras before going back. And every dive is costly. In our situation, we could shoot 45 minutes of footage without reloading the cameras. This allowed us to shoot a lot more footage, and we had no film costs for the shooting—just \$200 for each 45-minute HD tape.

**Harris:** *What difficulties did you have with HD versus film? What do you like least about shooting digitally?*

**Mantello:** When we decided to shoot in 3D HD, we thought that it would be easier than it was. There were many new technical challenges we had to overcome. Now that we have done it, our next project will probably be shot pretty much the same way, using what we have learned and the tools that we developed to improve our production process.

**Harris:** *While shooting on tape is far cheaper than shooting large film, the costs to transfer HD via film recording onto 15/70 are not inconsequential. Where and how did you do editing and film-out for your film?*

**Mantello:** It is true that since we were the first to produce a film in that format, we had to create all the necessary tools to edit the movie because nothing readily existed on the market. We did this according to the specifications of the director, who has been working in the digital field for many years. With our computer and software experts, we had to develop a full 3D HD editing suite with a network of workstations, and we created a 3D HD display allowing us to check the film in real-time, which is one of the most important issues in the 3D editing process.

The most costly operation was the final transfer of

the digital files to the 65mm negative. Nobody had ever done the full transfer of a movie from digital to film. We had to deal with several issues—for example, the digital and film color corrections. To perform this operation we decided to buy a Nitro Xtreme HD film recorder from Celco. They have been a great asset as they helped us to perform all the necessary tests and adjustments before starting the final recording. All the lab work was done with Gulliver, and both teams worked perfectly to deliver the final product in less than two months.

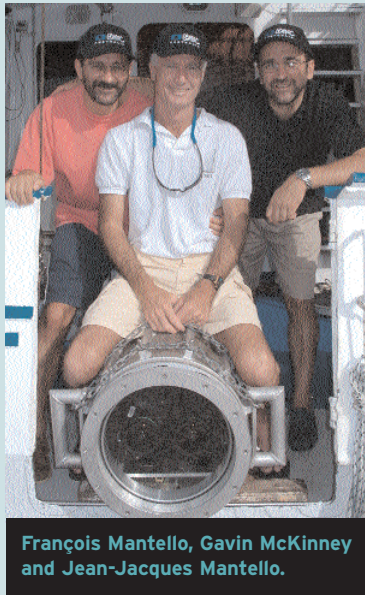
**Harris:** *HDCAM has limited resolution, but filming underwater and in 3D makes that less obvious. In the December LF Examiner you commented on some very positive test screening results. Do you think average audiences even knew they were looking at images filmed digitally instead of with large format film, and do you believe HDCAM has sufficient quality for regular large format films that are perhaps not underwater or 3D?*

**Mantello:** Yes, technically speaking there is less resolution in HD than 15/70 film, but the resolution is something very subjective. In HD 3D, you are

watching a picture of about 4K resolution (2K per eye), which is similar to a lot of CGI which is done in large format in 2K, then resized in 4K. As purists, technical people may argue on that point, but the most important fact is that the public does not see the difference. In our test screenings, we asked more than 500 people if the quality of the film was good, and 97 percent answered yes. Has the viewing public complained about picture quality on *Ghosts of the Abyss*? We think HDCAM is an exciting opportunity to help the large format world produce films that cost less and, therefore, are potentially more profitable. Obviously, this will encourage more productions, which is good for theaters.

**Harris:** *HDCAM is only one way of shooting digitally, albeit the furthest along commercially. Are you interested in going beyond HD and trying other new digital cameras? If so, what features would be most important to you?*

**Mantello:** Yes, for sure we would like to go beyond HD, but only if the new cameras with higher resolution are not as big as a 15/70 3D camera. It depends on what kind of movie you are shooting, but if you lose the flexibility to have a better resolution, then you lose one of the best assets of digital.



François Mantello, Gavin McKinney and Jean-Jacques Mantello.

## AN INTERVIEW WITH VINCE PACE, GHOSTS OF THE ABYSS DIRECTOR OF PHOTOGRAPHY

**Harris:** *Ghosts of the Abyss* takes giant screen audiences places they couldn't previously see with 15/70 cameras. What did you like most about filming in 3D HD as opposed to 15/70 film?

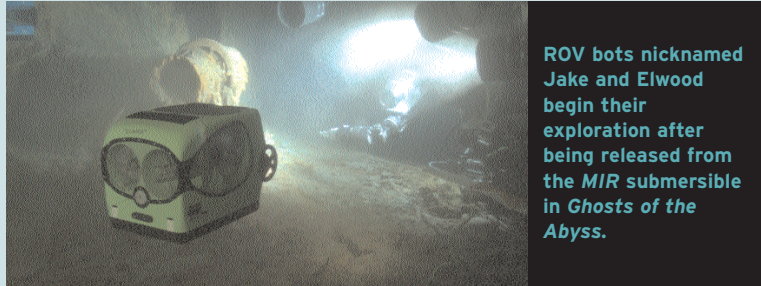
**Pace:** In many ways, I find the greatest attraction to the 3D HD format is the ability to record experiences that the 15/70 camera, due to its limitations, is not able to capture. I have witnessed the debate with film versus HD for some time, and I personally don't believe it is a valid argument. It would be for me the same as having a discussion about a beautiful model and an athlete. The 15/70 film format can create some of the most beautiful pictures I have ever seen. But what excites me is some of the adrenaline that 3D HD can put up on the screen. Being more compact and shooting at an F2.2 certainly has its advantages when you are going for a more dynamic product.

**Harris:** *I understand that you and James Cameron developed the 3D rig together for repackaged Sony 950 cameras. Excluding the underwater housing, how big is that whole setup with lenses, and how much did it weigh?*

**Pace:** From the onset, the project goal was to create a rig that was small and lightweight enough to be handheld, placed on a jib, and used on a Steadicam. This meant a complete design from the ground up to minimize its size and weight. In a handheld basic configuration the system weighs about 26 pounds and is about the size of two loaves of bread.

**Harris:** *HDCAM has a myriad of options for camera setup, color, contrast and so on—many variables to deal with. Film, in contrast, has a fairly well-defined look for a given emulsion and lens. How did you decide what the optimum setup was for the HD cameras for each shot?*

**Pace:** This is where I believe my most significant contribution as director of photography rested. From the beginning I was determined to treat the cameras as a



ROV bots nicknamed Jake and Elwood begin their exploration after being released from the *MIR* submersible in *Ghosts of the Abyss*.

film stock with very little deviation. I come from the background where potentiometers were replaced by menu boards. This is a significant advancement for dialing in the look of the camera; however, I believe that many adjustments should still be a function of post and not acquisition. Working with Dale Hunter, our HD engineer, we established a baseline for the cameras and diligently maintained it. As with film, our efforts concentrated on the creative elements, and we tried not to slow ourselves down by attempting to paint every scene through the electronics.

**Harris:** *When you were filming from the subs or ROVs, did you set exposure based on metering, or did you judge the best exposure from the HD monitor? Did you find HD easier or more difficult to expose consistently than film?*

**Pace:** There is the theory WYSIWYG—what you see is what you get—that haunts electronic cinematography. That assumes anyone can get there. We exposed on our monitors, but that would be just one element of the complete process. We consistently made sure our monitors were set up correctly, and viewing the camera is not as simple as a one-viewfinder operation. At any one time, we have a minimum of four monitors checking our output. The advantage is not in consistent exposure—the true advantage is the increased ability it gives you to artistically light your image. Jim Cameron and I would work together for 10 hours straight on each dive, choreographing this dance between subject, camera position and lighting position.

**Harris:** *What did you like least about filming with Sony CineAlta 24p HD as opposed to film? What were your biggest worries? What would you like to see improved in the future?*

**Pace:** Anybody who thinks it is easy to shoot in the electronic medium should stay at home. Do I miss the stability of a mechanical medium? Yes. Do I miss the depth of resources, whether it be experienced individuals, accessories or support equipment? Yes. However, when you get the formula to work right,

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Vince Pace, director of photography on *Ghosts of the Abyss*.

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and the team comes together like a seasoned pit crew, the results are stunning. If there were one thing I would improve on, it would be to reduce the cabling dependency.

**Harris:** *I understand you just finished filming Spy Kids 3 with your 3D system. Do you hope to do more large format film projects with the same rig?*

**Pace:** Currently, Robert Rodriguez is filming his next installment of *Spy Kids* using our system. I am working with him using a real-time 3D viewing system to interpret the 3D look of the film. His goals are different from *Ghosts of the Abyss* since he is releasing this in anaglyph, which should work well in the market the film is directed towards.

**Harris:** *If a new, upcoming large format filmmaker were contemplating whether to shoot digitally or with 15/70 film, what advice would you have?*

**Pace:** New? Upcoming? Large format filmmaker? Wouldn't that be like three strikes and you are out? All kidding aside, I do have my concerns when we talk about this electronic medium. Right now, I truly believe it works when the right ingredients come together to make a film. Is the electronic medium going to make the film better for this filmmaker? The answer is no. The determining factor will be in the story or the subject and whether 3D HD or 15/70 will better represent their subject. What we haven't touched on yet is that the 3D HD which Jim Cameron and I are working towards is not as conventional as most people assume. The dynamics of the system allow us to be much more third person or immersive. Our intent is not to bring the experience to the person but rather bring the person to the experience in a very immersive and captivating way. If I can make you forget the show is in 3D after the first 10 minutes of the show, I am on the right track. We would like to see product out there that holds up for its content and storyline as compared to the fact it was shot in 3D HD. Give me a filmmaker with the same goals, and I have lots of advice for him or her. ■