

Preparatory Event 2009 featuring Full Dome & Stereoscopic Movies  
for  
The International Festival of Scientific Visualization

**International Symposium**  
for  
**Immersive Science Visualization**

**Program & Abstracts**

**22-23 March 2009**  
**National Astronomical Observatory of Japan,**  
**Mitaka, Tokyo**

**Hosted by Organizing Committee for Preparatory Event 2009**

**Science Culture Promotion Unit through Astronomy Image (NAOJ)**

**Japan Science Foundation / National Astronomical Observatory of Japan**

**Composed by Shoichi Itoh, Akira Hirai, Hirotaka Nakayama**  
**(Science Culture Promotion Unit through Astronomy Image, NAOJ)**

# International Symposium for Immersive Science Visualization 2009

Sunday 22 March 2009

at Large Seminar Room

		発表者	演題
A-0	10:00 - 10:10	Hidehiko Agata (NAOJ)	Opening Address
A-1	10:10 - 10:30	畑田豊彦 (立体映像産業推進協議会会長・東京眼鏡専門学校校長)	立体映像産業推進協議会の活動紹介と本会会員による開発事例
		澤田一哉 (パナソニック電工(株)技監)	
A-2	10:30 - 10:45	Toshiyuki Takahei (Oriharcon Tech.)	About the Synra Dome of the Science Museum of Tokyo
A-3	10:45 - 11:00	Takashi Wada (Miraikan)	About the Gaia Dome of the National museum of emerging science and innovation (仮題)
A-4	11:00 - 11:15	Takaaki Takeda (NAOJ)	About the 4D2U Theater of the National Astronomical Observatory of Japan (仮題)
A-5	11:15 - 11:30	Shawn Laatsch (IAC)	3D Stereoscopic Visualization at Imiloa Astronomy Center - New Datasets from the Maunakea Observatories
A-6	11:30 - 11:45	Muller Hitoshi ( Musashino Art University, Imaging arts and sciences)	Visualize the reconstruction of early embryonic zebrafish

12:00 - 13:00	BREAK
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B	13:00 - 13:30	Ed Lantz (Visual Bandwidth, Inc. /Spherical Media Group)	Challenges of Immersive Scientific Visualization in the World
C-1	13:30 - 13:50	Hiroyasu Furuse (Sony Corporation)	Immersive Display System using Sony 4K SXRD Projector
C-2	13:50 - 14:10	Hideo KUROGANE (Victor company of Japan, LTD.)	Introduction to immersive projection display : DLA-SH4K projector
		Ichiro NEGISHI (Victor company of Japan, LTD.) Tadashi YANO (Victor company of Japan, LTD.)	
C-3	14:10 - 14:30	Nobuyuki Shibano (Panasonic)	Development of CyberDome - a Scalable Immersive Multi Projection Display with a Dome
C-4	14:30 - 14:50	Kiyonobu Fukusato (Barco)	From BARCO (仮題)

14:50 - 15:00	BREAK
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International Symposium for Immersive Science Visualization 2009

D-1	15:00 - 15:15	Shoichi Itoh (NAOJ) Hidehiko Agata (NAOJ) Tomoya Nagai (NAOJ) Hiroataka Nakayama (NAOJ) Seiichiro Naito (NAOJ) Akira Hirai (NAOJ)	What is our "Science Culture Promotion Unit through Astronomy Images"?
D-2	15:15 - 15:25	Yuma WATANABE Masaru HIROHASHI Masanori IUCHI Mai YONEZU Hitoshi MIURA Yukio ANDO	The Sun
D-3	15:25 - 15:35	Akira MIURA Hiroaki KOKUBU Ginko MOCHIZUKI Takaaki TAKEDA Hiroataka NAKAYAMA	Supernova
D-4	15:35 - 15:45	Takahiro TAKE Jun HASHIMOTO Noriko TAKABE (Libra Corporation) Toshiyuki TAKAHEI (Oriharcon Tech.) Hiroataka NAKAYAMA (NAOJ)	Exoplanets
D-5	15:45 - 15:55	Hanae Inami (The Graduate University for Advanced Studies) Hatsuki Matsuoka (National Museum of Japanese History) Kazutaka Koike (The Graduate University for Advanced Studies) Susumu Oka (The Graduate University for Advanced Studies) Isshi Tabe (Libra Corporation) Kaoru Kimura (Science Museum of Tokyo) Seiichi Sakamoto (JAXA-ISAS)	"What do the Incan Constellations tell us?"The Views of Anthropology and Astronomy in a Planetarium Session

15:55 - 16:00	BREAK
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at 4D2U Theater, Large Seminar Room and outside of LSR

16:00 - 18:30	4D2U Theater Demonstration, Vender Exhibit
18:30 - 20:30	Buffett Dinner
19:00 - 20:00	Special Demonstration at Dome

Coordinator: Hiroataka Nakayama (NAOJ)

# International Symposium for Immersive Science Visualization 2009

Monday 23 March 2009

at Large Seminar Room

E-1	9:00 - 9:15	Isshi Tabe (Libra Corporation)	Immersive Dome Theater in Japan
E-2	9:15 - 9:45	Carter Emmert (AMNH)	Planetarium Evolution driven by Scientific Data Visualization
F-1	9:45 - 10:05	Terence Mutagh (E&S Computer Company)	New Technology from E&S computer company
F-2	10:05 - 10:25	Steven T. Savage (Sky-Skan Inc.)	Sky-Skan Update - Projects, Products and the Future
F-3	10:25 - 10:45	Takayuki Ohira (Ohira Tech.)	Synchronization between the MEGASTAR and a digital planetarium
F-4	10:45 - 11:05	Staffan Klashed (SCISS ABA)	Data visualization and show production
F-5	11:05 - 11:25	Toshiyuki Takahei (Oriharcon Tech.)	Quadratura and MITAKA
F-6	11:25 - 11:45	Haruki Kamiyama (AstroArts)	The new style of digital planetarium,-- from field use to dome projection
F-7	11:45 - 12:05	Junji Nishigaki (Konica-Minolta Planetarium) Kazuhiro Takeuchi (Konica-Minolta Planetarium) Nobuhiro Ishimaki (Konica-Minolta Planetarium) Mitsuaki Shimo (Konica-Minolta Planetarium) Akira Fukushima (Konica-Minolta Planetarium) Hiroaki Ueda (Konica-Minolta Planetarium)	Development of a 2.4K Full Dome Projection System using a fisheye lens, Super Media Globe II

12:05 - 13:00	BREAK
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G-1	13:00 - 13:15	Kunitake Kaneko (DMC, Keio University)	4K transmission experiments at Keio DMC
G-2	13:15 - 13:30	Hirota NAKAYAMA (NAOJ/Chiba University) Yasuyuki ICHIHASHI (Chiba University) Nobuyuki MASUDA (Chiba University) Tomoyoshi ITO (Chiba University)	Three-Dimensional Animation by Electro-Holography
G-3	13:30 - 13:45	Masaru Hirohashi (Astrolab)	Telescope -The Door To The Universe-
G-4	13:45 - 14:00	Yutaka Kagaya (Kagaya Studio)	Production of a dome movie "The Celestial Railroad" and our future approach
G-5	14:00 - 14:15	Hiroshi Koike (Walk)	Space Elevator
G-6	14:15 - 14:30	Hiromitsu Kohsaka (Live Company Ltd.)	Hayabusa -Back To The Earth-
G-7	14:30 - 14:45	Terence Mutaugh	From E&S
G-8	14:45 - 15:00	Steven T. Savage (Sky-Skan Inc.)	Immersive movie making in fulldome - The making of Awesome Light - 3D Stereo Photography in Hawai'i, from the Sea to the Summit of MaunaKea's Observatories.

International Symposium for Immersive Science Visualization 2009

15:00 - 15:10	BREAK
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H	15:10 - 16:30	Panel Discussion-Moderated by Toshikazu Ebisuzaki	Carter Emmert
			Toshiyuki Takahei
			Ed Lantz
			Staffan Klashed
			Steven T. Savage(The Future of Immersive Scientific Visualization - Thoughts on Live and Pre-rendered Sci Viz)
			Terence Mutaugh
I-1	16:30 - 16:40	Hidehiko Agata (NAOJ)	Our Achievements at Full Dome & Stereoscopic Movies Preparatory Event
I-2	16:40 - 16:50	Shoken Miyama (NAOJ)	Closing Address

**Symposium Coordinator : Kenji Watanabe and Isshi Tabe**

## **A-0 (10:00-10:10)**

**Opening Address**

**Hidehiko Agata (NAOJ)**

## **A-1 (10:10-10:30)**

**Activity of Consortium of 3-D Image Business Promotion**

**Kazuya Sawada (Panasonic)**

題目：立体映像産業推進協議会の活動紹介と本会会員による開発事例

立体映像産業推進協議会 会長 畑田豊彦（東京眼鏡専門 学校校長）

法人会員 澤田一哉（パナソニック電工（株）技監）

講演概要

立体映像産業推進協議会※（略称：立体協、<http://www.rittaikyo.jp/>）は、立体映像関連技術の産業化に資することを目的として、2003年5月に設立された任意団体である。参加会員に対して立体映像関連のビジネスチャンスを提供するべく、「出会いの場」をキーワードに、シンポジウム、イブニングサロン、立体 Expo（展示会、技術セミナー）など、本会の内外でさまざまなインキュベーション活動を推進している。本講演では、立体協のこれらの活動について紹介すると共に、その活動がきっかけとなって生まれた、立体協会員の開発事例について紹介する。

※英語標記は Consortium of 3-D Image Business Promotion

Consortium of 3-D Image Business Promotion ([Rittaikyo http://www.rittaikyo.jp/](http://www.rittaikyo.jp/)) is an arbitrary group established aiming to contribute to the industrialization of the technology related to the stereoscopic images in May, 2003. "Place of meeting" is a keyword in promoted to offer the business opportunity related to the stereoscopic images to the participation member and a variety of incubation activities are promoted in both inside and outside of this meet consortium such as symposium, evening salons, and the Exposition (exhibition and technological seminar). In this lecture, we introduces the development case with the consortium member who introduces such activities.

## **A-2 (10:30-10:45)**

**Synra Dome**

**Toshiyuki Takahei (Oriharcon Tech)**

In the last summer 2008, the first public stereoscopic dome theater 'Synra Dome' was opened. Based on 4D2U and other new technologies, it represents cutting edge scientific visualizations and various usages of such real-time immersive environment. These days we play stereoscopic dome contents about astronomy and life science as weekday programs, and scientific live show 'Universe' by scientists on weekend. We're also holding public technical workshops as a free space to discuss the possibility of immersive visualization and to seek new collaborations. The quite new things just began in this Synra dome, and always happen here.

## **A-3 (10:45-11:00)**

**About the Gaia Dome of the Miraikan (仮題)**

**Takashi Wada (Miraikan)**

N/A



## **A- 4(11:00-11:15)**

### **About the 4D2U Theater of the National Astronomical Observatory of Japan**

**Takaaki Takeda (NAOJ)**

NAOJ four dimensional digital universe (4D2U) project's goal is to visualize astronomical data in a way that helps watchers feel as if they are witnessing the unfolding of the universe. For this goal, we have developed a viewers of astronomical catalogues, and made movies from simulations which astronomers do for their research. Here, we introduce the stereo-scope we have developed.

We also describe our visualization method for large scale N-body simulations, which is one of the most popular simulations in astronomy. We are currently tackling to visualize fluid simulations and we briefly describe our attempts.

## **A-5(11:15-11:30)**

### **3D Stereoscopic Visualization at Imiloa Astronomy Center – New Datasets from the Maunakea Observatories**

**Shawn Laatsch (Imiloa Astronomical Center)**

3D Stereoscopic Visualization at Imiloa Astronomy Center – New Datasets from the Maunakea Observatories Imiloa Astronomy Center has the world's first full dome 3D stereoscopic planetarium. This was installed in December of 2007 and opened in 2008 to the public. Our facility has partnered with the observatories on Maunakea to bring new datasets into the planetarium. These have been used by astronomers to present their findings to the general public and are starting to be used by astronomers for research into science visualization. In the paper I will show some of the datasets and discuss the methodology and significance of datasets from CFHT, Joint Astronomy Centre, and others. This data is in multiple wavelengths of the spectrum. We also have produced a 3D Stereoscopic planetarium production called Awesome Light – An Update from Maunakea observatories. This program features 3D full dome time lapse footage of Subaru Observatory, CFHT observatory, and Gemini Observatory. I'll give a brief description of the program and methodology for creating the footage for the digital full dome.

## **A-6 (11:30-11:45)**

### **Visualize the reconstruction of early embryonic zebrafish**

**Muller Hitoshi,( Musashino Art University, Imaging arts and sciences)**

The German scientist group has succeeded in reconstruct the early embryonic development of zebra fish by using scanned light sheet microscopy (P.Keller et.al,Science 2008,vol.322,no.5904,pp.1065-1069). With the result, we can obtain the digital data including zygotic cell's nuclei positions and their time development. The presenter is developing a movie to visualize this "digital embryo" with the cooperation of National Institute for Basic Biology and the German researcher.

## **B (13:00-13:30)**

### **Challenges of Immersive Scientific Visualization in the World**

**Ed Lantz (Visual Bandwidth, Inc./ Spherical Media Group)**

Scientific visualization is regarded as a tool for scientists to represent, investigate and understand complex data. This common definition does not emphasize the value of scientific visualization for nonscientists. Much of the knowable universe can only be experienced and understood through scientific visualization. Making such visualizations accessible to the public allows them to share in our expanding view of the universe. Indeed, expanding the knowable universe, not just for scientists, but for all humanity, might be considered one of the key reasons for publically funded science. Through education, storytelling and deeply engaging art, nonscientists assist in the assimilation of this knowledge into deeper personal and cultural meanings - essentially fueling an expanded cosmology or "world view" - in ways that scientists cannot. Group immersive visualization environments, particularly "fulldome" or digital dome theaters, are powerful venues for the dissemination and assimilation of new scientific understandings into personal and cultural cosmologies. Recent trends in digital planetarium programming are discussed and future directions for scientist/nonscientist collaborations are suggested.

## **C-1 (13:30-13:50)**

### **Immersive Display System using Sony 4K SXRD Projector**

**Hiroyasu Furuse (SONY)**

Sony has been produced 4K SXRD projector since 2004. It's installed not only digital cinema theater, but also a lot of entertainment facility like planetarium, R&D center, simulation industry and museum. Sony introduces dome & 3D stereo application success story using 4K SXRD projector. In addition, Sony gives brief introduction of "Sony 3D Cinema Projection System".

Hiroyasu Furuse

Product Planning Manager, Projector Planning Section, Planning Division

Marketing Manager, SXRD Section, Display Marketing Division

B2B Solution Business Group, Sony Corporation

## **C-2(13:50-14:10)**

### **Introduction to immersive projection display : DLA-SH4K projector**

**Harry Kurogane, Ichiro NEGISHI and Tadashi YANO (Victor company of Japan, LTD.)**

We have developed new projection display (DLA-SH4K) with liquid crystal on silicon device(D-ILA™). High resolution as 4096x2400 is considered by human eye resolution and high contrast ratio as 10,000:1 are good enough to create images for various kinds of immersive image applications such as full-dome system, 3D applications etc. Also this projector is suitable not only for research application, but also for practical applications because of special features.

## **C-3(14:10-14:30)**

**Development of CyberDome – a Scalable Immersive Multi Projection Display with a Dome**

**Nobuyuki Shibano (Panasonic)**

We introduce a system “CyberDome” with a large hemi spherical screen of 8.25 meter diameter, 18 projectors and 19 PCs, where many people can experience seamless, high-resolution stereoscopic images which are wide enough to cover the field of people vision. This CyberDome has a real-time rendering software including distortion free, edge blending, and synchronizing function. Now it is absolutely necessary to plan & design many urban renewal projects.

## **C-4(14:30-14:50)**

**From BARCO**

**Kiyonobu Fukusato (Barco JAPAN)**

N/A

## **D-1(15:00-15:15)**

**What is our “Science Culture Promotion Unit through Astronomy Images”?**

**Shoichi Itoh, Hidehiko Agata, Tomoya Nagai, Hirotaka Nakayama, Seiichiro Naito and Akira Hirai (Public Relation Center, National Astronomical Observatory of Japan)**

National Astronomical Observatory of Japan (NAOJ) has started a new project, the Science Culture Promotion Unit in collaboration with Mitaka City Government since 2007.

The aim of the project is to help bring up (1) talents who create astronomical visualized images with scientific accuracy based on theoretical calculation, and (2) talents who popularize science for people in general, through astronomical images that National Astronomical Observatory keeps in store, such as the contents of 4D2U, the four-dimensional digital universe project, and the images taken by Subaru Telescope and others.

This project has this for its objective that the contents and techniques using them will have the added value in next generations. NAOJ tries to make a contribution towards Mitaka City becoming the internationally fit place for creating the three dimensional contents in the future.

## **D-2(15:15-15:25)**

**The Sun**

**Yuma WATANABE, Masaru HIROHASHI, Masanori IUCHI, Mai YONEZU, Hitoshi MIURA, and Yukio ANDO (NAOJ)**

Our movie's theme is "the Sun". We made the movie as an omnibus film. We, four students, made different scenes respectively, and compiled them with an original ambient music, which is also composed and arranged by us (Watanabe and Yonezu). The movie begins with a images of the Sun, drawn in the Middle Age, followed by scenes of

the solar eclipse, and visualization of the solar magnetic field lines, taken by Hinode space craft launched by JAXA. Our movie does not look like a conventional scientific documentary, since our intension is to enlarge people who can enjoy scientific movies. The visual tools we used are Maya, 3dsMax, Photoshop, After Effects, and Premiere, and the audio tools we used are Yamaha Motif and Pro Tools. Completing a movie brings us a valuable experiences. We would like to make new scientific movies in near future.

## **D-3(15:25-15:35)**

### **Supernova**

**Akira MIURA, Hiroaki KOKUBU, Ginko MOCHIZUKI, Takaaki TAKEDA, and Hiroataka NAKAYAMA, Members (Science Culture Promotion Unit through Astronomy Image)**

We have compiled episodes related to supernovae. The movie consists of several parts. Part 1 describes historical episodes. In AD 1006, There appeared a very bright guest star (supernova) in the constellation of Lupus, as was described by many observers. The star was also seen in Heian-kyo, the capital of Japan in those days. Visualised in this part is a fly-through of Heian-kyo and a vision of the Four Symbols. Part 2 describes astronomical episodes. X-ray astronomy satellite "Suzaku", which was named after the bird guardian of the South (one of the Four Symbols), took a picture of the millennium of the supernova of AD 1006. This part also shows the structure of "Suzaku" and the X-ray telescopes that "Suzaku" mounted. Part 3 is a gallery of astronomical images: the ROSAT X-ray all sky map and pictures of supernova remnants in various wavelengths. Part 4 describes the beginning of a supernova explosion. This part shows a typical figure of the inner structure of a star just before the explosion, and then visualises a computer simulation of supernova explosion. The last part shows ASTRO-H, the new exploration X-ray telescope, and another Image gallery superimposed on credit titles.

## **D-4(13:35-15:45)**

### **Exoplanets**

**Takahiro TAKE, Jun HASHIMOTO, Noriko TAKABE, Toshiyuki TAKAHEI, and Hirotaka NAKAYAMA, (Science Culture Promotion Unit through Astronomy Image)**

We have compiled "exoplanets" to stereoscopic movie of the dome at Creator graduates of training courses in production. planets outside the solar system probe is very hot at current astronomy.

Subaru telescope is challenge the finding with AO and other equipment. AO is a equipment for fluctuation of atmosphere to correct, that can get a sharp image of stars from Earth. This movie focuses on these activities at Subaru telescope, and yet can do to realistic sensation movie by using the stereoscopic method.

## **D-5(15:45-15:55)**

**"What do the Incan Constellations tell us?" The Views of Anthropology and Astronomy in a Planetarium Session**

**Hanae Inami (ISAS) , Hatsuki Matsuoka (National Museum of Japanese History), Kazutaka Koike (NAOJ-Nobeyama), Susumu Oka (National Museum of Ethnology), Isshi Tabe (Libra Co.), Kaoru Kimura (Science Museum, Tokyo) and Seiichi Sakamoto (JAXA)**

Science communication is becoming a familiar way to promote science. However this is often not very effective for people who abominate science. So to overcome this, we have developed a new way to interest these people in science. Instead of talking directly about science, we interest them using ancient mythological stories about the night sky. In our planetarium session, we introduce dark clouds in the Milky Way, starting with a story about how, in Incan folklore, the shapes of these clouds signified animals. Then we explain that more recent research has shown that these clouds are the cradles of newborn stars. Our goal is to present things in a way that is interesting to a wide range of people, from anthropologists to astronomers, and everybody in between.



## **E-1(09:00-09:15)**

### **Immersive Dome in Japan-Overview**

**Isshi Tabe (Libra Corporation)**

There are over fifty immersive digital dome theater in Japan. The numbers growth rate of digital theater increases year by year . The unique purpose of immersive dome theater, especially many sites originated from planetarium is for astronomical education and popularizing science. As long as the immersive dome theater standing this region, the system need next four functions. 1) night Sky Simulator, 2) Full dome “power point like” presentation, 3) full dome movie player, 4) space engine. We can choose many ways how to project full or partial on dome, single lens system or multi projector systems. Make decision will be done by consideration of initial cost they can pay, shorten life of digital equipments, running cost. In my talk, the situation of immersive dome in Japan will be discussed.

## **E-2(09:15-09:45)**

### **Planetarium Evolution driven by Scientific Data Visualization**

**Carter Emmert (AMNH)**

Planetariums as invented by the Zeiss company in the 1920's pioneered the immersive interactive projection display environment as a diorama of sky and established a medium of public opti-mechanical, analog data visualization.

A decade of digital dome display has now explored a range of immersive imagery challenging the notion of what a planetarium is, not unlike the widespread use of laser shows and IMAX in the 1970's where planetariums became shared media theaters with significant departure from their early tradition of recreating sky and trends in tilted theater design increased.

Full dome computer graphic planetariums are now capable of immersively placing an audience into any visual environment as digital media tools and methods are perfected for greater ease of use. The experience can be anything, ranging from the purely imaginary, creative artistic to the artistically crafted representation of reality through capture, illustration and scientific data visualization. All these media produce digital "data", yet not all these categories derive as imagery from measurement or simulation as "scientific data" visualization does.

The ability to educate by plotting the results of science goes back to most simple of graphical representations, but the revolution in graphical technology has allowed us represent these results in ever more highly produced images, animations, interactives, immersive displays such as planetariums, with globally networked potentials for explanation. The coupling of graphics to simulations in real-time allows the specialist, teacher and student to all share in examining models of the physical universe.

Talk will focus on the structure of the production process employed by the American Museum of Natural History in crafting space shows from data visualization with international collaboration.

## **F-1(09:45-10:05)**

### **New Technology from E&S company**

**Terence Mutagh(E&S)**

Evans & Sutherland has been a world leader in bringing new technology to the domed and digital theatre community for many years .In this talk he will review what E & S has done in the past to promote and invigorate this community with new ideas and new technology. Moving to the present he will look at how the co-operation between Evans & Sutherland and their strategic partners , Goto Inc. of Japan is bringing new and exciting products to enable operators of theatres and their visitors to experience in ever more interesting and enjoyable ways, the universe and the world around us.

## **F-2(10:05-10:25)**

### **Sky-Skan Update Projects, Products and the Future**

**Steven T. Savage (Sky-Skan)**

Sky-Skan had its best year ever in 2008, and 2009 looks to be a year of unprecedented achievements. Many new projects around the world are shaping the fulldome community with new innovations including spectacular 2D and 3D stereo content, very high brightness 3D stereo fulldome systems, and new digital systems. Continued development of scientific visualization content for Astronomy, Earth Sciences, Chemistry, Biology, and Physics are a large part of Sky-Skan's growing science department.

Entertainment venues are discovering the fulldome experience rich with art and music that cannot be expressed by any other medium.

In the world of Digital fulldome, we have been busy since the first SkyVision fulldome showing over 10 years ago at London IPS. Even after 10 we are just scratching the surface of new possibilities in story telling with science, art and music which leave indelible memories on visitors under the dome.

## **F-3 (10:25-10:45)**

**“Synchronization between the MEGASTAR and a digital planetarium”**

**Takayuki Ohira (Ohira Tech)**

The hybrid system of an optical planetarium and a digital planetarium is being attached importance.

The optical planetarium MEGASTAR projects the super fine starry sky with more than 10 million stars. I have developed innovative solution “Auto Geometry” that synchronizes the MEGASTAR with a digital planetarium automatically. The Auto Geometry technology which uses a sensor mounted on the optical planetarium to capture objects of a digital planetarium and fixed stars of the optical planetarium makes it possible for automated synchronization with the computer.

## **F-4(10:45-11:05)**

### **Data visualization and show production**

**Staffan Klashed (SCISS)**

In this presentation we will focus on the latest in Sciss' two new products from the Uniview platform. First we will take a look at visualization of satellite imagery and data in the latest version of Uniview Theater. This will be followed by a run-through of our new show creation product, Uniview Producer.

In Theater we will explore some recent planetary datasets from both Earth, Moon and Mars. We will also take a quick peek into the future to see what we can expect in the coming years in the area of geospatial data generation. In Producer we will take a look at our new graphical non-linear editing toolset for quickly transforming interactive data visualization into linear shows. We will also explore how interactive and linear elements can be combined in the same show.

The presentation will end with a discussion on how to evolve our common language and understanding of the measurable parameters of data visualization. With proper metrics in place, we can better discuss, understand and stimulate mission-critical innovation in the industry.

## **F-5(11:05-11:25)**

### **Quadratura, future of the real-time dome system**

**Toshiyuki Takahei (Ohiharcon Tech)**

For digital planetarium theaters, I developed a brand-new software Quadratura. Technically it's a real-time Power Point like presentation tool for immersive environment. It's the best intuitive way to make good use of the immersive environment such as domes, multi-projection and stereoscopic theaters. Real-time composition of various types of materials opens a door of possibility what you can do in such environment. Further more, with its extensibility, it could be a platform to implement real-time scientific simulation and visualization. For content creators, it could be a drastic new way of content creation and distributions. Change your mind to prepare this new innovation.

## **F-6(10:25-10:45)**

**The new style of digital planetarium,-- from field use to dome projection.**

**Haruki Kamiyama(AstroArts)**

In Japan, many amateur and professional astronomers, planetarians uses Japanese de facto standard astronomy simulation software StellaNavigator regularly since it was first developed and went on sales seventeen years ago. StellaDome Professional is a evolved edition of StellaNavigator and you can project beautiful sky view onto a large dome-type screen. I will talk about this evolutions of the series of advanced astronomy softwares not only for personal use but also for the large scale institutional purposes.



## **F-7(11:45-12:05)**

### **Development of a 2.4K Full Dome Projection System using a fisheye lens, Super Media Globe II**

**Junji Nishigaki, Kazuhiro Takeuchi, Nobuhiro Ishimaki, Mitsuaki Shimo\*, Akira Fukushima\* and Hiroaki Ueda (Konica Minolta Planetarium)**

SUPER MEDIAGLOBE II(SMG II) is the first 2.4K full dome LCOS projector with a fisheye lens. It projects immersive stars and astronomic objects on the jet-black background. Its very high contrast ratio of 10000:1 in native and resolution of 2400 pixels in diameter can render what defies description; such as absorption nebulas or even cosmic background radiation of 3K! One fisheye lens projects perfectly seamless image from dome masters without slicing process by computers. Distortion, spherical aberration and chromatic aberration of the lens are well corrected using anomalous dispersion glass with multi coating. It provides clear images close to the optical star ball images onto the dome up to 15 meter or larger in diameter. Mitaka data base and user friendly interface for easy operation are embedded. Users can program 3D space travel, historical constellations and so on. Technical specifications and their performance are reported.

## **G-1 (13:00-13:15)**

### **4K transmission experiments at Keio DMC**

**Kunitake Kaneko (Keio University)**

Recently, digital media technologies have rapidly grown up and we can handle higher quality of medias than the existing broadcasting services on our computers. Among them, we, Keio DMC, have focused on 4K Super High Definition images, which has 8 million pixels on a single image, and tried to find the applications of 4K through several experiments last five years. We first started from capturing and displaying of 4K images, then tried production using 4K camera and distribution of content. For example, at iGrid2005, we transmitted 4K live images from Keio to UCSD, and in early summer of 2007, we captured "Era la Notte", a kind of opera, by 4K uncompressed recorder at Amsterdam, and transmitted it to San Diego with 4K JPEG2000 compressed images and 5.1ch surround sound. In 2007 winter, we also tried 4K uncompressed transmission of Kyoto Prize Ceremony from Kyoto to Stockholm. And, last December, we demonstrated a 4K tele-conference between Tokyo and San Diego. Through our experiments, we learned the importance of networking for high quality media technologies and that 4K digital images could be produced, recorded, encoded, switched, and delivered over worldwide IP networks.

## **G-2 (13:15-13:30)**

### **Three-Dimensional Animation by Electro-Holography**

**Hiroataka NAKAYAMA, Yasuyuki ICHIHASHI, Nobuyuki MASUDA, and Tomoyoshi ITO, (Chiba Univ.)**

Electroholography is one of the expected techniques for achieving Three-Dimensional (3-D) television. Because holography is one of the methods for reconstruction of 3-D objects. But the amount of calculation is so enormous that the speed-up of calculation is indispensable to achieve the electroholography television. Our laboratory in Chiba University developed the special-purpose computers, named HORN, to generate hologram at high speed. At present, we achieved reproduction of the image of the 3-D object composed of 1,000,000 points in every second.

## **G-3(13:30-13:45)**

**Telescope –The Door To The Universe-**

**Masaru Hirohashi (Astrolab)**

A short movie to boost The International Year of Astronomy 2009.

It tells the history of telescopes over the last 400 years. Originally it was made in NTSC DV format, I am converting this short movie into dome master for planetarium theaters. Furthermore, I am going to release a 20 minute planetarium show this spring.

## **G-4 (13:45-14:00)**

**Production of a dome movie "The Celestial Railroad" and our future approach**

**Yutaka Kagaya (Kagaya Studio)**

This is a report regarding a dome show “The Celestial Railroad” produced by KAGAYA Studio, which is focused on the process of production and the status of distribution for two years since its release. Furthermore, you will see our approach to a new project to promote the use of the dome movie as an educational material at school. New techniques currently being tested and studied at KAGAYA Studio are also introduced.

## **G-5(14:00-14:15)**

### **Space Elevator**

**Hiroshi Koike (Walk)**

**SPACE ELEVATOR -The Future as Foreseen by Scientists**

The objective of this film is to envision the future and what typical life could be like using advanced technologies. It is also to inspire the next generation of scientists, engineers, and inventors to imagine all the possibilities. International creators and scientists collaborated to draw out their ideas of future urban scenes that have never before been seen by anyone. Together, they have created this completely new-style science animation.

The time is set in the second half of the 21st century. From a young girl's perspective, we see her high-tech house, her trip through the futuristic city to the Space Elevator, and her adventure traveling on the Space Elevator to surprise her Dad while he is working on the Space Station. This animated video gives us a look into our future as foreseen by scientists.

## **G-6(14:15-14:30)**

### **HAYABUSA BACK TO THE EARTH-**

**Hiromitsu Kohsaka (Live Co.)**

HAYABUSA spacecraft was launched on 9 May 2003. After a period of reconnaissance operation, the spacecraft left the home position and made tours to various altitudes and solar phase angles to access the polar regions of Asteroid Itokawa. A sampling location on a smooth terrain called Muses Sea was selected. The touchdown, the 30-min stay on the asteroid surface, and the liftoff were performed on 19 and 25 November. HAYABUSA is now under preparations for its return trip to the Earth in 2010. This movie is the one of the document focused upon the eventual and dramatic round trip of Hayabusa spacecraft by using sophisticated computer graphic technologies.

## **G-7(14:30-14:45)**

**TWO NEW PRODUCTIONS from E&S**

**Terence Mutagh (E&S)**

For the last decade Evans & Sutherland has been the world leading producer of all dome shows. In conjunction with Goto Inc of Japan and other co producers such as the National Science Foundation in the United States it has pioneered the production of lower cost and high production value content. In this talk he will outline some of the shows that have already been successfully produced and distributed around the globe. To finish he will outline some of our forward production strategy and give details of the new production schedule for the next two years.

## **G-8 (4:45-15:00)**

**Immersive movie making in fulldome – The making of Awesome Light - 3D Stereo Photography in Hawai'i, from the Sea to the Summit of MaunaKea's Observatories.**

**Steven T. Savage (Sky-Skan)**

As short review of how not to freeze at sunrise while photographing the mountain and its observatories in 3D stereo with constantly changing light. A look at camera set-ups and the human body's reaction to high altitude and lack of sleep.

What's the trick to shooting 3D stereo on the on the cheap? Then, frame wrangling and post production to make a stunning stereo show at 14,000 feet above sea level.

## **H(15:10-16:30)Panel**

**<Future of Immersive Scientific Visualization>**

**Moderator: Toshikazu Ebisuzaki, RIKEN**

**Carter Emmert,**

**American Museum of Natural History**

### **Planetarium Shows Made from Data Visualization**

Production of dome format movies based in scientific data visualization allows institutions and organizations to craft explanations of basic principals of subjects of nature. At the American Museum of Natural History (AMNH) the attempt has been to address fundamental topics of astrophysics in a structure starting with curatorial review of subject matter and choice of subject. Subsequent scientific colloquia are then conducted with international call for participation to discuss and hone the ideas for show content and identify research areas particularly appropriate for visualization.

Scripting and editing in conjunction with careful production of complex visualized data is an integrated and challenging task. Time scales for each of these tasks are different and have to carefully be balanced with scientific, formative and executive review cycles.

Results of attempting to display the layout and behavior of the natural world beyond that which is commonly experienced by humanity has the potential for giving culture mass insight into the process of the universe. The closer such productions are driven by actual observation and simulation by physical understanding the more compelling they are. The esthetic of beauty can be considered most successful when it comes from nature itself because it informs us of what we are, how we got here and how we operate.

**Toshiyuki Takahei,**

**Orihalcon Technologies Co.**

### **Future of Immersive Scientific Visualization**

After the development of Synra Dome, I keep working on making it a platform of immersive visualization. With today's improvement of computer graphics, we can interactively visualize many kind of scientific results, and also do the simulation itself.

In Synra Dome we use a PC cluster with MDGrape2 special purpose accelerator to simulate galaxy collisions in real-time. For larger scale visualization, I developed Open N-Body Renderer as an open source software for both scientists and creators to share and handle the data as it is. Moreover, real-time platform Quadratura gives an intuitive way to make a 3d presentation and annotations with it.

**Ed Lantz**

**Visual Bandwidth, Inc./ Spherical Media Group**

### **Digital Domes as Group Immersive Portals into a Scientifically Accurate Model of the Known Universe**

There are now over 500 digital dome or "fulldome" theaters worldwide. The current trend has a small number of curators assimilating astronomical and astrophysical datasets, and vendors disseminating these datasets to individual theaters for real-time simulations and immersive storytelling. Expansion of this trend is predicted to include simulation and visualization of a wide range of physical and natural phenomena - ultimately the known universe - and real-time access to these simulations and datasets through a worldwide grid of photonic networks and server nodes. Such a network could also support access to real-time feeds from remote terrestrial and space-based immersive imagers. Digital planetariums interconnected on this "dome grid" would essentially become group immersive portals into a scientifically accurate model of the known universe. Such a project is worthy of an international consortium of institutions and organizations fueled by multi-agency funding. The proposed consortium would curate data, interconnect sites, and manage dissemination of both licensed and public domain content to digital planetariums as well as 3D cinemas, television and film producers, academic OptIPortals and internet users.

**Staffan Klashed**

**SCISS**

**Steven T. Savage**

**Sky Skan**

## **The Future of Immersive Scientific Visualization – Thoughts on Live and Pre-rendered Sci Viz**

Full-dome theaters are growing rapidly, supplanting old forms of the planetarium many of us have grown up with. Many theaters that made the leap to full-dome no longer use multimillion-dollar star projectors! Has this new dome visual language made star projectors obsolete? Is Sci Viz overtaking the sharp fidelity of the night sky?

Sci Viz is more than a lifetime's work. How will we prepare for this challenge?

Science visualization has very strong audience appeal, especially when presented live. More so than full-dome movies, 3D stereo is an even more compelling experience. So why is it not the next best thing? Why aren't CEOs jumping at this futuristic interactive medium?

Do CEOs want full-dome movie theaters (and collect the cash.)

Do CEOs feel presentation staff is too expensive?

Funding for some new projects are distributing shows for free and sabotaging producers who must invest to create content. Is the NSF a savior or saboteur? How do we keep Sci Viz content, fresh, exciting and inventive?

We explore the positive and negative sides of the full-dome's future as it relates to the role of Sci Viz in productions and live shows.

**Terence Mutagh**

**Evans & Sutherland**

As an opening statement he will talk about how the outlook for the near future. Then he will look further ahead for the next decade or two as to the revolutionary technologies which are set to offer new ways forward for both the developers of equipment and content, and their users.



## **I-1 (16:30-16:40)**

### **Our Achievements at Full Dome & Stereoscopic Movies Preparatory Event**

**Hidehiko Agata (NAOJ)**

We have concluded the Full Dome & Stereoscopic Movies Preparatory Event held March 13 through today (March 23 2009). I would like to express deep gratitude to all members who cooperated in this event. Today I will speak about what we have achieved at this event, so we are prepared to discuss and plan for what we are going to do at the future International Festival of Scientific Visualization.

## **I-1 (16:40-16:50)**

**Closing Address**

**Shoken Miyama (NAOJ)**

