

Chapman University

Chapman University Digital Commons

Art Faculty Articles and Research

Art

12-17-2021

Visual Displays in Space Station Culture: An Archaeological Analysis

Justin St. P. Walsh

Alice C. Gorman

Wendy Salmond

Follow this and additional works at: https://digitalcommons.chapman.edu/art_articles



Part of the Archaeological Anthropology Commons, Art and Design Commons, Christian Denominations and Sects Commons, Christianity Commons, Other Religion Commons, Religious Thought, Theology and Philosophy of Religion Commons, Slavic Languages and Societies Commons, and the Social and Cultural Anthropology Commons

Visual Displays in Space Station Culture: An Archaeological Analysis

Comments

This article was originally published in *Current Anthropology* in 2021. <https://doi.org/>

Creative Commons License



This work is licensed under a [Creative Commons Attribution-Noncommercial 4.0 License](https://creativecommons.org/licenses/by-nc/4.0/)

Copyright

The Wenner-Gren Foundation for Anthropological Research

Visual Displays in Space Station Culture

An Archaeological Analysis

Justin St. P. Walsh, Alice C. Gorman, and Wendy Salmond

We offer an archaeological analysis of the visual display of “space heroes” and Orthodox icons in the Russian Zvezda module of the International Space Station (ISS). This study is the first systematic investigation of material culture at a site in space. The ISS has now been continuously inhabited for 20 years. Here, focusing on the period 2000–2014, we use historic imagery from NASA archives to track the changing presence of 78 different items in a single zone. We also explore how ideas about which items are appropriate for display and where to display them originated in earlier Soviet and Russian space stations starting as early as the 1970s. In this way, we identify the emergence and evolution of a particular kind of space station culture with implications for future habitat design.

The Space Age has transformed the way humans live on Earth (Aporta and Higgs 2005; Lacy, Atwater, and Powers 1988; Litfin 2002). Navigation satellite constellations coordinate the movement of both individuals and goods, and views of Earth from space are routinely seen on social media and in the news. We have also become accustomed to knowing that a tiny human population lives outside the planet in low Earth orbit. In fact, humans have lived for periods of up to 438 consecutive days in various space habitats since the first space station, Salyut 1, was launched in 1971. The current iteration of these space habitats, the International Space Station (ISS), has now been occupied continuously by at least two people for 20 years. Over this time, a space society marked by a distinct material culture has also evolved. Close to half of all humans who have traveled to space (249, roughly 42%) have been visitors to or crew of the ISS, the largest spacecraft ever assembled, as well as the longest inhabited (more than seven years longer than Mir by mid-2020). The ISS is a collaboration of NASA, Roscosmos, the Japanese Aerospace Exploration Agency (JAXA), the European Space Agency (ESA), and the Canadian Space Agency (CSA). People from 19 different nations have traveled there. It is therefore a “natural laboratory” to study the formation of a space-based culture.

Previous studies of space archaeology have addressed on- and off-Earth landscapes (e.g., Capelotti 2010; Gorman 2016; O’Leary and Capelotti 2015), and especially issues of heritage and preservation (Darrin and O’Leary 2009; Walsh 2012, 2015; Westwood, O’Leary, and Donaldson 2017). The explicit goal of the ISS Archaeological Project is to provide an understanding of material culture as a key component of life in space, on par with the research by biomedical and psychological scholars that has been ongoing since the 1960s. We take as our inspiration a phrase first used in the National Academy of Sciences report *Human Factors in Long-Duration Spaceflight*, which described a

crewed spacecraft as “a micro-society in a miniworld” (Lindsay 1972:23). There have been several investigations into the religious beliefs of space travelers (e.g., Weibel 2015), but few have considered the material culture that accompanies them. The negotiation of these beliefs is part of the formation of a space culture (or perhaps subculture). In this paper, we are less interested in precisely identifying those beliefs and more interested in how they are manifested materially. A premise of this archaeological study is that the most mundane object can simultaneously operate as a functional tool, a symbol, and a mediator of social relations.

Under the influence of science fiction, space culture is often conceived in the popular imagination as a realm of disembodied science where the messiness of earlier human cultures is sublimated by machines and smoothed by clean plastic and metallic surfaces, which symbolize the future (e.g., Scharmen 2019). The reality is that life in space, although constrained, is every bit as materially entangled as at any terrestrial archaeological site from the past (Hodder 2012) and is shaped by entanglements with contemporary social and political events. A challenge for the ISS since its inception has been the welding of social and technological cultures from around the globe into one enclosed, habitable space. Principally, this has been the domain of the former Cold War adversaries, the United States and the USSR. As well as separate engineering heritages, these now partners bring different approaches to domesticity, science, and the design and organization of space modules (most visibly their interiors).

One of our primary methods is the cataloging of people and elements of material culture (objects and built spaces) from photographs taken during ISS missions, or “expeditions,” as they are known (Buchli 2021; Gorman and Walsh, forthcoming; Walsh and Gorman 2021). We use photos because we are unable to visit the ISS and observe it directly as archaeologists. Such

Justin St. P. Walsh is Associate Professor and Interim Chair and **Wendy Salmond** is Professor at the Department of Art of Chapman University (One University Drive, Orange, California 92866, USA [jstpw@chapman.edu]). **Alice C. Gorman** is Associate Professor at the College of Humanities, Arts and Social Sciences of Flinders University (GPO Box 2100, Adelaide 5001, South Australia, Australia). This paper was submitted 22 IX 20, accepted 17 III 21, and electronically published 17 XII 21.

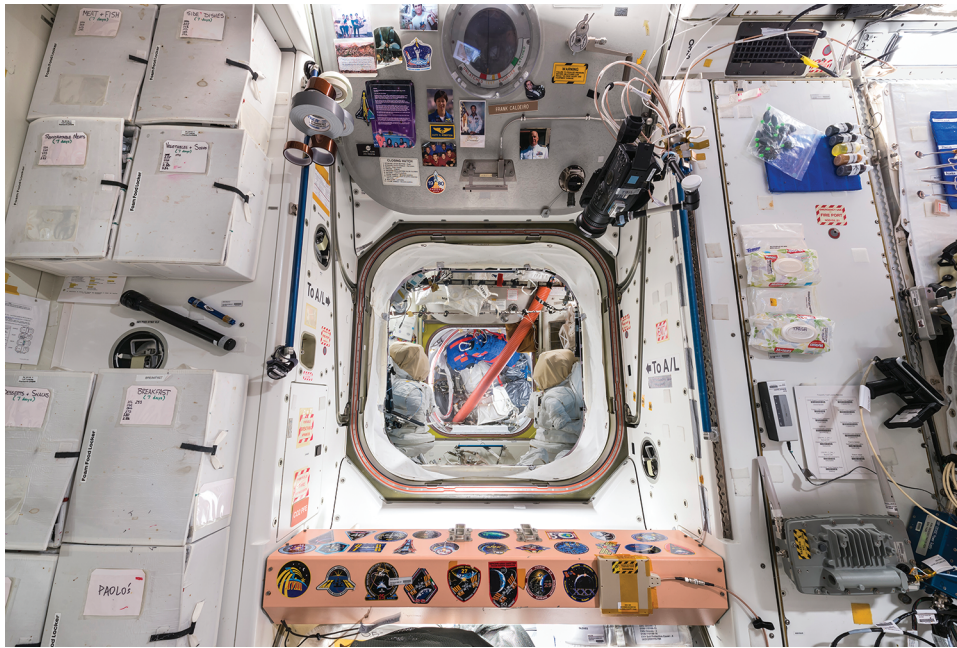


Figure 1. View from Node 1 into the Quest air lock. Above, on the hatch door, is a memorial commemorating deceased colleagues, represented by photographs, mission patches, name tags, and other items. Below, stickers representing patches from completed missions adorn a bulkhead. Photograph by Paolo Nespoli and Roland Miller, courtesy of NASA and Agenzia Spaziale Italiana.

a visit is cost prohibitive; moreover, the selection of social scientists—explicitly including archaeologists—as astronauts is prohibited by space agencies. The use of photographs in and of themselves as archaeological evidence is a relatively new phenomenon. Our method was inspired by De León (2015), who gave disposable cameras to migrants crossing the Sonoran Desert so that they could document experiences that he could not otherwise observe. The ISS photographs were likewise taken by crew of themselves as they performed various activities ranging from work to leisure. The crew receives training in photography prior to launch and sometimes receives direction from the ground about what kinds of images to capture; they were therefore aware that the photos might be published. The images used here were additionally selected for publication by NASA’s Public Affairs Office on its Flickr page (NASA 2020); they do not include all images that were made. The specific reasons for their being made and publicly distributed are thus complex and somewhat opaque, except for the fact that their publication is intended to promote a positive view of life on the ISS.

Here, we describe an analysis of a series of 48 photographs dating between November 2000 (Expedition 1, the beginning of habitation of the ISS) and April 2014 (Expedition 39) that depict life in the Russian Zvezda module.¹ This survey forms the first systematic investigation of the material culture of a space habitat. The photographs provide an extraordinary window on

1. The photographs used as source material in this study, as well as their associated data and metadata, have been permanently deposited in the Open Context repository with a Creative Commons license for distribution and reuse (<https://opencontext.org/projects/157-archaeology-of-the-international-space-station>, <https://doi.org/10.6078/M7Z0369Q>).

the lives, activities, beliefs, and interests of the ISS crew. In this study, we focus on practices of visual display. The items that crew members use to adorn the station walls alter the visual experience of the interior, provide a personal and earthly touch in the space machine environment, and say something about the values of the crew. It is also a material practice that sheds light on the evolution of a space culture. Designs for space architecture that acknowledge and accommodate inhabitants’ desires to modify the appearance of their shared living areas have never been implemented. Astronauts have improvised nevertheless. For example, in the US Node 1 module, on the door of the hatch leading to the Quest air lock, crew members created an expedient memorial to deceased colleagues, including photographs, name and mission patches, and even a nameplate from a terrestrial office door (fig. 1). Much of the “empty space” on the surfaces of Node 1 is decorated with stickers representing mission patches for all of the expeditions to date, resonating with similar displays at NASA, ESA, and JAXA centers on Earth (e.g., Kahler 2020).² In the European Columbus module, on the door of the hatch leading to the US Node 2, a variety of items,

2. In addition to plaques representing the patches mounted on walls in Johnson Space Center’s Mission Control Center, ESA’s Columbus Control Centre, and JAXA’s Tsukuba Space Center, patch stickers can be found adorning the outside of Kennedy Space Center’s Neil Armstrong Operations and Checkout Building, over a door where astronauts leave to meet their departing rockets; on the outside of the Zarya training module in the Space Vehicle Mockup Facility at Johnson Space Center; and even in the interior of the Node 1 replica in the same facility, where they have been placed in exactly the same configuration as in the real Node 1 on the ISS (on the basis of our observation in March 2017). By contrast, representations of mission patches are extremely rare at Russian space facilities, appearing primarily on



Figure 2. Hatch and hatch door of the Columbus module, looking into the Node 2 and Kibō modules. An artwork by Invader and a geocaching tag are visible on the door to the left of the directional sign reading “OVHD” (overhead). Photograph by Paolo Nespoli and Roland Miller, courtesy of NASA and Agenzia Spaziale Italiana.

including ESA mission stickers, an artwork by the French contemporary artist known as Invader, and a geocaching tag, are displayed (Blakemore 2015; fig. 2). The emphasis on mission stickers and colleagues, out of the entire range of such items that could be chosen, shows the importance of personal and institutional affiliations and connectedness to a space community of those who have gone before and those who will come after.

In the Russian part of the space station, the items displayed include imagery of Russian historic figures, Orthodox icons, and other religious items. Icons are a religious art form that emerged in the sixth century CE from more vernacular traditions of depicting Christ and other religious figures. Veneration of icons has always been a political act. In the eighth and ninth centuries, reactions against portrayals of Christ led to a period of iconoclasm. Icons went underground, as they did later under the state-sanctioned atheism of the USSR Communist regime from 1917 until 1991. A statement attributed to Yuri Gagarin, following his successful orbit of Earth in 1961, that “I looked and looked, but I didn’t see God,” typified a relationship between space, science, and Soviet ideology. Thus, the integration of icons into life on Russian space stations, alongside images of historic “space heroes,” is intimately linked to terrestrial politics.

Cultural Geography of the ISS

Planning for what would become the ISS began in 1982. The space station was originally intended as a US-only project; the Cold War was still in full swing (as suggested by the station’s

previous name, Freedom). The fall of the Soviet government in 1991 and the subsequent emergence of European and American cooperation on the Russian Mir space station (1986–2001) led to the development of a joint project. The Russian cargo module Zarya was the first component to be launched, in November 1998, as the station’s original hub for power and life support (fig. 3: the ISS). It was followed the next month by the US module known as Node 1. Over the next 11 years, major modules added were Zvezda (Russia, July 2000), Destiny (United States, February 2001), Columbus (ESA, February 2008), and Kibō (Japan, July 2009), as well as a series of small connector and service modules belonging to NASA, ESA, and Roscosmos (most importantly the US Node 2 and Node 3 and the Russian Rassvet). In its fully constructed state (2010 and after), the habitable volume of the ISS is roughly 1,000 m³ (Kitmacher 2015).

Nationalities and Segments

As of mid-2020, there have been 63 expeditions to the ISS. Each expedition has lasted roughly three to six months, with 122 crew members taking part (many of them, especially Russian cosmonauts, doing so multiple times).³ The international nature of the crew is permanent. For the first 13 expeditions, until late 2006, the crews were composed exclusively of NASA and Roscosmos personnel. More recently, the United States and Russia have typically each placed two or three crew members on board, with

3. By mid-2020 (Expedition 63), Roscosmos had sent 47 cosmonauts to the ISS for a total of 14,584 person days. By contrast, NASA had sent 146 astronauts for a total of 14,984 person days. The average amount of time that an individual cosmonaut has spent on board is three times greater than that of an American astronaut (310 days compared with 103).

the inside of the shuttle bus that carries crew to the launchpad at Baikonur Cosmodrome (we thank Julie Patarin-Jossec for this information).

ISS Configuration

As of April 2016

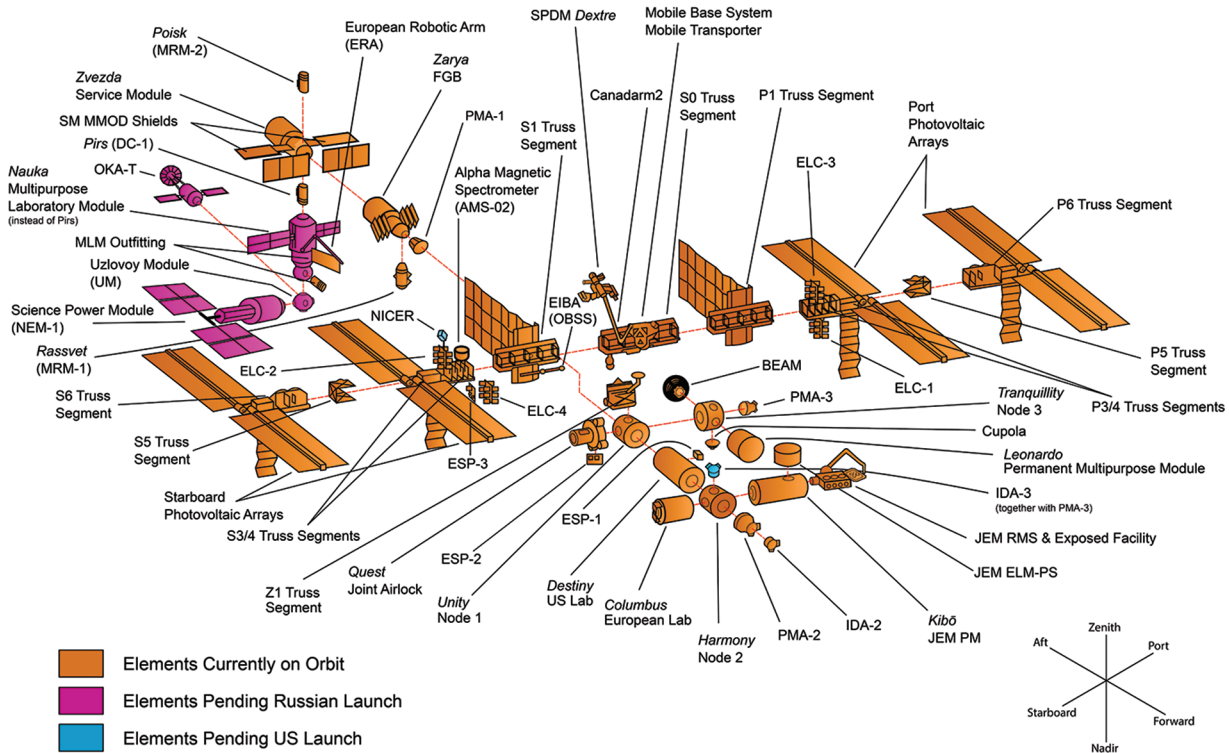


Figure 3. International Space Station (ISS; exploded view). Note the directional axes at the lower right. Diagram by NASA, used with permission.

ESA or JAXA sometimes supplying the sixth occupant; CSA crew have been more occasional participants.

Management of the spaces on the ISS has been divided broadly between the “Russian Orbital Segment” and the “US Orbital Segment.” The segments meet at the Pressurized Mating Adapter, which connects the US Node 1 and the Russian Zarya modules (fig. 3). The division between segments is also evident from the distribution of both resources and costs among the ISS partner agencies according to international agreements. Roscosmos is responsible for 100% of the activities and expenses in its segment, while the other agencies have divided costs and resources for the rest of the station, such that NASA has a 76.6% share, JAXA 12.8%, ESA 8.3%, and CSA 2.3% (NASA and RSA 1998; St.-Arnaud et al. 2013).

Analysis of the Zvezda Module Interior

From the very beginning of the station’s history, Zvezda has been a hub for all kinds of activity (fig. 4). From 2000 to 2009, there were only two permanent crew quarters for rest and privacy on the ISS; these were (and continue to be) located at the aft end of the Zvezda module. Although crews as large as four began serving on the ISS as early as 2006’s Expedition 14 and six crew members became the norm in late 2007, two more permanent crew quarters were added to Node 2 only in November

2008, followed by a second pair in August 2009. Following the addition of the new US permanent berths, the crew quarters in Zvezda began to be inhabited exclusively by Russian crew.

Given that one of the purposes of the ISS was to develop the human capacity to live in space, the ad hoc nature of provisions

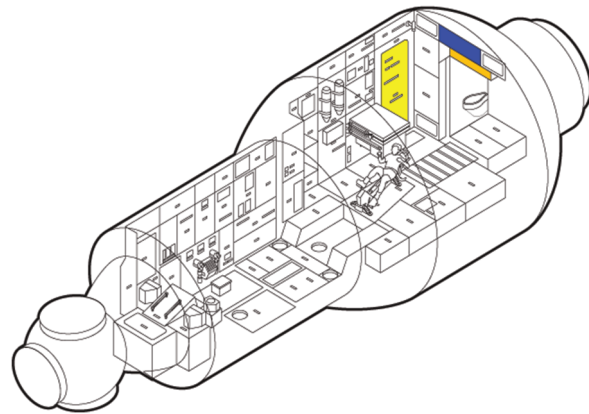


Figure 4. Zvezda module (aft end at upper right). The “top area” is blue, the “niche” is orange, and the single crew berth shown in this diagram is yellow. Diagram by NASA, used with permission, with colors added by the authors.

for something as basic as sleep seems remarkable. However, as Gary Kitmacher (2002:15) has noted, the original plans for the space station did not envision a long-term crew larger than three members. Planning for additional crew berths happened only after the earliest modules had already been built and placed in orbit. The disjunctions between what designers took into consideration for the physical disposition of interior spaces on the one hand and the needs and desires of crew on the other hand created opportunities for adaptation and reinterpretation (fig. 4). In addition to two crew quarters, *Zvezda* also contains one of the two galleys on board, one of the two latrine facilities, and a treadmill for exercise. This module is also where crews display items such as paintings, photographs, flags, patches, and more (fig. 5). This phenomenon was visible from the first moment of habitation. Already in Expedition 1 (November–December 2000), a small icon (roughly 10 cm high) was placed at the highest point of the aft wall, in the center, making it highly visible from the primary direction of approach (fig. 6). This location implies that the icon had a particular significance for the Russian crew. Soon after, many more photographs and paintings, frequently pertaining to Russian Orthodox beliefs, were placed in this area. Unlike the displays in the US segment, these items appeared and disappeared over time; they were moved around and reorganized (fig. 7).

At certain moments, the religious items were drastically reduced in number or vanished completely from the photographs. The deployment of imagery of Russian heroes, Orthodox icons,

and other religious items on the ISS is a material practice that sheds light on the evolution of a space culture. Each icon is a replica of an original sacred prototype, and none of any given type—apart from those to which miracles are attributed—is considered more significant than any others. Analysis of images in the *Zvezda* module reveals patterns over time in the placement of religious icons and pictures of Soviet space heroes that had not previously been observed, demonstrating the potential of archaeological methods to offer new insights into social behavior on the ISS. Indeed, in a separate article, we have identified the way the “niche” and activities around it functioned to create a hierotopy, or a formally constructed sacred space with defined boundaries, purposely arranged structures or decorations, and the performance of specific activities (Salmond, Walsh, and Gorman 2020; see also Lidov 2006).

Images of Soviet space heroes also appeared early on. These heroes include the first human in space, Yuri Gagarin; the Russian scientist who, in the early twentieth century, first theorized life in space and conceived of multistage rocketry, Konstantin Tsiolkovsky; and the original director of the Soviet space program, Sergei Korolev (fig. 8). They most frequently appear in a niche directly over a portal that leads to the docking adapter for Soyuz and Progress vehicles—in a sense, they are located over one of the station’s front doors. The Russian crew visually lay claim to a significant space heritage by their display of these portraits in such a prominent position. Since *Zvezda* has been one of the most frequent venues for videoconferences with Earth



Figure 5. From left to right, NASA astronaut Michael Barratt, Japanese Aerospace Exploration Agency astronaut Koichi Wakata, and Hungarian American space tourist Charles Simonyi (Expedition 19, March 28, 2009) are shown in front of the aft wall of *Zvezda*. On the wall are, clockwise from top center, a gold cross and Russian flag, a mission patch for the Soyuz TMA-13 vehicle, a patch for the Russian cosmonaut corps, a photo of Konstantin Tsiolkovsky, an icon of the Mother of God of Kazan, a toy spacecraft based on the Russian Kliper prototype, a small landscape painting, a photo of Yuri Gagarin, another photo of Tsiolkovsky, a miniature painting of the Troitse-Sergieva Lavra church, and icons of Saint Sergius of Radonezh and Christ. Another icon of the Mother of God of the Sign with saints is visible over the crew quarter door in the far upper right corner. Photograph courtesy of NASA, used with permission.



Figure 6. Roscosmos cosmonaut Sergei Krikalev (Expedition 1, December 2000) exercises in front of the aft wall of Zvezda. In the center of the “top area” is a small icon of Saint Theodor Tiron. To the left, above Krikalev’s head, is a mission patch for STS-106, a prehabitation flight by the space shuttle *Atlantis* to the International Space Station in September 2000 that stocked the station with supplies for Expedition 1. Photograph courtesy of NASA, used with permission.



Figure 7. Roscosmos cosmonaut Oleg Kononenko (Expedition 17, July 17, 2008) works in front of the aft wall of Zvezda. In the top area, from left to right, are icons of Saint Sergius of Radonezh and Saint Nicholas, a mission patch for Expedition 17, a gold cross, a Russian flag, a mission patch for Soyuz TMA-12, a patch for the Russian cosmonaut corps, and an icon of the Mother of God of the Sign with saints. In the niche area, from left to right, there are a photo of Konstantin Tsiolkovsky, a photo of Yuri Gagarin, a toy spaceship in the form of the Russian Kliper prototype, an icon of the Mother of God of Kazan, and another photo of Tsiolkovsky. Photograph courtesy of NASA, used with permission.



Figure 8. NASA astronaut Tim Kopra (Expedition 47, April 12, 2016, the fifty-fifth anniversary of Yuri Gagarin's flight) is shown in front of the "niche." In the niche are a Russian flag with the words "Ya lyublyu Rossiyu" (I love Russia) printed on it and, from left to right, four photos, of Konstantin Tsiolkovsky, Sergei Korolev, Yuri Gagarin, and Gagarin and Korolev together. Photograph courtesy of NASA, used with permission.

audiences, the displayed items are placed in a location that also makes them visible beyond the ISS.

We cataloged 414 instances of 75 unique items on display in 48 historic images dating from 2000 to 2014. All of the images were accessed from NASA's Johnson Space Center public Flickr account (NASA 2020). Each photo was chosen because it showed some change in the configuration of items in the aft space of Zvezda relative to earlier images. The locations of the items were

also recorded so that their appearance, disappearance, movement, and relationships to other items and the general area could be assessed. The results revealed spatial and symbolic patterns. First, the items appeared in waves, rather than simultaneously or at a steady pace (fig. 9). Periods when large numbers of items were on display occurred in November 2002 and early 2008 through the end of 2009, while few items appeared between 2004 and 2005 and there were few items again in 2011–2012. It is

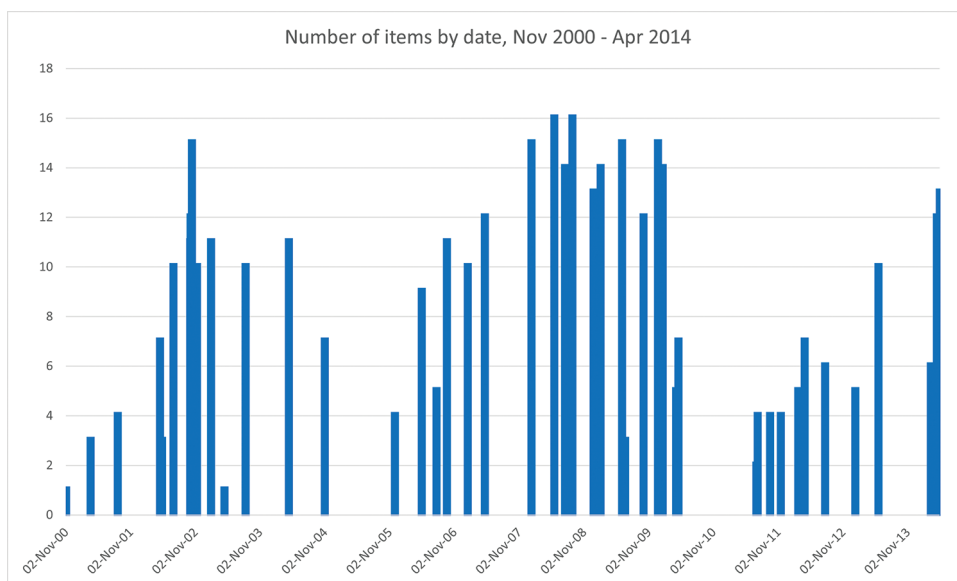


Figure 9. Chart of item counts per photograph for Zvezda's aft wall, November 2000–April 2014. Chart by Justin St. P. Walsh.

notable that the second period of increase corresponds to the time when *Zvezda* started to be inhabited only by Russian crew, beginning in 2008.

Religious items specific to Russian Orthodoxy made up one-third of the items (138 instances of display vs. 276). They made up a notably larger proportion of items on display between late 2006 and late 2008, peaking in early 2008 with nine religious items compared with six secular ones (fig. 10). The most common object type on display was photographs (27% of all items), followed by icons (20%); other pictures, such as landscape paintings (17%); mission and agency patches (11%); flags (8%); and other religious items, such as Orthodox crosses, relics, and books (6%). The photographs primarily consisted of images of Soviet space heroes. Among the religious items were copies of the New Testament, a gold cross, and a reliquary cross of Saint Athanasius. Seven icons appeared in the *Zvezda* photos: a small icon of Christ, a medium icon (roughly 25 cm high) of the Mother of God of Kazan, the Mother of God of the Sign surrounded by saints, a miniature icon of Saint Nicholas, a small icon of Christ Pantocrator, a medium icon of Saint Sergius of Radonezh, and a large icon of the Mother of God of Kazan. Other icons known from news sources to be present on the ISS during this period were apparently not displayed on the aft wall when the photographs in the Flickr archive were taken.

There were two significant zones of display: the niche, the setback area of the aft wall directly over a portal leading to the crew and cargo vehicles, and, located over the niche, the “top area,” which was probably the most prominent zone for placement. Between 2000 and 2014, item types appeared as follows: 74% of the photographs appeared in the niche, 58% of the other religious items, especially crosses, appeared in the niche, 48% of the icons (a plurality of them) appeared in the top area, 64% of the flags appeared in the top area, and 73% of the mission patches appeared in the top area. These patterns seem to indicate dif-

ferent meanings associated with the two zones—a mostly secular shrine to space heroes below and a more religious and nationalistic area up above.

When we turn our attention to specific items, other patterns emerge. The most common item was a famous photograph of Gagarin holding a dove, a widely accepted symbol of peace. This image was first seen on board the ISS during Expedition 2 (April 2001), probably in commemoration of the fortieth anniversary of his flight (fig. 11). It was first displayed on the aft wall in 2002, during Expedition 5, and it has appeared on the wall in every single photograph taken of *Zvezda*'s interior from that point forward. With one exception, when it was placed in the top area in the center, it has appeared in the niche. By contrast, the second most common item was an icon of the Mother of God of Kazan (fig. 12), which appeared 25 times following its first appearance during Expedition 2 in 2001 (fig. 13). Half of these times, it was placed in the top center position. A small Russian flag appeared in 19 images (i.e., 40% of the time). This was three times as frequent as the next most common flag (which belonged to the United States). Seventy-four percent of the time, the Russian flag was in the top area, especially top center. These examples seem to underline the implicit significance of different display zones on *Zvezda*.

Identifying a Russian Space Station Culture: Space Heroes, Icons, and the Origins of a Tradition

Historic Context of the “Trinity”

In more recent years, the niche area over the portal became the primary—indeed, practically the exclusive—space for the placement of the images of Soviet space heroes. Portraits of Tsiolkovsky and Gagarin, both alone and together, were abundant in the Soviet Union and later in Russia from the 1960s onward (Thomas 2010:16–17, 111–115, 122). Korolev, whose identity was a state

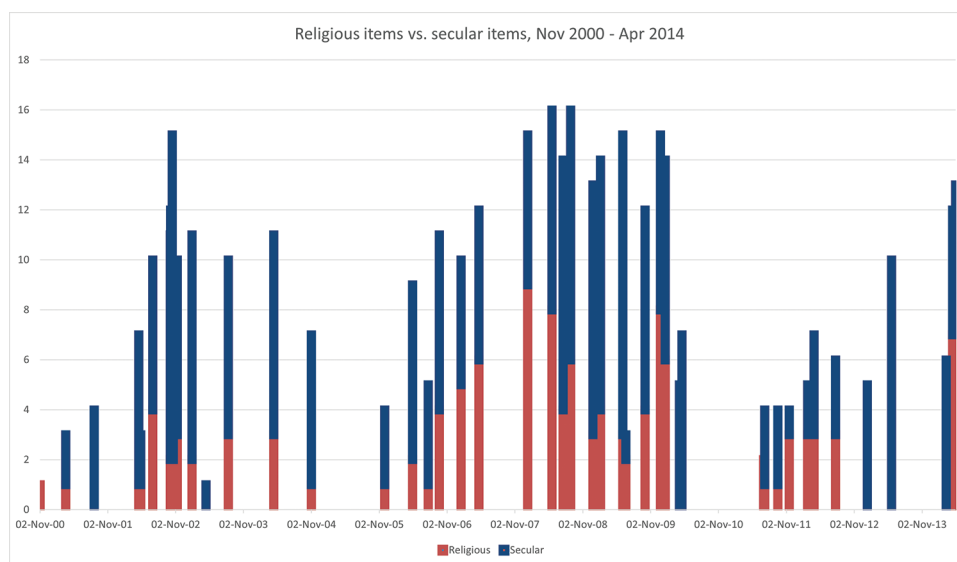


Figure 10. Chart of religious and secular item counts per photograph for *Zvezda*'s aft wall, November 2000–April 2014. Chart by Justin St. P. Walsh.



Figure 11. On April 25, 2001, cosmonaut Yuri Lonchakov holds an image of Yuri Gagarin with a dove presented to him by the Bulgarian Young Pioneers during a postflight visit to Sofia on May 7, 1961. This image was later (at least by the middle of 2002) placed on Zvezda's aft wall, where it remains to the day of this publication. Photograph courtesy of NASA, used with permission.



Figure 12. The Kazan Mother of God icon is revered as a protectress of Russia and an important symbol of nationalist sentiment after the fall of Communism (Shevzov 1999). Unknown artist, public domain, via Wikimedia Commons (https://upload.wikimedia.org/wikipedia/commons/a/a1/The_Mother_of_God_of_Kazan_1850s_icon.jpg).

secret until his death in 1966, began to appear in portraits in the 1970s (Siddiqi 2010). The three men have been described as a kind of secular “holy trinity” in the atheist late Soviet Union (Thomas 2010:69); they were promoted by the state as national heroes, similar to the general secretaries of the Communist Party, through the dissemination of their pictures. Images of Tsiolkovsky, Korolev, and Gagarin appeared in sculptures, stamps, paintings, mosaics, and other state media, as well as in popular culture. For example, Tsiolkovsky and Gagarin were prominently featured in a scene from Andrei Tarkovsky’s film *Solaris* (1972), where their portraits formed the backdrop to a meeting of an official space commission (Thomas 2010:53; fig. 14).

Traditions of Display

Hero portraits also appeared in the earlier Salyut and Mir space stations. While some cosmonauts have commented on the act of bringing icons to space (Salmond, Walsh, and Gorman 2020), none have spoken about the use of images of space heroes or why a particular item might be placed in a specific location. The analysis of material culture that follows is not a quantification analysis similar to the one above for the ISS, however, because the imagery from earlier space stations is both rare and difficult to acquire. One example appears in an image from the Mir EO-23 mission in early 1997 where a photo of Gagarin is clearly visible above NASA astronaut Jerry Linenger (fig. 15). To the right of this image was another one depicting Tsiolkovsky and, slightly lower, a calendar with a photo of a Soyuz rocket launch and an inset portrait of Korolev. Another photograph, from the earlier



Figure 13. Roscosmos cosmonaut Mikhail Tyurin (Expedition 14, January 16, 2007) floats in front of the aft wall of Zvezda. Centrally placed in the “top area” is the Mother of God of Kazan icon. Photograph courtesy of NASA, used with permission.

Mir EO-20 mission in 1996, shows that there had previously been two icons flanking the Gagarin portrait (fig. 16). The placement of the icons, with their formal presentation-style hinged frames, seems carefully organized around Gagarin, creating a shrine-like, ritualized space to bring the atheist past and the religious present together. Below are the three crew members; behind them were placed flags of Russia and the ESA, indicating that the background for the photo was carefully chosen, constructed, and framed. All of these items were located in the top area of the aft wall of the Mir Core Module (the main living space on that space station), directly over the passageway leading to the primary docking adapter for visiting Soyuz and Progress spacecraft. In other words, the pictures were in precisely the

same location in Mir as the later images on the ISS were in Zvezda. The Mir Core Module, whose form derived from the so-called durational orbital station type, which included all of the seven Soviet Salyut stations from 1971 to 1986, was itself the basis for Zvezda’s design (Harland 2005; figs. 17, 18). In fact, Zvezda was originally designed and built to serve as the core of Mir-2, a planned Russian successor to the original Mir station. In general terms, they share a highly similar layout, to the extent that one NASA astronaut who visited Mir and Zvezda reported a sense of *déjà vu* (Chladek 2007). Moreover, nine Russian cosmonauts flew on at least one Salyut and on Mir; 15 other cosmonauts flew on both Mir and the ISS. Traditions including the decoration of the walls and (in the post-Soviet period) the



Figure 14. In this still from Soviet director Andrei Tarkovsky’s film *Solaris* (1972), large portraits of Konstantin Tsiolkovsky (*left*) and Yuri Gagarin (*right*), together with the Apollo 11 crew off-screen to the left and other unidentifiable people off-screen to the right, form the backdrop to a meeting of a space agency commission. Image courtesy of Mosfilm, used with permission.



Figure 15. NASA astronaut Jerry Linenger (Mir expedition EO-23, February–May 1997) floats in front of the aft wall of the Mir Core Module. Behind him in the “top area” is a photo of Yuri Gagarin in his flight suit, with a portrait of Konstantin Tsiolkovsky to the right and a small landscape painting to the left. Photograph courtesy of NASA, used with permission.

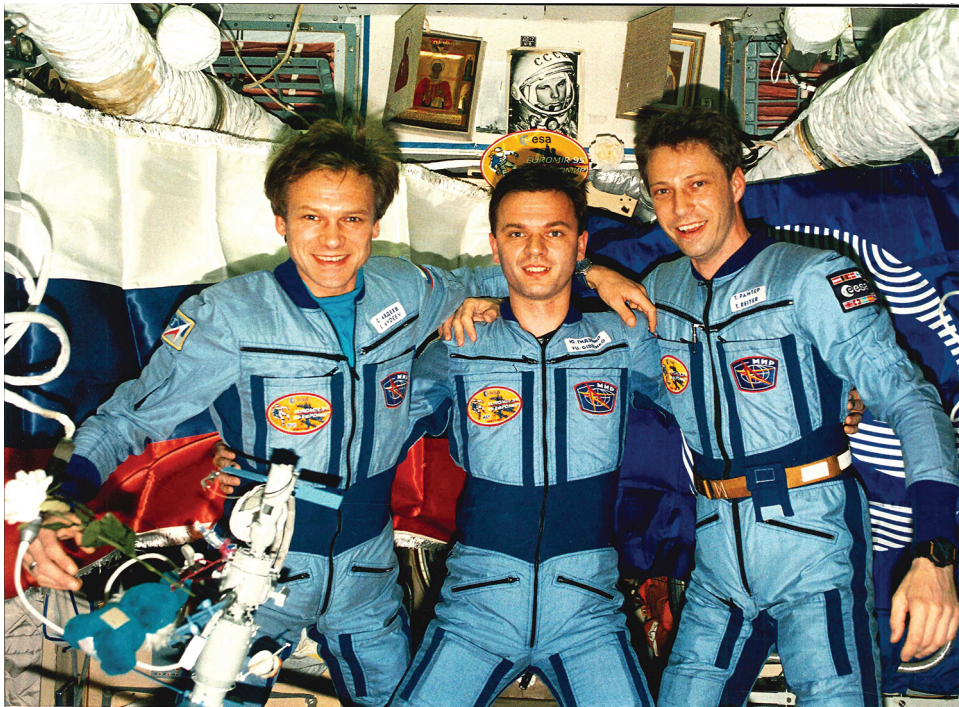


Figure 16. Crew of Mir expedition EO-20 (from left to right, cosmonauts Sergei Avdeyev and Yuri Gidzenko—with a golden EuroMir 95 mission patch behind his head, reminiscent of a halo—and European Space Agency [ESA] astronaut Thomas Reiter, September 1995–February 1996) pose in front of the aft wall of the Mir Core Module. Above their heads is a photograph of Yuri Gagarin in his flight suit, flanked by two icons of Saint Anastasia. Photograph courtesy of ESA, used with permission. We thank Joachim Becker of spacefacts.de for access to a high-resolution version of this image.

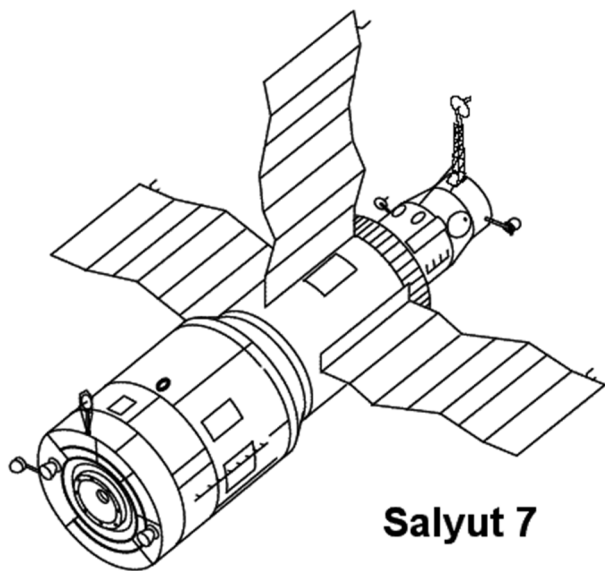


Figure 17. Salyut 7 space station (1982–1986; aft end at lower left). Diagram courtesy of NASA, used with permission.

collaboration of cosmonauts with church authorities to transport icons and relics to space were likely transmitted from one group of crew members to another. The social links between and among these crew can be mapped to show how such cultural transmission could happen (fig. 19).

The display of Russian space heroes on the aft wall of *Zvezda* is a sign of a broader Russian space station cultural practice, with continuity from one station to another and spanning the Soviet and post-Soviet periods. In a black-and-white still image from a videoconference with the first crew of Salyut 5 (July–August 1976), an official portrait of Gagarin in military uniform

was carefully centered between the two cosmonauts (fig. 20). A copy of this portrait later appeared in *Zvezda*'s top area in Expedition 2. The Salyut 5 photograph is the earliest identifiable example of the phenomenon of using images (of whatever kind) to decorate the interior of a Russian space station. The third crew of Salyut 5 (February 1977) can be seen in a similar video still, this time with an image of Soviet leader Leonid Brezhnev behind them. The timing and formal placement of these images may indicate that these were official rather than personal displays.

The gradual transformation of the interior space of the cosmonauts' quarters over their long history mirrors this trend of displaying images and objects unrelated to the mission. What changes are the kind of images, their placement, and the frequency of their appearance. Images of Gagarin were frequent. Tsiolkovsky appeared occasionally on Mir (but apparently not the Salyut stations), and Korolev was barely present. There was also an overall shift from an unorganized display with little visual hierarchy or intentionality to a relatively organized, although never static, visual field. In the 1970s, the personal effects of the cosmonauts were scattered wherever a place could be found for them. A calendar with a photo of the beloved singer Vladimir Vysotsky was displayed on Mir in EO-3 (1987), while a graphic portrait of Futurist poet and revolutionary icon Vladimir Maiakovsky was placed on the "ceiling" of Salyut 7, probably in honor of his birthday, and glossy advertisements for cars can be seen in other photos—choices that reflect the private lives and enthusiasms of individual Soviet citizens. In the early 1990s, the interior space of the Soviet modules underwent a noticeable change. In the middle of the Mir EO-9 mission (May 18–October 10, 1991), the Communist Party was overthrown. The red Soviet flag was replaced by the tricolor flag of the former Russian Empire. A degree of hierarchy or order was now established for visual displays.

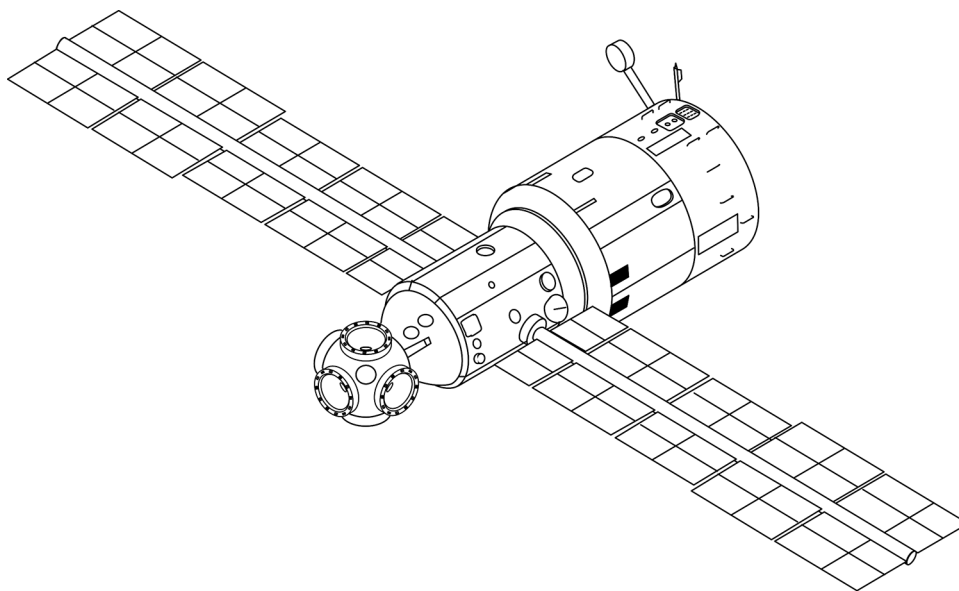


Figure 18. Mir Core Module (1986–2001; aft end at upper right). Diagram courtesy of NASA, used with permission.



Figure 19. Social network graph of 61 Soviet Russian cosmonauts who served on space stations from Salyut 4 (1974–1977) to the International Space Station (ISS; 2000–present). This graph shows connections between cosmonauts who served together on space stations weighted by the duration of their time together. Thicker lines indicate longer durations. The sizes of the nodes and names correlate with each node’s “betweenness centrality” (how short the distance is between any nodes through that node). High “betweenness” is typically interpreted as greater influence on the network. The colors of the lines and nodes indicate clusters that are closer to each other than they are to the rest of the network. The light blue cluster, for example, links Georgy Grechko (Salyut 4, Salyut 6, and Salyut 7) with Sergei Krikalev (Mir and ISS).

Conclusion

The ways in which the photographs of the three space heroes are displayed on the aft wall of *Zvezda*—at times alone, at others interspersed with icons, crosses, relics, and other objects associated with Russian national identity—invite comparison with the way icons are displayed in Orthodox churches and homes. The horizontal zones of the niche and the symmetrical way in which images are placed there recall the church iconostasis—the wall that divides the sacred space of the altar from the congregation (Thomas 2010; Zak 2015). In that context, icons are organized in a series of horizontal rows representing the structure of the divine world, with icons of Christ flanked by the Mother of God and John the Baptist (the Deësis) at the center. The placement of the images and icons in *Zvezda* may also mark

the space as domestic: a re-creation of the icon corner, the space in an Orthodox home where revered family icons are displayed. The symbolic associations of this devotional space were so ingrained in Orthodox Russian consciousness that, after the death of Vladimir Lenin in 1924, its format was co-opted for the purposes of immortalizing the dead leader, and “Lenin corners” (or “red corners”) subsequently became a common feature of public and private life in the USSR (Buchli 2000). The reemergence of icon corners in homes and private spaces after 1991 has been a particularly potent symbol of Communism’s demise and the Orthodox Church’s resurgence.

Space stations, from Salyut to the ISS, embody a series of tensions between laboratory and home. Attention to habitability is meant to resolve these tensions, providing a space designed so that crew comfort contributes to their productivity. Soviet space stations had pastel interiors intended to create a “homey” feel (Bluth and Helppie 1986:I:110; Meuser 2015). This was, however, a home without women (who, even now, make up only 11.5% of all people who have traveled into space and 14% of ISS long-term residents). Svetlana Savitskaya, the second woman in space, spent time on Salyut 7 in 1981 and 1983; the next female cosmonaut was Yelena Kondakova, who stayed on Mir for five months in 1994–1995. Yelena Serova was the fourth female cosmonaut and so far the only one to visit the ISS, in 2014–2015. In contrast to the ubiquity of Gagarin’s image in the *Zvezda* module, it is notable that the first Soviet woman in space, Valentina Tereshkova, does not appear once. In this framing, to be reminded of home by the spatial symbolism of the icon corner may be to reinforce the gendered separation of space from home in USSR and Russian ideology. An additional possibility, not necessarily precluding the first hypothesis, is presented by the appearance of a portrait of Alexei Leonov, the first person to perform a space walk, in the niche for the first time in mid-2020. Leonov died in October 2019, suggesting that the niche might be reserved for deceased space heroes, similar to the US memorial in Node 1 (described above). Since Tereshkova is still living, she may be considered ineligible for memorialization.

The phenomena shown in the photos confirm our original suggestion that even if the ISS is “international” in many respects, there are not only distinctly national features but also national customs that can and do frequently occur. No religious items have been observed yet in publicly available images of the US, European, or Japanese modules (even though the religious beliefs of many American astronauts have been well documented; Weibel 2015). The *Zvezda* objects are therefore notable. The absence of religious imagery in the US Orbital Segment modules, even as other kinds of display have emerged over time, is itself a reflection of one aspect of American culture—the claim of separation of church and state, although in daily terrestrial life the United States’ historical roots in Christianity are often highly visible. Such symbolism has not carried over into US spaces in space.

Since at least 2017, it appears that there have been no icons displayed on *Zvezda*’s aft wall, although they have been seen in recent images and videos of other parts of the module. During



Figure 20. Cosmonauts Boris Volynov and Vitali Zholobov are seen in a video still from the first expedition to Salyut 5 (July–August 1976). Between them is a military portrait of Yuri Gagarin.

the arrival of the Expedition 57 crew in June 2018, there were no religious items on the wall—only the photographs of Gagarin, Tsiolkovsky, and Korolev. The gold cross returned to the wall in time for the arrival of the Expedition 61 crew in July 2019. The coming and going of images and objects in the *Zvezda* niche suggest that this location continues to play an especially important part in the highly ritualized division of space on the ISS, where nations typically work hard to stress international collaboration. The contents of the niche fluctuate back and forth between a celebration of Russian, Orthodox, and patriotic values and the old secular rhetoric of the Soviet program centered around space heroes. Paradoxically, this pattern gives the post-Soviet Russian Orbital Segment of the ISS some of the qualities of Soviet-era society: a continued differentiation between “us” and “them” and a self-conscious awareness that by using images in certain ways, visual statements are being made about Russia’s assertive presence in space and in the geopolitical arena. The persistent presence of the image showing Gagarin with a dove could be read as a visual reassurance of commitment to the peaceful uses of outer space as enshrined in UN treaties. The three space heroes continue to dominate, as they did in the Soviet era, but the way they are interspersed with icons and relics heightens the sense that they, too, are icons, thereby dismantling the atheist and materialist rhetoric about space science from the Soviet period. Following Malinowski, Weibel and Swanson (2006) argue that cosmonauts’ space rituals are a form of “magical thinking” drawing on the pre-Soviet philosophy of cosmism, which combines “theosophy, panslavism and Russian Orthodox religious thinking, with the technological optimism of that era” (Lytkin, Finney, and Alepko 1995:370).

Analysis of images in the *Zvezda* module reveals patterns over time in the placement of religious icons and pictures of Soviet space heroes that had not previously been observed, demonstrating the potential of archaeological methods to offer new insights into social behavior on the ISS. It is worth emphasizing that, despite the long-standing tradition of visual display on space stations that we have identified, the practices observed here were seemingly unanticipated by *Zvezda*’s designers—there are no frames or holders for the items and no guidance from the architecture or decor about how and where to place them.⁴ Space station habitability might be improved by designs that take into account the likelihood that crew will want to decorate various spaces by providing architectural and decorative accommodations for visual displays to happen. Even so, the evolution of such practices so far demonstrates that such displays will also happen organically according to the needs and desires of individual crew members as well as those of the group as a whole.

4. Architect Galina Balashova, who was responsible for many of the design cues found in Soviet spacecraft (including a two-tone color scheme for identifying “up” and “down” that also appears in *Zvezda*), did include bungees holding what appear to be paintings to the wall of a speculative crew cabin (Meuser 2015). Bungees are attached to the lower aft wall of *Zvezda* at left and right, but from the available images, it appears that they are used to hold mission documents. It is also worth recalling that in the Tarkovsky film *Solaris*, the space station’s library includes artworks on the shelves and walls, most notably Pieter Bruegel the Elder’s 1565 painting *The Hunters in the Snow* (in the original novel, by contrast, the narrator says of the library, “Display for its own sake was improbable in these surroundings” [Lem 1970:110]).

Acknowledgments

The International Space Station Archaeological Project is supported by a Discovery Project grant from the Australian Research Council (DP190102747).

References Cited

- Aporta, Claudio, and Eric Higgs. 2005. Satellite culture: Global Positioning Systems, Inuit wayfinding, and the need for a new account of technology. *Current Anthropology* 46(5):729–753.
- Blakemore, Erin. 2015. There's an invader in the International Space Station. *Smithsonian*, March 13.
- Bluth, B. L., and M. Helppie. 1986. *Soviet space stations as analogs*. 2nd edition. Washington, DC: NASA.
- Buchli, Victor. 2000. *An archaeology of socialism*. Oxford: Berg.
- . 2021. Extraterrestrial methods: towards an ethnography of ISS. In *Lineages and advancements in material culture studies: perspectives from UCL Anthropology*. T. Carroll, A. Walford, and S. Walton, eds. Pp. 18–32. London: Taylor & Francis.
- Capelotti, P. J. 2010. *The human archaeology of space*. Jefferson, NC: McFarland.
- Chladek, Jay. 2007. *Outposts on the frontier: a fifty-year history of space stations*. Lincoln: University of Nebraska Press.
- Darrin, Ann, and Beth O'Leary, eds. 2009. *Handbook of space engineering, archaeology, and heritage*. Boca Raton, FL: CRC.
- De León, Jason. 2015. *The land of open graves: living and dying on the Migrant Trail*. Berkeley: University of California Press.
- Gorman, Alice C. 2016. Tracking cable ties: contemporary archaeology at a NASA satellite tracking station. In *That was then, this is now: contemporary archaeology and material cultures in Australia*. Ursula K. Frederick and Anne Clarke, eds. Pp. 101–107. Cambridge: Cambridge Scholars.
- Gorman, Alice C., and Justin Walsh. Forthcoming. Archaeology in a vacuum: obstacles to and solutions for developing a real space archaeology. In *Archaeology outside the box: investigations at the edge of the discipline*. Hans Barnard and Ran Boytner, eds. Los Angeles: Cotsen Institute of Archaeology.
- Harland, David. 2005. *The story of space station Mir*. New York: Springer.
- Hodder, Ian. 2012. *Entangled: an archaeology of the relationships between humans and things*. Malden, MA: Wiley-Blackwell.
- Kahler, Kirby. 2020. Walking through the doors of history: unlocking a space tradition. *Space Review*, September 8.
- Kitmacher, Gary H. 2002. Design of the Space Station habitable modules. Paper presented at the 53rd International Astronautical Congress, Houston, October 1–17.
- . 2015. *Reference guide to the International Space Station: utilization edition*. NP-2015-05-022-JSC. Houston: NASA Johnson Space Center.
- Lacy, Stephen, Tony Atwater, and Angela Powers. 1988. Use of satellite technology in local television news. *Journalism Quarterly* 65(4):925–929.
- Lem, Stanislaw. 1970. *Solaris*. Joanna Kilmartin and Steve Cox, trans. San Diego, CA: Harcourt.
- Lidov, Alexei. 2006. Hierotopy: the creation of sacred spaces as a form of creativity and subject of cultural history. In *Hierotopy: creation of sacred spaces in Byzantium and medieval Russia*. A. Lidov, ed. Pp. 32–58. Moscow: Progress-Tradition.
- Lindsay, Donald B. 1972. *Human factors in long-duration spaceflight*. Washington, DC: Space Sciences Board, National Academy of Sciences.
- Litfin, Karen T. 2002. Public eyes: satellite imagery, the globalization of transparency, and new networks of surveillance. In *Information technologies and global politics: the changing scope of power and governance*. James N. Rosenau and J. P. Singh, eds. Pp. 65–88. Albany: State University of New York Press.
- Lytkin, Vladimir, Ben Finney, and Liudmila Alepko. 1995. Tsiolkovsky, Russian cosmism and extraterrestrial intelligence. *Quarterly Journal of the Royal Astronomical Society* 36:369–376.
- Meuser, Philipp. 2015. *Galina Balashova: architect of the Soviet space programme*. Berlin: DOM.
- NASA. 2020. NASA Johnson. <https://www.flickr.com/photos/nasa2explore>.
- NASA and RSA (Russian Space Agency). 1998. Memorandum of understanding between the National Aeronautics and Space Administration of the United States of America and the Russian Space Agency concerning cooperation on the civil International Space Station. https://www.nasa.gov/mission_pages/station/structure/elements/nasa_rsa.html.
- O'Leary, Beth, and P. J. Capelotti, eds. 2015. *Archaeology and heritage of the human movement into space*. Space and Society. New York: Springer.
- Salmond, Wendy, Justin Walsh, and Alice C. Gorman. 2020. Eternity in low Earth orbit: icons on the International Space Station. In *The mutual influence of religion and science in the human understanding and exploration of outer space*. D. Weibel and G. Swanson, eds. Special issue, *Religions* 11 (11):611.
- Scharmen, Frederick. 2019. *Space settlements*. New York: Columbia University Press.
- Shevzov, Vera. 1999. Miracle-working icons, laity, and authority in the Russian Orthodox Church, 1861–1917. *Russian Review* 58(1):26–48.
- Siddiqi, Asif. 2010. *The red rockets' glare: spaceflight and the Russian imagination, 1857–1957*. Cambridge: Cambridge University Press.
- St.-Arnaud, Diane, Andre Farand, Motoko Uchitomi, Robin J. Frank, and Igor Porokhin. 2013. The legal framework for the International Space Station. Presentation to the UN Committee on the Peaceful Uses of Outer Space Legal Subcommittee, April 17. <https://www.unoosa.org/pdf/pres/lsc2013/tech-05E.pdf>.
- Thomas, Andrew. 2010. *Kul'tura kosmosa: the Russian popular culture of space exploration*. Boca Raton, FL: Dissertation.com.
- Walsh, Justin. 2012. Protection of humanity's cultural and historic heritage in space. *Space Policy* 28(4):234–243. <https://doi.org/10.1016/j.spacepol.2012.04.001>.
- . 2015. Purposeful ephemera: the implications of self-destructing space technology for the future practice of archaeology. In *Archaeology and heritage of the human movement into space*. Beth Laura O'Leary and P. J. Capelotti, eds. Pp. 75–90. Space and Society. New York: Springer, https://doi.org/10.1007/978-3-319-07866-3_6.
- Walsh, Justin, and Alice C. Gorman. 2021. A methodology for space archaeology: the International Space Station Archaeological Project. *Antiquity* 95 (383):1331–1343.
- Weibel, Deana L. 2015. “Up in God's great cathedral”: evangelism, astronauts, and the seductiveness of outer space. In *The seductions of pilgrimage: afar and astray in the Western religious tradition*. M. Di Giovine and D. Picard, eds. Pp. 223–256. London: Ashgate.
- Weibel, Deana L., and Glen E. Swanson. 2006. Malinowski in orbit: “magical thinking” in human spaceflight. *Quest* 13(3):53–61.
- Westwood, Lisa, Beth O'Leary, and M. Wayne Donaldson. 2017. *The final mission: preserving NASA's Apollo sites*. Gainesville: University Press of Florida.
- Zak, Anatoly. 2015. A rare look at the Russian side of the space station: how the other half lives. *Air & Space*, September. <https://www.airspacemag.com/space/rare-look-russian-side-space-station-180956244/>.