

A profile of humanity: the cultural signature of Earth's inhabitants beyond the atmosphere

Paul E. Quast

Beyond the Earth foundation, Edinburgh, UK

Research Article

Cite this article: Quast PE (2018). A profile of humanity: the cultural signature of Earth's inhabitants beyond the atmosphere. *International Journal of Astrobiology* 1–21. <https://doi.org/10.1017/S1473550418000290>

Received: 18 April 2018
Revised: 13 June 2018
Accepted: 21 June 2018

Key words:

Active SETI; data storage; deep time messages; eternal memory archives; future archaeology; long-term communication strategies; SETI; time capsules

Author for correspondence:

Paul E. Quast,
E-mail: info@beyondtheearth.org

Abstract

The eclectic range of artefacts and ‘messages’ we dispatch into the vast expanse of space may become one of the most enduring remnants of our present civilization, but how does his protracted legacy adequately document the plurality of societal values and common, cultural heritage on our heterogeneous world? For decades now, this rendition of the egalitarian principle has been explored by the Search for Extra-Terrestrial Intelligence community in order to draft theoretical responses to ‘who speaks for Earth?’ for hypothetical extra-terrestrial communication strategies. However, besides the moral, ethical and democratic advancements made by this particular enterprise, there remains little practical exemplars of implementing this garnered knowledge into other experimental elements that could function as mutual emissaries of Earth; physical artefacts that could provide accessible details about our present world for future archaeological observations by our space-faring progeny, potential visiting extrasolar denizens or even for posterity. While some initiatives have been founded to investigate this enduring dilemma of humanity over the last half-century, there are very few comparative studies in regards to how these objects, time capsules and transmission events collectively disseminate content about the aggregate of our species and the Earth system it inhabits. This catalogue, assembled for extended study as part of the *Beyond the Earth foundation*, is intended as an initial, dialogic step towards evaluating such a ‘profile of humanity’. This investigation will endeavour to collate all cultural resources that can presently be garnered from spacecraft (non-mission orientated, cultural material that conveys an impression of Earth) and non-terrestrial transmissions (electromagnetic signals that are intentionally aimed off-world to embody humanities’ evolving, philosophical identity) in the expanse beyond our planetary borders in order to cross-analyse how we presently illustrate the diversity of our planet before, subsequently, deducing how we could appropriately depict our collective human civilization [and biosphere] within deep space and cosmic time.

Overview

The cultural signature of humanity is a fluctuating, artificial field of intelligent design that [unevenly] emanates outwards from our planet as a result of the many pioneering initiatives we have engineered to preserve the abstract, cognitive reasoning of our species [and its prolific exploration of the cosmos]. There are many applications that presently contribute to this purposeful, celestial property of the Earth; our desires to create secure ‘eternal memory’ libraries to preserve information beyond our terrestrial environment (Guzman *et al.*, 2015), communication attempts with extra-terrestrial intelligence (Zaitsev, 2006), expressions within ‘SpaceArt’ (Paglen, 2012), mission outreach initiatives (Sutherland, 2015) and also symbolic gestures (Schulze-Makuch, 2016) devised to impart some profound heuristic about our observed position within the universe. However, considering the present criticism associated within Messaging to Extra-Terrestrial Intelligence (METI) and the ongoing controversy of a *priora* transmission strategies (Billingham and Benford, 2011; Brin, 2014; Gertz, 2016), it is vital that we should also responsibly contextualize all of our envoys [including physical artefacts and memoranda items that are capable of reaching other minds beyond the temporal horizon] and examine how they could collectively define the anthropocentric ‘voice’ of our world – or, in the very least, to keep track of the many narratives and philosophies we employ in describing our planet and its resident human population.

Presently, there is no consolidated inventory of the numerous multifaceted ‘technomarker’ activities that define our world at a distance other than several assessments [of our radio messages] performed by the Search for Extra-Terrestrial Intelligence (SETI) and METI communities (Vakoch, 2009; Zaitsev, 2012; Dumas, 2015) who responsibly document intelligible, electromagnetic envoys that intend to initiate diplomatic relations on behalf of Earth’s populace over intervals of deep time. In the absence of this centralized index, we currently possess many disparate accounts that cite singular events or references of unsubstantiated, ‘weird’ materials (Chilton, 2016) which could presently provide a unilateral impression of our planet. Due to this, accurately assessing humanities’ extended sphere of influence is particularly

difficult as we cannot reasonably articulate the role of a number of frequent, inimical concerns that could be inherent within these relics including;

- The aggregate of these objects and messages may provide an ethnically-biased perspective of our planet – omitting many cultures and indigenous communities in favour of populations who speak louder than others.
- Content chosen as an emissary of Earth might not democratically reflect our planet and may be partial towards the ideologies established by hegemonic populations – a subset of our shared global society.
- Information conveyed by numerous activities may subsequently contradict other sources thus providing incoherent documentation that could be disruptive for the receivers' [archaeological] deductions.
- This material may be unintelligible to a future recipient if we do not render concepts into comprehensible frameworks to aid in interpretation – an issue that could be inelegant at best or irresponsible at worst.
- We cannot deduce or evaluate what 'metamessage' (Saint-Gelais, 2014) information could have been conveyed to a receiver.

In line with prior surveys of METI signals and also the intricate registry produced by the Oglethorpe Universities' International Time Capsule Society (Oglethorpe University, 1990), the below catalogue is presented as a work-in-progress directory to document the celestial legacy of our civilization beyond Earth's borders. This index has been established in order to; consolidate and classify the information that could come to collectively define our generation(s) and the Earth system it inhabits, provide unique support material for an impending, phased publication that will theorise about the present perception(s) of Earth (the premise will be based upon the hypothetical acquisition of segments/all available spatial resources by dissimilar agents) and also to contribute to the development of ethical guidelines in line with other emergent fields that stand to influence our planet's indelible legacy. It is anticipated that the established categories and overall framework of this directory will be updated over time as sustained research, peer contributions and future initiatives elucidate the anthropogenic signature emanating from Earth on behalf of all terrestrial life and its' future descendants.

Notes

The principle, common criterion for all of the below listings is that the stated information will be accessible in space and remain accessible in some capacity over moderate to extended periods of

time. Some past/forthcoming initiatives have also been included to document these impending activities for communal review. The below catalogue is divided into a series of subcategories based predominately upon; the medium used to convey this information beyond Earth's atmosphere, the identified/detailed purpose of the activity (extra-terrestrial/descendant communication, information-storage, symbolic event, mission outreach etc.) and also whether these artefacts and transmission events can intelligibly fulfil their stated criteria (e.g. communicating with our descendants while also compensating for social evolution over protracted time frames). These listings only detail artefacts that have/will not returned to Earth and do not feature mission-orientated infrastructure (e.g. satellite communications, physical probes, launch vehicles, scientific payloads) or the radiosphere i.e. the unintentional field of electromagnetic 'leakage' emanating from terrestrial technologies.

This catalogue has been assembled in the interest of quantifying the range of cultural property that presently resides within space in order to provide support data for further academic study and communal research. A substantial portion of the information detailed below has been gathered through the kind support of the various individuals, institutes, organizations and other entities who have contributed to this biogenic signature of Earth. Some fields within each subcategory are marked with '-----' to denote lacunae and all activities are listed chronologically in CE notation.

METI interstellar radio messages

This category is largely defined by scholars within the SETI community who classify the below Active SETI transmission events under a number of set criteria including; relevant selection of signal target(s), adequate signal properties necessary to transverse the interstellar medium in order to be detected by an extra-terrestrial receiving array, appropriate modulation techniques that could theoretically be accessible for an Extra-Terrestrial Intelligence (ETI) and also selective content which denotes ideologies that should be comprehensible for extrasolar denizens. Furthermore, these messages also score high on the San Marino Scale (Almár and Shuch, 2006); a metric range used to assess the risks associated with deliberate transmissions from Earth to other civilizations.

Note: 'Arrival' field denotes the estimated CE date for each signal to physically reach their stated target(s) – based upon widely-accepted, parallax measurements. This does not, however, delineate whether the signal contents will arrive in a legible manner or as recognizable packets of energy per unit of receiver surface area.

Initiative name	Transmitted	Organizer(s)	Targeted object(s)	Arrival	Transmitted content(s)
Arecibo message (Sagan, 1978; Goldsmith and Owen, 2001; Grinspoon, 2003; Atri et al., 2011)	16 November 1974	Frank Drake, Richard Isaacman, Linda May, James C.G. Walker, Carl Sagan	Towards NGC 6205/Messier 13, Hercules	Revised estimate ~26974	Numbers (base unit of 10), a selection of chemical elements, DNA formulas, number of DNA nucleotides, the shape of a double helix, human graphic, planets diagram & transmitting telescope –sent via binary phase shift keying using cardinality of 1679 bits (a defined semi-prime number). Transmission; Arecibo Observatory 305 m radio telescope, 1000 kW.

(Continued)

(Continued.)

Initiative name	Transmitted	Organizer(s)	Targeted object(s)	Arrival	Transmitted content(s)
Greetings to Altair (Personal correspondence with Shin-ya Narusawa - collaborator on the JAXA METI Experiments; Pink, 2008)	15 August 1983	Hisashi Hirabayashi, Masaki Morimoto	HD 187642, Aquila	July 1999	13 images depicting; (1) definitions of numbers, signs, operations and elements, (2) structure of the solar system, (3) DNA nucleotides, (4) structure and replication of DNA, (5) protobionts, (6) jellyfish with dimensions, (7) fish with dimensions, (8) amphibian emerging from water to land with dimensions, (9) vertebrate organism with dimensions, (10) primate with dimensions, (11) family of humans, gene number and world population, (12) woman's face with depiction of raised [hello] arm gesture, (13) interpretive key [total number of 'bits', wavelength of transmission frequency and radius of dish] and molecular formula for ethanol alongside English/ Japanese words for 'toast/ cheers' - binary-encoded, each comprised 71 × 71 mosaic. Transmission; Stanford 46 m radio telescope 'The Dish'.
NASDA METI Messages (Personal correspondence with Shin-ya Narusawa - collaborator on the JAXA METI Experiments)	~22 August 1995 ~20 August 1996 ~12 August 1997 ~18 August 1998	National Science Development Agency of Japan (NASDA); Cosmic College for Students, Institute of Space & Astronautical Science (ISAS)	Libra constellation ----- HD 116658, Virgo -----	2147- 2361 ----- 2247 -----	(1995) 11 × 11 mosaic image detailing parents holding child's hands. (1996) 11 × 11 mosaic images of an 'alien' and an earthling. (1997) 11 × 11 mosaic images of (1) a human smiling (2) a rice dumpling and tea. (1998) 11 × 11 mosaic image depicting 1 + 1 = 2 in icons and corresponding Arabic integers. (All) Transmissions; 64 m Usuda Deep Space Center antenna.
Cosmic Call 1 (Vakoch, 2009; Dumas, 2010; Zaitsev, 2011; Zaitsev and Ignatov, 1999)	24 May 1999 30 June 1999 30 June 1999 1 July 1999	Team Encounter/ Alexander Zaitsev	HD 186408, Cygnus HD 190406, Sagitta HD 178428, Sagitta HD 190360, Cygnus	November 2069 February 2057 October 2067 April 2051	A noise-resistant exponent alphabet detailing; numbers, mathematical concepts, physical units, chemical elements, physical, biological, astronomical units and other concepts visualized within 23 graphical pages (each 127 × 127 mosaics) - sent via binary phase shift keying. Transmissions; RT-70 Yevpatoria, 148, 152, 152, 152 kW.
Teen Age Message (Zaitsev, 2002a, 2002b; Zaitsev, 2008)	29 August 2001 3 September 2001 3 September 2001 3 September 2001 4 September 2001 4 September 2001	Alexander Zaitsev/ Yevpatoria RT-70 Radio Telescope Observatory, Education Department of Moscow	HD 197076, Delphinus HD 95128, Ursa Major HD 50692, Gemini HD 126053, Virgo HD 76151, Hydra HD 193664, Draco	February 2070 July 2047 December 2057 January 2059 May 2057 January 2059	Three sectioned transmission: (1) a monochromatic radio wave with doppler correction for the Earth's rotation and motion around the Sun. (2) A 15 min concert performed on a Theremin musical instrument (7 songs in total). (3) TAM logo, texts of 'Greeting' to ETI written in both Russian and English and an image glossary of basic terrestrial concepts - digital information sent via binary phase shift keying and Theremin audio signals using single side band (SSB) modulation. Transmissions; RT-70 Yevpatoria, 150 kW (HD197076) & 96 kW (all other).
Cosmic Call 2 (Dumas, 2010; Dumas and Dutil, 2010; Dominus, 2015; Chorost, 2016; Dumas and Dutil, 2016; Braastad and Zaitsev, 2003)	6 July 2003 6 July 2003 6 July 2003 6 July 2003 6 July 2003	Team Encounter/ Alexander Zaitsev	Hip 4872, Cassiopeia HD 245409, Orion HD 75732, Cancer HD 10307, Andromeda HD 95128, Ursa Major	April 2036 August 2040 May 2044 September 2044 May 2049	A [re-evaluated] noise-resistant exponent alphabet detailing; numbers, mathematical concepts, physical units, chemical elements, physical, biological, astronomical units and other concepts visualized on a single, long graphical page (mosaic is 127 pixels wide) - sent in binary phase shift keying. (All) Transmissions; RT-70 Yevpatoria, 150 kW.
A Message from Earth (Atkinson, 2008; BBC, 2008; Kiss, 2008; Moore, 2008)	9 October 2008	RDF Digital/Bebo, Alexander Zaitsev	Hip 74995, Libra	February 2029	501 text messages, photographs and drawings concerning participants own lives, ambitions, views of world peace and planet Earth along with images of celebrities, notable landmarks - sent in binary phase shift keying. Transmission; RT-70 Yevpatoria, 150 kW.

(Continued)

(Continued.)

Initiative name	Transmitted	Organizer(s)	Targeted object(s)	Arrival	Transmitted content(s)
Lone Signal (Byrd, 2013; Gohring, 2013; Kramer, 2013; Pickard, 2014; Busch, 2013)	17 June 2013	Pierre Fabre & several entrepreneurs	HD 119850, Boötes	July 2030	Continuous wave/ hailing component (a binary encoding system, which uses an octal intermediary to represent; numbers, mathematical operators and other symbols) & 8201 [144 characters] messages submitted by the public. Transmissions; Jamesburg 30 m Earth Station.
JAXA METI Experiments (Personal correspondence with Shin-ya Narusawa - collaborator on the JAXA METI Experiments; Dumas, 2015; JAXA Space Education Center, 2013; 2014)	22 September 2013 23 August 2014	JAXA Space Camp, Shin-ya Narusawa (collaborator), Usuda Deep Space Center	HD 75732, Cancer HD 75732, Cancer	2053 2054	(2013) 11 × 11 mosaic images detailing parents holding a child's hands. (2014) A single image (potentially 11 × 11 pixel mosaic) of the Sun and a human. (All) Transmissions; 64 m Usuda Deep Space Center antenna, 20 kW.
Sónar Calling GJ 273b (Personal correspondence with Alan Penny - METI International Vice President - at the UK SETI Research Network Conference 2018, University of Oxford; Sónar, 2017; Vakoch, 2017)	16 October 2017 17 October 2017 18 October 2017 14 May 2018 15 May 2018 16 May 2018	Sónar Music Festival, Institute of Space Studies of Catalonia, METI International	GJ273b/Hip 36208, Canis Minor	(16–18 October) ~ March 2030 (14–16 May) ~ October 2031	A 'hello' file consisting of [repeated] sequenced prime numbers along with an introduction to 8 bit encoding, a 'tutorial' file demonstrating 8 bit mathematical concept primers and physical concepts along with; (16 October) seven 10 second music compositions, (17 October) six 10 second music compositions, (18 October) six 10 second music compositions, (14 May) five 10 second music compositions, (15 May) ten 10 second music compositions, (16 May) five 10 second music compositions from the Sónar Music Festival artists – transmitted 3 times a day, over three consecutive days. (All) Transmissions; Tromsø EISCAT 32 m dish, 1.5 MW.
Pending					
Message to the Milky Way (Diamond Sky Productions, 2013)	-----	Diamond Sky Productions/ Carolyn Porco, The Day the Earth Smiled	-----	-----	Public images were taken on 19 July [2013] that 'Describe us and our home planet...' and also 'One element of this message will be a musical contribution from a member of the public'. [Intended] Transmission; Arecibo Observatory 305 m radio telescope.
Interstellar Beacon/ Backup Earth (Kitchen, 2017)	-----	William Kitchen, Paul Shuch, John Spencer, Daniel Batchelder, Armin T. Ellis, Nova Spivack, Ethan Siegel	-----	-----	An interstellar Rosetta stone encapsulating language and communication strategies, an interstellar time capsule detailing natural and anthropological history including the art and science of humanity, an interstellar 'Noah's Ark' containing the genome sequences of numerous organisms and instructions for recreating humans 'Human Nursery' – transmitted using laser pulses.

Outreach, educational and symbolic transmissions

This category details signals that are not regarded (by the majority of the mainstream SETI community) as a serious communication attempt with ETI civilizations but rather as symbolic gestures, outreach activities or educational opportunities. Some METI

transmissions are listed within this category based upon the extent of criticism from SETI scholars under the criteria; choice of target (s), signal properties, appropriate transmission equipment used, accessibility of contents, lack of encoding methods employed within the signal design etc.

Initiative Name	Transmitted	Organizer(s)	Targeted Object(s)	Arrival	Transmitted Content(s)
Morse Message (Valentine, 2011; Kotel'nikov Institute of Radio-engineering and Electronics, 2008)	19 November 1962 24 November 1962	Soviet Union Radioastronomers	Venus (pasted planet and now travelling towards HD 131336, Libra)	4122	(19 November) 'MIR' (peace/world), (24 November) 'LENIN' (i.e. Vladimir Lenin) and 'SSSR' (abbreviation for Soviet Union) – using Morse Code. Transmissions; Yevpatoria Pluton-M transmitter, 50 kW.

(Continued)

(Continued.)

Initiative Name	Transmitted	Organizer(s)	Targeted Object(s)	Arrival	Transmitted Content(s)
Discovery; Calling All Aliens (Harrison, 2007; Dumas, 2015)	2005	Discovery Channel (Canada)	-----	-----	-----
Across the Universe (NASA Content Administrator, 2008; NBC News, 2008)	4 February 2008	Martin Lewis, NASA	HD 8890, Ursa Minor	2442	Across the Universe song by The Beatles along with message; 'Send my love to the aliens. All the best, Paul.' by Paul McCartney. Transmission; Madrid Deep Space Communications Complex 70 m antenna (DSS-63), 18 kW.
Hello from Earth (IT News, 2009; Leonard, 2009; Osborne, 2009)	28 August 2009	Wilson da Silva/ Australia National Science Week/NASA	Hip 74995, Libra	2029	25 878 text messages from the public (every 160 characters in length) – encoded in binary format. Transmission; Canberra Deep Space Communications Complex 70 m antenna (DSS-43).
Wow! Reply (National Geographic, 2012)	15 August 2012 15 August 2012 15 August 2012	National Geographic Channel, Campfire & Arecibo Observatory	HD 54351, Gemini HD 50692, Gemini HD 75732, Cancer	2162 2069 2053	20 000 Twitter messages with 'training headers' & celebrity videos – sent in binary phase shift keying. Transmissions; Arecibo Observatory 305 m radio telescope, 1 MW.
Toronto Science Fair METI Experiment [Canada] (Dumas, 2015)	2013	Toronto Science Fair, Algonquin Radio Observatory	HD 10700, Cetus Kepler-62, Lyra	2025 3213	'~100 words on video'. Transmission; Algonquin Radio Observatory.
A Simple Response to an Elemental Message (McCracken, 2016; Schulze-Makuch, 2016; Scuka, 2016; Quast, 2017)	10 October 2016	Paul Quast, ESA, University of Edinburgh, UKATC	HD 8890, Ursa Minor	2450	3775 ecological messages/ poems/ statements submitted by the public in 146 countries, 81 historical quotes and 70 photographs of Earth/humankind including several copies of the Arecibo Message – all encoded in binary format. Transmission; ESA 35 m Cebreros Deep Space Ground Station, 20 kW.
Stephen Hawking Memorial Broadcast (European Space Agency, 2018; Hawking Foundation, 2018)	15 June 2018	ESA, The Stephen Hawking Foundation, Vangelis	1A 0620-00, Monoceros	~5475	A six minute message drawn from a Stephen Hawking's speech [about preserving the planet] set against a specially-written musical piece composed by Vangelis. Transmission; ESA 35m Cebreros Deep Space Ground Station, 20 kW.

Space mission outreach (transmissions to probes)

indirect [non-operation function] signals sent specifically to spacecraft.

This category encompasses transmissions that are intended as public engagement activities for specific space missions or

Initiative Name	Transmitted	Organizer(s)	Targeted Object(s)	Arrival	Transmitted Content(s)
Wake-up Rosetta (European Space Agency, 2013; 2014)	2014	ESA	Rosetta/67P (i.e. Churyumov-Gerasimenko comet)	~27 min	10 'Wake-up' videos submitted by the public for the end of the Rosetta spacecraft hibernation sequence. Transmission; [unspecified facility] ESA Deep Space Ground Station, 20 kW.

Cultural expression and advertisement messages

predominately orientated as expressions of cultural articulation (or 'SpaceArt'). Signals within this category are also identified based upon criticism and criteria posed by the SETI community.

Category details transmissions which are commercial in nature (i.e. advertisement campaigns) or poetic messages that are

Initiative Name	Transmitted	Organizer(s)	Targeted Object(s)	Arrival	Transmitted Content(s)
Poetica Vaginal (Van Damme et al., 2009; Marshall, 2010; López del Rincón, 2015)	1986	Joe Davis/ Massachusetts Institute of Technology	HD 22049, Eridanus HD 10700, Cetus 2 other star systems (?)	(1) 1996 (2) 1998 (3/4) -----	Purportedly, a series of weak test transmissions of vaginal contraction sounds (translated into text, music and phonetic speech) from ballet dancers. The U.S. Air Force prevented the official, 'million Watt' transmission occurring. Transmissions; MIT's Millstone Hill Radar.

(Continued)

(Continued.)

Initiative Name	Transmitted	Organizer(s)	Targeted Object(s)	Arrival	Transmitted Content(s)
Message from Human Beings to the Universe - Nançay Message (Dumas, 2015; Malloy, 2016)	1987	Jean-Marc Philippe	Milky Way; Sagittarius A*	27000–29000	10 500 messages. Transmission; Nançay radio telescope.
Cosmic Connexion (Luxorion 2006; Zaitsev, 2012)	30 September 2006	Jean-Jacques Beineix/ Cargo Films, CNES, ARTE	HD 222404, Cepheus	2051	Animated [nude] presenters depicting humankind through images, sound, film, animations and cartoons within a short video file. Transmission; Issus-Aussaguel Station radio telescope.
Dorito Advertisement (Barras, 2008; Highfield, 2008; Space Daily, 2008)	12 June 2008	Doritos/ University of Leicester/ EISCAT	HD 95128, Ursa Major	2050	30-second video file encoded in binary. Transmission; EISCAT Svalbard radar.
Logo of Zhitomir City (Журнал Житомира, 2009)	~15 September 2009	Zhitomir City Council	-----	-----	The official logo of Zhitomir City. Transmission; RT-70 Yevpatoria.
RuBisCo Stars Message (Chandler, 2009; Gilster, 2009)	7 November 2009 7 November 2009 7 November 2009	Joe Davis	L1159-16, Aries SO J025300.5 + 165258, Aries HD 20630, Cetus	2024 2022 2039	DNA sequence of RuBisCo photosynthesis protein – encoded in binary (C = 00 T = 01 A = 10 and G = 11) and performed as a sound piece. Transmissions; Arecibo Observatory 305 m radio telescope.
Break the Eerie Silence (Jones, 2010; Southorn, 2010)	12 March 2010	Penguin UK, Sent Forever, National Science and Engineering Week, The Big Bang	M42, Orion	~3334	~1000 messages. Transmission; Goonhilly Satellite Earth Station 32 m antenna. See also 'Sent Forever' organization in the 'Short-Range, commercial transmissions' category.
Klingon Opera (Reuters, 2010; U-The Opera, 2010)	18 April 2010	Pool Worldwide/ CAMRAS	HD 124897, Boötes (i.e. 'Qo'noS' location)	2047	An invitation [in Klingon] to attend an Earth-based performance of Klingon Opera. Transmission; Dwingeloo Radio Observatory 25 m radio telescope.
Cogito (De Paulis, 2017; 2018)	(1) 26 November 2014 (2) Ongoing transmissions	Daniela de Paulis, Dwingeloo Radio Observatory, CAMRAS	(1) Titan (26 November 2014) (2) Subsequent messages; no specific, purposeful targets are defined	(1) ~79 min (2) -----	Human (and other organism) brain waves are recorded in real-time by a laboratory-grade electroencephalograph (EEG) before being converted into sound for instant transmission. Transmissions; Dwingeloo Radio Observatory 25 m telescope.

Short-Range, commercial transmissions

This category details commercial entities that transmit public content into space for a fee or as part of local outreach. Contents

of signals placed within this category should not be decipherable past $1 \leq pc$ (1- 3ly) from Earth and possess an eclectic range of themes that may not be properly encoded for any of the above applications.

Transmitter organization	Initiative designation	Transmitted	Organizer(s)	Targeted object(s)	Transmitted content(s)
Deep Space Communication Network (Personal correspondence with Jim Lewis - managing director of DSCN; Lewis, 2017)	Live from Australia Festival	18 January 2015	Aphids	-----	Transmissions (for all in DSCN subset); 'high-powered klystron amplifiers connected by a travelling wave-guide to a 5 m parabolic dish'.
DSCN	Sam Klemke (Closer Productions, 2015; Salce, 2015)	13 August 2014	Closer Productions	-----	A film about '35 years of Sam Klemke living on Earth'.
DSCN	Destination Selfie	12 June 2014	Nathaniel Stern	-----	-----
DSCN	A Perfect Day (Browne, 2013)	22 January 2013	Susanna Browne	-----	A song sent via 'high frequency radio transmission into space'.

(Continued)

(Continued.)

Transmitter organization	Initiative designation	Transmitted	Organizer(s)	Targeted object(s)	Transmitted content(s)
DSCN	Tweets in Space (Chakelian, 2012; Katz, 2012; Scharf, 2012a, 2012b; Tweets in Space, 2012)	28 November 2012	Scott Kildall, Nathaniel Stern	GJ 667Cc, Scorpius	1500 tweets from the global public via 'analogue and digital signals'.
DSCN	Space messages from Germany	26 January 2010	Cenyo Incorporation	-----	-----
DSCN	Live band performance	10 June 2010	Mercury Records Limited	-----	Audio files from live band performances.
DSCN	Text messages from England	24 December 2009	REaD Group	-----	Text messages [submitted as part of an advertising campaign].
DSCN	Text messages - Part 2	9 October 2009	Beeby Clark + Meyler	-----	Text messages [submitted as part of an advertising campaign].
DSCN	Text messages - Part 1	9 October 2009	Beeby Clark + Meyler	-----	Text messages [submitted as part of an advertising campaign].
DSCN	The Space Show 21	19 August 2009	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 20	19 May 2009	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	Deep space transmission	15 May 2009	Kapwani Kiwanga	-----	-----
DSCN	Eduardo Kac drawing	9 March 2009	Eduardo Kac	-----	Eduardo Kac Ph.D. drawing.
DSCN	Deep space Transmission	27 January 2009	Charles H. Andrews	-----	-----
DSCN	The Day the Earth Stood Still (Overbye, 2008; Rense, 2008)	12 December 2008	Twentieth Century Fox	HD 128620, Centaurus	The Day the Earth Stood Still (film - 2008 edition).
DSCN	The Space Show 19	12 December 2008	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 18	6 October 2008	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	Deep space transmission	5 September 2008	Sui Genesis, Inc.	-----	-----
DSCN	The Space Show 17	September 2008	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 16	19 August 2008	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	Ophiuchus Improvization	September 2008	Paul Amlehn, Robert Fripp	-----	'Queer Reflection Harmonic Minor' musical composition.
DSCN	Yelling at the Stars (Aphids, 2008; Real Time, 2008)	7 April 2008/31 May 2008	Willoh S. Weiland, Aphids Residencies and Mentoring Scheme, Sidney Myer Music Bowl/ Next Wave Festival	-----	40-min audio/ visual performance.
DSCN	The Space Show 15	December 2007	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 14	November 2007	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 13	September 2007	David M. Livingston	-----	Internet radio talk show space commerce and exploration.

(Continued)

(Continued.)

Transmitter organization	Initiative designation	Transmitted	Organizer(s)	Targeted object(s)	Transmitted content(s)
DSCN	The Space Show 12	July 2007	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 11	April 2007	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 10	March 2007	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 9	December 2006	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 8	September 2006	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 7	August 2006	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 6	July 2006	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	Romanian Gymnastic	July 2006	Romanian Gymnastics	-----	Video compilation of Romanian gymnastics.
DSCN	The Space Show 5	April 2006	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 4	March 2006	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	Audi engine photo	28 February 2006	-----	-----	A photograph of an Audi car engine.
DSCN	The Space Show 3	February 2006	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 2	December 2005	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	The Space Show 1	December 2005	David M. Livingston	-----	Internet radio talk show space commerce and exploration.
DSCN	Birthday photos	24 July 2005	-----	-----	Birthday photographs.
DSCN	Craigslist Messages 2 (MacMillan, 2005; Naubaum, 2005; Than, 2005)	15 March 2005	Jim Buckmaster	-----	A video message from Craig Newmark, a clip from the documentary <i>24 Hours on Craigslist</i> , and 'hundreds of thousands' of postings.
DSCN	Craigslist Messages 1	11 March 2005	Jim Buckmaster	-----	138 000 public messages/ ads/postings from Craigslist forum.
DSCN	The Orange County register messages to deep space	-----	Residents of Orange County, California.	-----	Public messages from residents of Orange County, California.
DSCN	Deep space whale song	-----	-----	-----	Encoded whale song audio.
DSCN	Black Eyed Soul in deep space	-----	-----	-----	-----
Talk2ETs (MacMillan, 2005; Talk2ETs, 2015)	2006 - Present	Private, Commercial Enterprise	Eric Knight/ Civilian Space eXploration Team	None Designated	Public messages, sentiments (exact nature of the content is unverifiable) etc. Transmissions; 6 m parabolic reflector and 'very high power + 500 Watt block-up converters'.
Sent Forever (Thomason, 2008; Sent Forever, 2009)	2009 - (?)	Private, Commercial Enterprise	Stephanie Baillache, Chris Thomason	None Designated	Public messages, statements, sentiments, images, music etc. Transmissions; Goonhilly Satellite Earth Station 32 m Antenna.

(Continued)

(Continued.)

Transmitter organization	Initiative designation	Transmitted	Organizer(s)	Targeted object(s)	Transmitted content(s)
Pan Galactic Email Station (Personal correspondence with Blackrock Castle Observatory faculty - facilitators of the Pan Galactic Email Station; Blackrock Castle Observatory, 2017)	2010 - Present	Blackrock Castle Observatory, Cork	Blackrock Castle Observatory, Cork	None Designated	Public messages, statements, sentiments, images, music etc. Transmissions; Elfordstown Earthstation 32 m radio telescope.

Human time capsules and external memory initiatives

This category details informative, 'eternal memory' initiatives and physical time capsule elements that may be largely accessible for future human agents. These initiatives provide a modest to

elaborative quantity of intelligible information (assertion is predicated upon discovery by future humans with similar cognitive and morphological functions) with some objects capable of compensating for predicted shifts in cultural evolution on Earth over protracted intervals of time.

Mission; Item Title	Date	COSPAR ID	Current location	Organizer(s)	Content(s) Description & Carrier Medium(s)
LAGEOS; Time Capsule (O' Donnell and Worrell, 1976)	1976	1976-039A	Medium Earth Orbit	NASA	Binary arithmetic counting scheme, a graphic of Earth's orbit around the Sun and 3 Mollweide projections of Earth's changing tectonic activity (Permian-age/Pangaea map, present-day configuration and future projection in 8.4 million years) – etched on 10 × 18 cm ² stainless steel sheets.
Cassini; 'A Portrait of Humanity' (Benford, 1999; Lomberg, 2004)	ORIG.1997	-----	Titan's surface (PROJECT CANCELLED)	Jon Lomberg, Gregory Benford, NASA	Stereoscopic photograph of a multi-ethnic grouping of individuals, 6-axis view of Earth, Huygens lander and Cassini probe, images of planets with symbols, a large image of Saturn, photographs of the Big Dipper, M51 and Hercules cluster and a scaled map of the solar system depicting planets, symbols and probe/ lander trajectories – etched onto a diamond disk wafer.
The Orbiting Unification Ring Satellite (O.U.R.S) (Woods, 1992)	ORIG. 2000	-----	Low Earth Orbit (SEEMINGLY CANCELLED)	Arthur Woods/ O.U.R.S Foundation	A large orbiting ring sculpture with an electronic digital record of Earth's diverse cultures [in the year 2000]; pictures, sounds and text – stored on optical laser discs.
Encounter 2001 Spacecraft (Astronet, 1998)	ORIG. 2001	-----	Beyond Jupiter/ Interstellar Space (PROJECT CANCELLED)	Charles Chafer/ Jim Spellman/ Encounter 2001/ Celestis, AeroAstro	'Human hair from... 4.5 million people worldwide' (apparently six strands per person) along with pictures and small messages.
Rosetta Project (Rogers, 2017; The Long Now Foundation, 2009)	2004	2004-006A	Deep Space	ESA, Long Now Foundation	1500 languages detailing the Universal Declaration of Human Rights spread across 13,000 pages with redundancy material and a basic Swadesh vocabulary list – micro-etched onto a pure nickel disc. A stylus is included.
Mars Phoenix Lander; Visions of Mars DVD (Lomberg, 2010; Planetary Society, 2018)	2007	2007-034A	Mars - Vastitas Borealis	NASA/ JPL, University of Arizona, Planetary Society	Multimedia collection of literature/ art; H.G. Wells 'War of the Worlds' (with Orsen Welles radio broadcast), Percival Lowell's 'Mars as the Abode of Life', Ray Bradbury's 'The Martian Chronicles', Kim Stanley Robinson's 'Green Mars' etc., messages to future Martian inhabitants & list of name [see below 'Send your name into space' category] – on special silica glass DVD.

(Continued)

(Continued.)

Mission; Item Title	Date	COSPAR ID	Current location	Organizer(s)	Content(s) Description & Carrier Medium(s)
International Space Station; Immortality Drive (Coyle, 2008; Reid, 2009)	2008	1998-067A (item later placed on board ISS)	Low Earth Orbit	Richard Garriott	DNA sequences of eight humans (Stephen Hawking, Stephen Colbert, Jo Garcia, Richard Garriott, Tracy Hickman, Laura Hickman, Matt Morgan, Lance Armstrong) & digital copy of the book; 'George's Secret Key to the Universe' – on a microchip.
EchoStar XVI; The Last Pictures (Paglen, 2012; Creative Time, 2017; O'Grady, 2017)	2012	2012-065A	Geostationary Orbit (Longitude: 61.5° W)	Trevor Paglen, Creative Time	100 micro-etched, black and white photographs – on silicon wafer disc, encased in a gold-plated aluminium case.
NanoRosetta; Human Genome Project (Svec, 2013)	ORIG. ~2013	-----	Moon (SEEMINGLY CANCELLED)	Carnegie Mellon University, Nanorosetta, Astrobotic	3.2 billion base pairs from human genome – microscopically-etched onto 5 CD-sized nickel discs.
Falcon Heavy; Isaac Asimov's Foundation Trilogy (Spivack, 2016a, 2016b; Britt, 2018; The Arch Mission, 2018)	2018	2018-017A	On a trajectory to near-Ceres/asteroid belt orbit	The Arch Mission Foundation, SpaceX	A copy of Isaac Asimov's Foundation trilogy (the novels; <i>Foundation</i> , <i>Foundation and Empire</i> , and <i>Second Foundation</i>) – written onto a '5D quartz laser storage device'.
Pending					
Moon Ark (Press Trust of India, 2015; Zhorov, 2016; MoonArk, 2017; Studio for Creative Inquiry, 2017)	Stated 2019	-----	Awaiting launch details	Carnegie Mellon University, Astrobotic	Hundreds of images, poems, musical compositions, nano-objects (including solid 18k gold icosahedrons, chondritic meteorite fragments, diamond samples and carbon 60 fullerenes), mechanisms and other earthly samples – contained within four independent 2' x 2' diameter chambers (labelled; earth, metasphere, moon & ether respectively according to their concept and contents).
Astrobotic Peregrine lander; Arch 2020 (Grush, 2018)	Stated 2020	-----	Awaiting launch details	The Arch Mission Foundation, Astrobotic, United Launch Alliance	25–50 million pages from the [English edition of] Wikipedia encyclopaedia along with a copy of the 'Rosetta Project' comprised 1500 Languages and additional details – micro-etched onto thirty-two 1.7 x 1.7 cm ² square nickel sheets.
Time Capsule to Mars (Explore Mars, 2014; Holler, 2014; UKSEDS, 2015)	-----	-----	Awaiting project details	Emily Briere, Iulia Jivanescu, David Rokeach, MIT Space Propulsion Lab & Explore Mars Inc.	Digital messages and photographs from the public – on 'potentially quartz storage technology'.
The Human Document Project (Manz, 2010; Elwenspoeck, 2011; Human Document Project, 2017)	-----	-----	Awaiting project details	Human Document project consortium	A document on key aspects of contemporary human culture – no specific medium is presently decided.
Mars One; The HELENA payload (Richards, 2014)	-----	-----	Awaiting project details	Andre Van Vulpen, Angus Tavner, David Blair, Josh Richards & Mars One	'Content submitted by the public via social media during National Science Week 2015' – on a radiation-hardened DVD.
MOM on the MOON (Puli Space, 2016; Kunze, 2018)	-----	-----	Awaiting project details	Memory of Mankind, Puli Space	The Memory of Mankind token (denoting location of this underground vault in Hallstatt, Austria) and up to six tablets of ceramic microfilm.
Lunar Mission One; Digital Memory Boxes (Griffin, 2014; Li, 2014; Wall, 2014; Gitlin, 2015)	-----	-----	Awaiting project details	Lunar Missions Trust, David Iron	An encyclopaedia of Earth's biosphere, history of human civilization, a public archive, a private archive consisting of millions of digital memory boxes (contents presently undecided) and also DNA from human hairs (medium for

(Continued)

(Continued.)

Mission; Item Title	Date	COSPAR ID	Current location	Organizer(s)	Content(s) Description & Carrier Medium(s)
					information and physical artefacts is presently undecided) with a separate 'Footsteps on the Moon' image repository – '~100 Terabytes' of information.
PTScientists; ALINA Wikipedia Archive (Foust, 2016; Coldewey, 2016)	-----	-----	Awaiting project details	PTScientists, Spaceflight Industries, Audi	A large extract of the Wikipedia encyclopaedia – etched onto ceramic data discs.
KEO Satellite (Butler, 1998; Ashraf, 2003; Wayne, 2011; KEO, 2013)	-----	-----	Awaiting project details	Jean-Marc Philippe/ KEO Ltd.	Four page long messages from each person on Earth (estimate was for 6 billion population during original launch), a diamond that encases samples of human blood, air, seawater and earth, DNA and the human genome graphics engraved onto a diamond face, an astronomical clock that shows the current rotation rates of several pulsars, photographs of people from all cultures and a contemporary encyclopedia of current human knowledge – encoded onto glass, radiation-resistant DVDs and enclosed within a hollow 1 m diameter sphere.
The Beyond the Earth 'Companion Guide to Earth' library (Quast, 2018)	Stated 2023–2024	-----	Awaiting project details	The Beyond the Earth Foundation	Spherical introductory guides comprised of two hemispheres; (1) 'North'; intuitive magnification/ directionality cues, an exosemiotic, ideographic guide with corroborating Lincos lexicon, an atlas of terrestrial/ celestial cultural vault locations, the complete ' <i>Ramazzottius varieornatus</i> ' genome, human anatomy and cognition markers, sample biota library and tree of life diagrams and instructions for collaborative tasks. (2) 'South'; curated cultural content from the plurality of ethnic/ indigenous heritages, linguistics Rosetta guide, population statistics and audio tracks with spectrograms – all information is micro-etched onto a series of 16 double-sided discs and enclosed within 32 mm capsules.

Passive METI initiatives

Artefacts within this category are intended as 'Rosetta stones' for intercepting ETI and are capable of providing a comprehensible (and in some cases limited) account of life on Earth for another

intelligent civilization which may not share our sensory perceptions, morphology, genetic heredity, ontogenic or phylogenetic traits, mutually-experienced environment or cognitive capabilities.

Mission & item title	Date	COSPAR ID	Current location	Organizer(s)	Content(s) description & carrier medium(s)
Pioneer 10 & 11; Plaques (Sagan <i>et al.</i> , 1972)	1972, 1973	1972-012A, 1973-019A	Interstellar Space (both)	NASA/ ARC	Diagrams of humankind (prototypical male/female models), the spacecraft, our Solar System, hydrogen line & pulsar map – on gold anodized, aluminium plaques.
Voyager 1 & 2; Golden Records (Sagan, 1978)	1977, 1977	1977-084A, 1977-076A	Interstellar Space (both)	NASA, Cornell University Committee (Chaired by Carl Sagan)	A collection of 116 images (depicting; solar system, planets, humans, animals of Earth, architecture, physical constants, food etc.), a variety of natural sounds of Earth (wind, thunder, animal calls etc.), an eclectic musical

(Continued)

(Continued.)

Mission & item title	Date	COSPAR ID	Current location	Organizer(s)	Content(s) description & carrier medium(s)
					selection representing numerous cultures and eras, spoken greetings in 55 ancient and modern languages, human sounds (footsteps, laughter, EEG of human brain activity etc.), 'per aspera ad astra' phrase in Morse code and printed messages from the 1977 US President & U.N. Secretary-General – on gold anodised, copper mother LP records, wrapped in the US flag and enclosed within aluminium covers.
New Horizons; One Earth Message (New Horizons Message Initiative, 2015; Washburn, 2015; Lomberg, 2016; Shanks, 2016)	-----	2006-001A	Interstellar Space (New Horizons probe). Proposed 'One Earth Message' is still under consideration by NASA <i>et al.</i>	Galaxy Garden Enterprises LLC/ Jon Lomberg	A rich, crowd-sourced encyclopaedia of digital pictures, audio files, information about animals, people, places, history/world events and primer strategies for decoding along with the potential inclusion of software and three-dimensional files – all submitted by the public and selected via communal voting before uplink to the internal memory of the New Horizons probe (with the option of periodically updating this 'Golden Record 2.0' repository).

Space mission publicity and outreach initiatives

Initiatives within this category are identified as part of the publicity and educational activities for a featured space mission and also by the esoteric content included aboard these spacecraft.

Most of the items within this category have been organized through outreach activities within numerous space agencies or have been the result of collaborative engagement between organizations.

Mission & Item Title	Date	COSPAR ID	Current Location	Organizer(s)	Content(s) Description & Carrier Medium(s)
Huygens: Music2Titan (European Space Agency, 2004a)	1997	1997-061C	Titan - Xanadu region	ESA, Julien Civange, Louis Haéri	Four pop songs ['Lalala', 'Bald James Dean', 'Hot Time' and 'No Love'] – on CD-ROM (same CD as signatures – see 'Send your name into space' category below).
MER Mars Exploration Rovers [Spirit & Opportunity; MarsDial (Lomberg, 2010; Boyle, 2012)	2003	2003-027A, 2003-032A	Mars - Gusev Crater & Meridiani Planum	NASA/Cornell University/ Planetary Society/ Jon Lomberg	A Martian sundial (used to calibrate the Pancam on rovers as well as educational purposes) consisting of etched drawings/lettering, an additional inscription and the word 'Mars' in 24 languages – on an aluminium plate with anodised metal surfaces in black, gold, colour along with a silicon rubber compound.
Beagle 2/Mars Express; Blur call-sign & Damien Hirst painting (Beagles 2 website, 2004; Sutherland, 2015)	2003	2003-022C	Mars surface (LANDER MEMORY QUESTIONABLE)	British Space Agency, ESA	A Blur (the music band) call-sign to test communication channel [stored in internal memory] & Damien Hirst spot painting as a calibration target plate for cameras/ spectrometers [physical painting on landers surface].
New Horizons; Mementos (Collect Space, 2008; The Editors of Sky and Telescope, 2015)	2006	2006-001A	Interstellar Space	NASA	Florida/ Maryland quarter coins, two US flags, CD ROMs with photographs of mission team & names [see below category], a piece of SpaceShipOne, 1991 US postal stamp & 1oz of Clyde Tombaugh ashes.
	2011	2011-070A	Mars - Gale Crater	NASA	Graphic of Leonardo Di Vinci, excerpt from his 'Codex on the Flight of Birds'

(Continued)

(Continued.)

Mission & Item Title	Date	COSPAR ID	Current Location	Organizer(s)	Content(s) Description & Carrier Medium(s)
Curiosity [Mars Explorational Rover] (Redazione, 2012; Shiner, 2013)					along with some essays, drawings and list of names [see below 'Send your name into space' category].
Juno; Galileo Plaque & Lego Figurines (Collect Space, 2011; NASA Content Administrator, 2011)	2011	2011-040A	Orbiting Jovian System (2021 - end of mission deorbit)	NASA/JPL, Lego, Italian Space Agency	Graphic of Galileo Galilei with hand-written paragraph [concerning Jupiter observations] and signature – on a 71 × 51 mm ² flight-grade aluminium plaque. Lego figurines of Juno, Galileo & Jupiter in aluminium included aboard craft.
Pending					
CHEOPS: European Kids Drawings (Campbell, 2015; European Space Agency, 2016)	Stated 2019	-----	Awaiting launch details	University of Bern, ESA	3000 children's drawings – engraved onto two metal plaques.

'Send your name into space' initiatives

This category details the popular 'send your name into space' outreach initiatives that are conducted by space agencies for either

the global public or select groups of individuals/organizations (e.g. The Planetary Society).

Space mission	Date	COSPAR ID	Current Location	Organizer(s)	Content(s) description & carrier medium(s)
Viking 1 & Viking 2 (National Aeronautics and Space Administration, 1978; Benford, 1999)	1975, 1975	1975-075C, 1975-083C	Mars – Chryse Planitia & Utopia Planitia	NASA	Microdot of signatures from thousands of people (administrators, science teams, flight teams, camera technicians, support personnel, analysts and interns) who contributed towards the development of the Viking landers.
Mars Pathfinder (Planetary Society, 2017)	1996	1996-068A	Mars – Ares Vallis region	NASA/JPL/ Planetary Society	100,000 names [originally collected for the failed Mars' 96 mission] – on a microchip.
Cassini; 'Send your Signature to Saturn' (Murrill, 1997; NASA, 2004; Zeluck, 1996)	1997	1997-061A	Saturn (DESTROYED – DE-ORBITED INTO SATURN)	NASA/JPL/ESA/ ASI/Planetary Society	616 420 handwritten signatures (including Christiaan Huygens & Giovanni Cassini signatures) – on DVD disc.
Huygens CD[Cassini]/ 'Messages on Titan' (European Space Agency, 2004b)	1997	1997-061C	Titan – Xanadu region	ESA/ASI/NASA	85 000 signatures [along with some texts, drawings and musical compositions] – on CD-ROM.
Mars Polar Lander [Mission Failed] (Ainsworth, 1998)	1999	1999-001A	Mars – Planum Australe (DESTROYED – SURFACE IMPACT)	NASA/JPL	~1 000 000 names of kids from across the globe – on CD ROM.
Stardust (NExT); 'Send your name to a comet' (NASA, 1999; Collect Space, 2014; Planetary Society, 2017)	1999	1999-003A	~312,000,000 km in deep space	NASA/JPL/ Planetary Society	Electronically-etched (~1 000 000) names of public and 58 214 Vietnam veterans memorial names – on 10.16 cm silicon chips.
Hayabusa; 'Let's Fly to Meet Your 'Star Prince' (Shujiro, 2003; Matogawa, 2005; Reddy, 2005)	2003	2003-019A	Deep space near 25143 Itokawa – List placed aboard 'Minilander' (FAILED TO LAND)	JAXA/Sawai Shujiro	880 000 signatures engraved onto a 10 cm aluminium sphere 'target marker'.
MER Mars Exploration Rovers [Spirit & Opportunity] (Planetary Society, 2017)	2003, 2003	2003-027A, 2003-032A	Mars – Gusev Crater & Meridiani Planum	NASA/Planetary Society	4 000 000 names apiece along with Stephen Little artwork 'Monochrome (for Mars)' – on silica glass DVDs.
Deep Impact 'send your name to a comet' (Carey, 2005)	2005	2005-001A	~431 000 000 km from Earth (DESTROYED – IMPACTED COMET)	NASA	625 000 names – on CD ROM.

(Continued)

(Continued.)

Space mission	Date	COSPAR ID	Current Location	Organizer(s)	Content(s) description & carrier medium(s)
New Horizons (Griggs, 2015; Johns Hopkins Applied Physics Laboratory, 2016; Planetary Society, 2017)	2006	2006-001A	Interstellar Space	NASA	434 738 names – on CD ROM.
Mars Phoenix Lander (Planetary Society, 2017)	2007	2007-034A	Mars – Vastitas Borealis	NASA/JPL, University of Arizona, Planetary Society	250 000 names – on DVD (same DVD as the 'Visions of Mars DVD' archive - see above 'Human time capsules & eternal memory initiatives' category).
Dawn (NASA, 2007)	2007	2007-043A	Ceres (asteroid belt)	NASA	~365 000 names – on microchip.
Kaguya [SELENE] (Kaplan, 2007)	2007	2007-039A	Moon – Gill crater	JAXA/Planetary Society	412 627 names – printed on 280 × 160 mm ² aluminium sheet.
Kepler Space Observatory (NASA, 2008; Zimmer, 2009)	2009	2009-011A	[Earth-trailing] Heliocentric Orbit	NASA	~60 000 names – on DVD.
Lunar Reconnaissance Orbiter [LRO] (Jenner, 2009)	2009	2009-031A	Moon – Eccentric polar orbit	NASA	~1 600 000 names – on microchip.
Akatsuki [PLANET-C] (JAXA, 2009a, 2009b)	2010	2010-020D	Elliptical orbit around Venus	JAXA/ Planetary Society	260 214 names and messages (with 2 figurines) – on ~90 aluminium plates.
IKAROS (Par, 2010; Planetary Society, 2010)	2010	2010-020E	Heliocentric orbit ~ 110 000 000 km from Earth	JAXA/ Planetary Society	63 248 names and messages – on aluminium plates (stored in 3/4 of IKAROS' square-shaped sail corners). Content collected by JAXA only. 89 000 names and messages – separate names stored upon the Planetary Society's silica glass mini-DVD.
Curiosity [Mars Explorational Rover] (NASA, 2010)	2011	2011-070A	Mars - Gale Crater	NASA	1 246 445 names – etched onto 2 silicon microchips.
Mars Maven (University of Colorado, 2012; NBC News, 2014)	2013	2013-063A	Areocentric elliptic orbit around Mars	NASA/Planetary Society	100 000 names, 377 student artworks and 1000 haiku poems – on DVD.
Hayabusa 2 (Planetary Society, 2014; Yoshikawa <i>et al.</i> , 2015)	2014	2014-076A	En-route to asteroid 162173 Ryugu	JAXA/Planetary Society	~400 000 names, messages, illustrations and photographs – etched on a target marker (participants names only) and also on the internal memory chip of spacecraft.
OSIRIS-Rex (NASA, 2014; Lalwani, 2016; Planetary Society, 2016; Planetary Society, 2017)	2016	2016-055A	En-route to asteroid 101955 Bennu	NASA/Planetary Society	442 000 names and 'We the Explorers' artworks – on a silicon chip.
Mars Insight (Greicius, 2017)	2018	2018-042A	En-route to Mars (Elysium Planitia)	NASA	2 429 807 names – on two microchips.
Pending					
Parker Solar Probe; Hot Ticket (NASA, 2018)	Stated 2018	-----	Awaiting launch details	NASA	1 137 202 names – on an SD card attached to a plaque with epigraph dedicated to Eugene N. Parker.
LightSail 2 [#SelfieToSpace] (Davis, 2016; Planetary Society, 2016)	Stated 2018	-----	Awaiting launch details	Planetary Society	Awaiting detailed listing of contents.
Team Indus; Millions2 Moon Movement (Analytics India, 2017)	Stated 2019	-----	Awaiting launch details	Team Indus (Bangalore)	Micro-engraved names – on an aluminium sheet.

Other objects beyond Low Earth Orbit

This category documents the various objects that are present within space which are capable of providing a limited perception of our cultural articulation beyond Earth's atmosphere including;

unsanctioned objects left by manned space mission, novelty items inserted into Earth orbit, other tactile elements and also SpaceArt initiatives that presently still reside within this celestial environment.

Mission & Item Title	Date	COSPAR ID	Location	Organizer(s)	Content(s) Description
Apollo 11; Goodwill Messages (NASA, 1969; Pearlman, 2007)	1969	1969-059C	Moon – Sea of Tranquillity	NASA	Statements of goodwill from 73 [1969] world leaders – engraved on a silicon disc and enclosed within an aluminium case.
Apollo 11; Gold Olive Branch (Minnesotastan, 2010)	1969	1969-059C	Moon – Sea of Tranquillity	NASA	A gold (presumably cast gold) olive branch; a traditional symbol of peace.
Apollo 11; Lunar Plaque (Johnson, 2008; Smithsonian Institution, 2018)	1969	1969-059C	Moon – Sea of Tranquillity	NASA/Jack Kinzler	2 hemisphere maps of Earth, an inscription and astronauts' signatures – engraved on stainless steel.
Apollo 12; Moon Museum (Landes, 2016; Museum of Modern Art (MOMA), 2018)	1969	1969-099C	Moon – Mare Cognitum	NASA/Jack Kinzler	6 miniature artworks by Robert Rauschenberg, David Novros, John Chamberlain, Claes Oldenburg, Forrest Myers and Andy Warhol – on a small, ceramic wafer.
Apollo 12; Lunar Plaque	1969	1969-099C	Moon – Mare Cognitum	NASA/Jack Kinzler	Inscription and astronauts' signatures – engraved on stainless steel.
Apollo 14; Lunar Plaque	1971	1971-008C	Moon – Fra Mauro Base	NASA/Jack Kinzler	2 hemisphere maps of Earth, an inscription and astronauts' signatures – engraved on stainless steel.
Apollo 15; Lunar Plaque	1971	1971-063C	Moon – Hadley Rille	NASA/ Jack Kinzler	2 hemisphere maps of Earth, an inscription and astronauts' signatures – engraved on stainless steel.
Apollo 15; Fallen Astronaut (Smithsonian Air and Space Museum, 2017)	1971	1971-063C	Moon – Hadley Rille	David Scott & Paul Van Hoeydonck	8.5 cm aluminium figurine in a spacesuit.
Apollo 16; Lunar Plaque	1972	1972-031C	Moon – Descartes Highlands	NASA/Jack Kinzler	2 hemisphere maps of Earth, an inscription and astronauts' signatures – engraved on stainless steel.
Apollo 16; Family Photograph (Orwig, 2015)	1972	1972-031C	Moon – Descartes Highlands	Charles Duke & Family	Photograph of the astronaut Charles Duke and his family.
Apollo 17; Lunar Plaque	1972	1972-096C	Moon – Taurus-Littrow	NASA/Jack Kinzler	2 hemisphere maps of Earth, lunar landing site map, an inscription and astronauts' signatures – engraved on stainless steel.
Mars Express; Red Encounter (Red Encounter, 2003)	2003	2003-022A	Areocentric orbit around Mars	Ferrari, ESA	Sample of Ferrari red paint 'Rosso Corsa' – contained in a glass 'FRED' sphere sealed into a PMMA block.
Saparmurat Niyazov 'Rukhnama' Book and 2 Flags (BBC News, 2005; Kalder, 2013)	2005	[Launched with] 2005-031A	Low Earth Orbit	Saparmurat Niyazov Roscosmos (?)/ JAXA (?)	A copy of the book 'Rukhnama' written by former Turkmenistan president Saparmurat Niyazov along with a Turkman flag and presidential standard.
TerraSAR-X; Weltraum Visitor Sculpture (Weltraum Kunst, 2003–2016)	2007	2007-026A	Sun-synchronous orbit	Ragnhild Becker, Gunar Seitz, German Aerospace Centre (DLR), EADS Astrium	Three-dimensional sculpture affixed to satellite hull.
Falcon Heavy; Tesla Roadster & 'Starman' (Leonard, 2018; Malkin, 2018; Rein <i>et al.</i> , 2018)	2018	2018-017A	En-route to near-Ceres/ asteroid belt orbit	Space X/Elon Musk	[Cherry-Red] Tesla Roadster electric sports car and a space-suited mannequin strapped into the driver's seat with David Bowie's 'Space Oddity' song looping on the car radio (along with a sign stating; 'Don't Panic'). See also 'Falcon Heavy; Isaac Asimov's Foundation Trilogy' in 'Human time capsules & eternal memory initiatives' category.
Pending					
The Orbital Reflector (Debczak, 2017; Orbital Reflector, 2017)	Stated 2018	-----	Awaiting launch details	Trevor Paglen	A reflective, faceted mylar inflatable satellite with no commercial or military application.

Acknowledgements. The author would like to thank Carl Walker and Mark McCaughrean (both ESTEC) for providing an intricate account of European Space Agency activities that have contributed to the cultural signature of Earth alongside Shin-ya Narusawa (JAXA Messages), Alexander Zaitsev (Cosmic Call 1&2, Teen Age Message), Jim Lewis (Deep Space Communications Network), Jacob Haqq-Misra (Lone Signal), Jon Lomberg (Voyager 1 & 2 Records, One Earth Message and other projects), Alan Penny (METI International), Daniela de Paulis (Cogito) and also the staff at the Blackrock Castle Observatory (Cork) for facilitating access to their message [content] records for this catalogue. The author would also like to thank David Brin, Gregory Benford and Duncan Forgan for their invaluable input and guiding comments to maintain the accuracy of this index. Finally, the author would also like to acknowledge the SETI/ METI communities for their sustained investigations to classify off-world transmission events. This catalogue would have taken far longer to compile had it not been for their sustained efforts and intriguing analysis performed across a myriad of disciplines.

References

- Ainsworth D** (1998) *Mars '98 Payload Integrates As Scientists View First Close-Ups Of Strange, Layered Polar Terrain*. NASA. Retrieved on 4 September 2017, Available at <http://www.jpl.nasa.gov/releases/98/m98integ.html>.
- Almár I and Shuch PH** (2006) The San Marino scale: a new analytical tool for assessing transmission risk. *Acta Astronautica* **60**, 57–59.
- Analytics India** (2017) Claim your moonshot, send your name to moon via Team Indus Moon Mission. *Analytics India Magazine*. Retrieved on 19 July 2018, Available at <https://analyticsindiamag.com/claim-moonshot-send-name-moon-via-team-indus-moon-mission/>.
- Aphids** (2008) Willoh S. Weiland Yelling at the Stars. Aphids Archive (online). Retrieved on 27 September 2017, Available at http://aphids.net/archive/Yelling_At_Stars_Next_Wave_Festival.
- Ashraf SF** (2003) Once Upon a Time, 50,000 years ago... Rediff (online). Retrieved on 1 September 2016, Available at <http://www.rediff.com/news/2002/oct/15spec.htm>.
- Astronet** (1998) Spacecraft with Human Hair and DNA Planned for Interstellar Flight. Astronet website. Retrieved on 16 February 2018, Available at <https://carlkop.home.xs4all.nl/humanha.html>.
- Atkinson N** (2008) *Messages From Earth Beamed to Alien World*. Universe Today; Space and Astronomy News. Retrieved on 5 January 2017, Available at <https://www.universetoday.com/19335/messages-from-earth-beamed-to-alien-world/>.
- Atri D, DeMarines J and Haqq-Misra J** (2011) A protocol for messaging to extraterrestrial intelligence. *Acta Astronautica* **27**, 165–169.
- Barras C** (2008) First space ad targets hungry aliens. *New Scientist* (online). Retrieved on 5 January 2017, Available at https://www.newscientist.com/article/dn14130-first-space-ad-targets-hungry-aliens?feedId=online-news_rss20.
- BBC** (2008) *Is anyone listening out there?* BBC News; Science & Environment. Retrieved on 29 August 2017, Available at <http://news.bbc.co.uk/2/hi/science/nature/7660449.stm>.
- BBC News** (2005) Turkmen book 'blasted into space'. BBC News (online). Retrieved on 14 May 2016, Available at <http://news.bbc.co.uk/1/hi/world/asia-pacific/4190148.stm>.
- Beagle 2 website** (2004) Blur Call Sign. Beagle 2 Retrieved on 19 August 2017, Available at <http://www.beagle2.com/resources/blursignal.htm>.
- Benford G** (1999) *Deep Time: How Humanity Communicates Across Millennia*. New York: Avon Books, Inc. (ISBN: 0380975378).
- Billingham J and Benford G** (2011) *Costs and Difficulties of Large-Scale 'Messaging', and the Need for International Debate on Potential Risks*. California, USA: Cornell University Library (arXiv:1102.1938).
- Blackrock Castle Observatory** (2017) Pan Galactic Email Station. Retrieved on 16 September 2016, Available at <https://www.bco.ie/whats-here/cosmos-at-the-castle/pangalactic/>.
- Boyle R** (2012) How A Sundial Lets Curiosity See Mars in Living Color. *Popular Science*. Retrieved on 5 November 2017, Available at <https://www.popsoci.com/science/article/2012-08/how-mars-rover-curiousity-sundial-will-help-rover-see-mars-living-color>.
- Braastad R and Zaitsev AL** (2003) *Synthesis and Transmission of Cosmic Call 2003 Interstellar Radio Message*. Kotel'nikov Institute of Radio-engineering and Electronics. Retrieved on 30 September 2016, Available at <http://www.cplire.ru/html/ra&sr/irm/CosmicCall-2003/index.html>.
- Brin D** (2014) The search for extra-terrestrial intelligence (SETI) and whether to send "messages" (METI): a case for conversation, patience and due diligence. *Journal of the British Interplanetary Society* **67**, 8–16.
- Britt R** (2018) SpaceX Launches Isaac Asimov's 'Foundation' Books Into Deep Space. Inverse.com. Retrieved on 7 February 2018, Available at <https://www.inverse.com/article/41025-space-x-tesla-spaceman-asimov-foundation-arch-books-falcon>.
- Browne S** (2013) A Perfect Day. Susanna Browne website. Retrieved on 16 November 2017, Available at <http://susannabrowne.com/A-Perfect-Day>.
- Busch MW** (2013) Lone Signal and Jamesburg Earth Station Technologies: Technical Setup. Retrieved on 14 September 2016, Available at http://www.webcitation.org/6lk4qwRQ5?url=https://s3.amazonaws.com/lone-signal-prod-web/Lone%2BSignal%2BTechnical%2BSetup_06042013.pdf.
- Butler D** (1998) Space 'time capsule' could send a message to the future. *Nature* **391**, 112. Retrieved on 14 September 2017, Available at <https://www.nature.com/articles/34252>.
- Byrd D** (2013) Got something to say to an alien? Lone Signal can beam your message. EarthSky, Retrieved on 1 November 2016, Available at <http://earthsky.org/space/got-something-to-say-to-an-alien-lone-signal-wants-to-beam-your-message>.
- Campbell H** (2015) Kids, Send your Art into Space on the Cheops Satellite. Space 2.0.com. Retrieved on 13 March 2017, Available at http://www.science20.com/kids_send_your_art_into_space_on_the_cheops_satellite-155368.
- Carey B** (2005) 625,000 Names to be vaporized in Deep Impact. Space.com. Retrieved on 17 February 2017, Available at <https://www.space.com/1255-625-000-names-vaporized-deep-impact.html>.
- Chakelian A** (2012) Tweets in Space: Contacting E.T., 140 Characters at a Time. *Time Magazine* (online). Retrieved on 16 August 2017, Available at <http://newsfeed.time.com/2012/05/10/tweets-in-space-contacting-e-t-140-characters-at-a-time/>.
- Chandler DL** (2009) ET: Check your voicemail. MIT News (online). Retrieved on 2 October 2017, Available at <http://news.mit.edu/2009/sketch-rubisco>.
- Chilton M** (2016) 100 weird objects sent into space. *The Telegraph*. Retrieved on 27 September 2016, Available at <http://www.telegraph.co.uk/music/news/100-weird-objects-in-space/>.
- Chorost M** (2016) How a Couple of Guys Built the Most Ambitious Alien Outreach Project Ever. *Smithsonian Air & Space Magazine* (online). Retrieved on 7 June 2017, Available at <http://www.smithsonianmag.com/science-nature/how-couple-guys-built-most-ambitious-alien-outreach-project-ever-180960473/>.
- Closer Productions** (2015) Sam Klemke's Time Machine. Closer Productions. Retrieved on 19 October 2017, Available at <http://closerproductions.com.au/films/sam-klemkes-time-machine>.
- Coldewey D** (2016) To the Moon! Lunar XPRIZE team looks to send Wikipedia into space aboard homemade rover. *TechCrunch*. Retrieved on 20 April 2018, Available at <https://techcrunch.com/2016/04/21/to-the-moon-lunar-xprize-team-looks-to-send-wikipedia-into-space-aboard-homemade-rover/>.
- Collect Space** (2008) To Pluto, with postage: Nine mementos fly with NASA's first mission to the last planet. CollectSpace.com. Retrieved on 3 January 2017, Available at <http://www.collectspace.com/news/news-102808a.html>.
- Collect Space** (2011) LEGO figures flying on NASA Jupiter probe. CollectSpace.com. Retrieved on 17 January 2017, Available at <http://www.collectspace.com/news/news-080411a.html>.
- Collect Space** (2014) Your name in space: NASA asteroid probe latest mission to fly names. Collect Space.com. Retrieved on 18 February 2017, Available at <http://www.collectspace.com/news/news-011514a-send-your-name-space.html>.
- Coyle J** (2008) Stephen Colbert to have his DNA sent to space. *Welt* (online). Retrieved on 7 June 2017, Available at <https://www.welt.de/english-news/article2411553/Stephen-Colbert-to-have-his-DNA-sent-to-space.html>.

- Creative Time** (2017) Trevor Paglen: The Last Pictures. Creative Time website. Retrieved on 2 January 2017, Available at <http://creativetime.org/projects/the-last-pictures/>.
- Davis J** (2016) Selfies, messages and names delivered for LightSail 2 flight. The Planetary Society. Retrieved on 17 April 2017, Available at <http://www.planetary.org/blogs/jason-davis/2016/20160328-mini-DVD-delivered.html>.
- De Paulis D** (2017) Cogito. Daniela de Paulis website. Retrieved on 12 June 2018, Available at <http://www.danieladepaulis.com/?p=307>
- De Paulis D** (2018) Cogito. Cogito website. Retrieved on 12 June 2018, Available at <http://www.cogitoinspace.org/>
- Debczak M** (2017) Artist Plans to Launch a Giant Sculpture into Orbit. Mental Floss.com. Retrieved on 2 October 2017, Available at <http://mentalfloss.com/article/504849/artist-plans-launch-giant-sculpture-orbit>.
- Diamond Sky Productions** (2013) Message to the Milky Way. Diamond Sky Productions. Retrieved on 14 August 2017, Available at <http://diamondskyproductions.com/recent/index.php#mmw>.
- Dominus M** (2015) *A Message to the Aliens (Introduction)*. The Universe of Discourse (blog). Retrieved on 18 August 2017, Available at <http://blog.plover.com/aliens/dd/intro.html>.
- Dumas S** (2010) The 1999 and 2003 messages explained. Retrieved on 1 February 2017, Available at <http://www.plover.com/misc/Dumas-Dutil/messages.pdf>.
- Dumas S** (2015) Message to Extra-Terrestrial Intelligence – a Historical Perspective. Researchgate. Available at https://www.researchgate.net/publication/281036518_Message_to_Extra-Terrestrial_Intelligence_-_a_historical_perspective.
- Dumas S and Dutil Y** (2010) The Evpatoria Messages. SETI League; Contact in Context. Retrieved on 23 April 2017, Available at <https://www.plover.com/misc/Dumas-Dutil/evpatoria07.pdf>.
- Dumas S and Dutil Y** (2016) Annotated Cosmic Call Primer. Smithsonian Air & Space Magazine (online). Retrieved on 14 October 2016, Available at <https://www.smithsonianmag.com/science-nature/annotated-cosmic-call-primer-180960566/>.
- Elwenspoek MC** (2011) Long-time data storage: relevant time scales. Challenges, Vol.2 Issue 1 pp 19–16.
- European Space Agency** (2004a) Rock'N'Rolling for Titan. European Space Agency: Our Activities. Retrieved on 5 November 2017, Available at http://www.esa.int/Our_Activities/Space_Science/Cassini-Huygens/Rock_n_roll_heading_for_Titan.
- European Space Agency** (2004b) *CD-ROM Attached to Huygens*. European Space Agency: Cassini-Huygens. Retrieved on 4 January 2017, Available at <http://sci.esa.int/cassini-huygens/26564-cd-rom-attached-to-huygens/>.
- European Space Agency** (2013) Wake Up, Rosetta! European Space Agency: Our Activities. Retrieved on 6 April 2015, Available at http://www.esa.int/Our_Activities/Space_Science/Rosetta/Wake_up_Rosetta.
- European Space Agency** (2014) The Competition Winners Who Helped Us Wake Up Rosetta! European Space Agency: Rosetta. Retrieved on 12 November 2017, Available at http://www.esa.int/Our_Activities/Space_Science/Rosetta/The_competition_winners_who_helped_us_wake_up_Rosetta
- European Space Agency** (2016) Three Thousand Drawings to Fly into Space on CHEOPS. European Space Agency: CHEOPS. Retrieved on 5 April 2017, Available at <http://sci.esa.int/cheops/57659-three-thousand-drawings-to-fly-into-space-on-cheops/>.
- European Space Agency** (2018) ESA honoured to take part in Hawking tribute. European Space Agency: Art & Culture in Space. Retrieved on 15 June 2018, Available at https://www.esa.int/About_Us/Art_Culture_in_Space/ESA_honoured_to_take_part_in_Hawking_tribute.
- Explore Mars** (2014) Time Capsule to Mars. Time Capsule to Mars website. Retrieved on 13 September 2017, Available at <http://www.timecapsuleto-mars.com/>.
- Foust J** (2016) German X Prize team announces launch contract. SpaceNews (online). Retrieved on 20 April 2018, Available at <http://spacenews.com/german-x-prize-team-announces-launch-contract/>.
- Gertz J** (2016) Reviewing METI: a critical analysis of the arguments. *Journal of the British Interplanetary Society*, 31–36 (arXiv: 1605.05663).
- Gilster P** (2009) “RuBisCo Stars” and the Riddle of Life. Centauri-Dreams (online). Retrieved on 19 May 2017, Available at <https://www.centauri-dreams.org/?p=10283>.
- Gitlin JM** (2015) Building an archive on the Moon (and doing science, too). Ars Technica. Retrieved on 15 March 2017, Available at <https://arstechnica.com/science/2015/12/lunar-mission-one-is-crowdsourcing-a-trip-to-the-moon/>.
- Gohring N** (2013) Lone Signal aims to send “hello!” tweets to extraterrestrials. CNN Money. Retrieved on 28 May 2017, Available at <http://www.webcitation.org/6Hk9s9TD4?url=http://money.cnn.com/2013/06/17/technology/enterprise/lone-signal/index.html>.
- Goldsmith D and Owen TC** (2001) *The Search for Life in the Universe*. Herndon, VA: University Science Books (ISBN: 1891389165).
- Greicius T** (2017) *More Than 2.4 Million Names Are Going to Mars*. NASA. Retrieved on 14 September 2017, Available at <https://www.nasa.gov/feature/jpl/more-than-24-million-names-are-going-to-mars>.
- Griffin A** (2014) Lunar Mission One to crowdfund moon drilling project by offering space time capsules on Kickstarter. Independent (online). Retrieved on 4 February 2017, Available at <http://www.independent.co.uk/news/science/lunar-mission-one-to-crowdfund-moon-drilling-project-by-offering-space-time-capsules-on-kickstarter-9869561.html>.
- Griggs MB** (2015) How To See If Your Name Is Going To Pluto On The New Horizons Spacecraft. Popular Science. Retrieved on 23 August 2017, Available at <http://www.popsoci.com/check-and-see-if-your-name-going-pluto-new-horizons-spacecraft>.
- Grinspoon D** (2003) *Lonely Planets: The Natural Philosophy of Alien Life*. New York: Harper Collins Publishers Inc. (ISBN: 9780060185404).
- Grush L** (2018) This non-profit plans to send millions of Wikipedia pages to the Moon – printed on tiny metal sheets. The Verge (online). Retrieved on 20 May 2018, Available at <https://www.theverge.com/2018/5/15/17353194/lunar-library-wikipedia-moon-arch-foundation-astrobotix-spacex>.
- Guzman M, Welch C and Hein AM** (2015) Eternal Memory: Long-Duration Storage Concepts for Space. Conference Paper: 66th International Astronautical Congress, Jerusalem, Israel.
- Harrison AA** (2007) *Starstruck; Cosmic Visions in Science, Religion and Folklore*. USA: Berghahn Books (ISBN: 9781845452865). Retrieved on 14 January 2016, Available at <https://books.google.co.uk/books?id=ORncQUBAEjUC&pg=PA52&lpg=PA52&dq=Discovery;+Calling+All+Aliens+transmission&source=bl&ots=O-oOYahJ7-&sig=L2tyDjQXEYyJus8hIUuLiShyMk&hl=en&sa=X&ved=0ahUKewjstPwpgqfVAhWEmLQKHZ1UDmAQ6AEIJDAB#v=onepage&q=Discovery%3B%20Calling%20All%20Aliens%20transmission&f=false>.
- Hawking Foundation** (2018) The Stephen Hawking Tribute CD. Stephen Hawking interment (website). Retrieved on 16 June 2018, Available at <https://www.stephenhawkinginterment.com/theccd/>.
- Highfield R** (2008) UK astronomers to broadcast adverts to aliens. The Telegraph (online). Retrieved on 2 February 2017, Available at <http://www.telegraph.co.uk/news/science/science-news/3335306/UK-astronomers-to-broadcast-adverts-to-aliens.html>.
- Holler W** (2014) Student Led Time Capsule to Mars Project Most Ambitious Crowd-Funded Campaign In History. Explore Mars website. Retrieved on 7 February 2017, Available at <https://www.exploremars.org/student-led-time-capsule-to-mars-project-most-ambitious-crowd-funded-campaign-in-history>.
- Human Document Project** (2017) The Human Document Project (HUDOC). Retrieved on 4 September 2017, Available at <http://hudoc2017.manucodiata.org/>.
- IT News** (2009) NASA to text message interplanetary cousins. IT News.com. Retrieved on 15 August 2016, Available at <https://www.itnews.com.au/news/nasa-to-text-message-interplanetary-cousins-152737>.
- JAXA** (2009a) Venus Climate Orbiter “AKATSUKI” (PLANET-C) Message Campaign. Japan Aerospace Exploration Agency (JAXA). Retrieved on 5 February 2016, Available at http://global.jaxa.jp/press/2009/10/20091023_akatsuki_campaign_e.html.
- JAXA** (2009b) We will deliver your message to the brightest star Venus” – “AKATSUKI” Message Campaign – Deadline for accepting messages extended. Japan Aerospace Exploration Agency (JAXA). Retrieved on 15 March 2016, Available at http://global.jaxa.jp/projects/sat/planet_c/topics.html.
- JAXA Space Education Center** (2013) Usuda Space Camp Year 2013 (Japanese). Retrieved on 26 November 2017, Available at http://edu.jaxa.jp/education/participation/cosmic_advanced/archive/2013/saku_udsc1/.

- JAXA Space Education Center** (2014) Usuda Space Camp Year 2014 (Japanese). Retrieved on 26 November 2017, Available at http://edu.jaxa.jp/education/participation/cosmic_advanced/archive/2014/udsc_2/.
- Jenner L** (2009) *1.6 Million Names to the Moon*. NASA. Retrieved on 16 February 2017, Available at https://www.nasa.gov/mission_pages/LRO/multimedia/million_names.html.
- Johns Hopkins Applied Physics Laboratory** (2016) Search by name and Last Name. Pluto.JHUAPL.edu. Retrieved on 16 September 2017, Available at <http://pluto.jhuapl.edu/Mission/Communications/Search-Name.php>.
- Johnson SL** (2008) Red, white & blue: U.S. Flag at home on the moon. *Houston History Magazine* 6, 60.
- Jones T** (2010) How would you break the 'Eerie Silence' – winners! Zoonomian (blog): Communicate Science. Retrieved on 2 May 2017, Available at <https://communicatescience.com/zoonomian/2010/03/15/how-would-you-break-the-erie-silence-winners/>.
- Kalder D** (2013) Turkmenistan: Proudly Maintaining the Tradition of Dictator Literature. Publishing Perspectives.com. Retrieved on 14 October 2017, Available at <https://publishingperspectives.com/2013/12/turkmenistan-proudly-maintaining-the-tradition-of-dictator-literature/>.
- Kaplan M** (2007) Send a New Year's Message to the Moon on Japan's SELENE Mission. The Planetary Society. Retrieved on 17 August 2016, Available at http://www.planetary.org/press-room/releases/2007/0111_Send_a_New_Years_Message_to_the_Moon.html.
- Katz L** (2012) Finally, a chance to tweet to aliens. Cnet. Retrieved on 29 October 2017, Available at <https://www.cnet.com/news/finally-a-chance-to-tweet-to-aliens/>.
- KEO** (2013) KEO: The satellite that carries the hopes of the world. KEO.org. Retrieved on 12 September 2015, Available at <http://www.keo.org/uk/pages/message.php>.
- Kiss J** (2008) *Bebo tries to contact Earth-like planet*. The Guardian. Retrieved on 4 August 2017, Available at <https://www.theguardian.com/media/2008/jul/29/bebo.digitalmedia>.
- Kitchen WJ** (2017) The Interstellar Beacon. Retrieved on 12 June 2017, Available at <https://www.interstellarbeacon.org/>
- Kotel'nikov Institute of Radio-engineering and Electronics** (2008) MIR, LENIN, SSSR. Retrieved on 24 August 2015, Available at <http://www.cplire.ru/html/ra&sr/irm/MIR-LENIN-SSSR.html>.
- Kramer M** (2013) New Project Will Send Your Messages to Aliens in Deep Space. Space.com. Retrieved on 13 June 2017, Available at <https://www.space.com/21528-alien-intelligence-messages-lone-signal.html>.
- Kunze M** (2018) Memory of Mankind. Memory of Mankind website. Retrieved on 14 December 2017, Available at <https://www.memory-of-mankind.com/>.
- Lalwani M** (2016) NASA wants to send your art on a round-trip to space. Engadget.com. Retrieved on 14 March 2017, Available at <https://www.engadget.com/2016/02/19/nasa-wants-to-send-your-art-on-a-round-trip-to-space/>.
- Landes N** (2016) In 1969, Warhol, Rauschenberg, and Chamberlain Sent Their Art To The Moon. Artsy (online). Retrieved on 13 June 2018, Available at <https://www.artsy.net/article/artsy-editorial-how-warhol-rauschenberg-and-chamberlain-smuggled-art-onto-the-moon>.
- Leonard D** (2009) Send ET a Text Message From Earth. Space.com. Retrieved on 24 August 2017, Available at <https://www.space.com/7140-send-text-message-earth.html>.
- Leonard D** (2018) Is the Tesla Roadster Flying on the Falcon Heavy's Maiden Flight Just Space Junk? Space.com. Retrieved on 7 February 2018, Available at <https://www.space.com/39602-falcon-heavy-tesla-not-just-space-junk.html>.
- Lewis J** (2017) Deep Space Communications Network. Retrieved on 3 August 2017, Available at <http://deepspacecom.net/view-transmission/>.
- Li S** (2014) A Time Capsule on the Moon. The Atlantic (online). Retrieved on 27 February 2017, Available at <https://www.theatlantic.com/technology/archive/2014/11/a-time-capsule-on-the-moon/383052/>.
- Lomberg J** (2004) A Portrait of Humanity. Jon Lomberg website. Retrieved on 13 August 2015, Available at www.jonlomberg.com/articles.html.
- Lomberg J** (2010) Artist Jon Lomberg. Jon Lomberg website. Retrieved on 3 January 2017, Available at <https://www.jonlomberg.com/profile.html>.
- Lomberg J** (2016) One Earth Message. One Earth Message website. Retrieved on 8 March 2017, Available at <http://www.oneearthmessage.org>.
- López del Rincón D** (2015) *Bioarte: arte vida en la era de la biotecnología* (Spanish). Gobierno de España: Ministerio de Cultura (ISBN: 9788446042464).
- Luxorion** (2006) Messages aux extraterrestres: Cosmic Connexion, (French). Luxorion. Retrieved on 4 November 2017, Available at <http://www.astro-surf.com/luxorion/seti-messages.htm>.
- MacMillan A** (2005) Tele-Spamming our alien brethren. *Popular Science* 266 98, 101. Retrieved on 6 September 2016, Available at <https://books.google.co.uk/books?id=Xfgb-rsXXiMC&pg=PA98&lpg=PA98&dq=craigslist+transmission+into+space&source=bl&ots=FFicGKiSyt&sig=A7ewbQSh0fpi7fWVU6cuYgqI1pc&hl=en&sa=X&ved=0ahUKewjlhtS-uZDVahUJY1AKHfneCLgQ6AEINDAC#v=onepage&q=craigslist%20transmission%20into%20space&f=false>.
- Malkin B** (2018) SpaceX oddity: how Elon Musk sent a car towards Mars. The Guardian (online). Retrieved on 7 February 2018, Available at <https://www.theguardian.com/science/2018/feb/07/space-oddy-elon-musk-spacex-car-mars-falcon-heavy>.
- Malloy J** (2016) *Social Media Archaeology and Poetics*. Cambridge, MA: MIT Press (ISBN: 9780262034654).
- Manz A** (2010) The Human Document Project and Challenges. Researchgate (doi: 10.3390/challe1010003).
- Marshall M** (2010) Earth calling: A short history of radio messages to ET. New Scientist (online). Retrieved on 16 October 2016, Available at <https://www.newscientist.com/article/dn18417-earth-calling-a-short-history-of-radio-messages-to-et/>.
- Matogawa Y** (2005) Hayabusa: To 880,000 Little Princes and Princesses. Japan Aerospace Exploration Agency (JAXA). Retrieved on 5 February 2016, Available at http://www.isas.ac.jp/e/snews/2005/1130_tm.shtml.
- McCracken E** (2016) *Artistic Odyssey to Send Messages to Stars*. University of Edinburgh. Retrieved on 14 February 2016, Available at <http://www.ed.ac.uk/news/2016/starmessage-030216>.
- Minnesotastan** (2010) Gold Olive Branch Left on the Moon. Neatorama.com. Retrieved on 19 December 2016, Available at <http://www.neatorama.com/2010/11/10/gold-olive-branch-left-on-the-moon/>.
- MoonArk** (2017) Moon Ark: An Epochal Artifact Designed to Communicate forward across Time and Space. Moon Arts website. Retrieved on 18 August 2017, Available at <http://moonarts.org/>.
- Moore M** (2008) *Messages from Earth sent to distant planet by Bebo*. The Telegraph. Retrieved on 14 June 2017, Available at <http://www.telegraph.co.uk/news/newstoppers/howaboutthat/3166709/Messages-from-Earth-sent-to-distant-planet-by-Bebo.html>.
- Murrill MB** (1997) *Signatures from Earth Board Spacecraft to Saturn*. NASA. Retrieved on 9 October 2017, Available at <https://saturn.jpl.nasa.gov/news/2157/signatures-from-earth-board-spacecraft-to-saturn/>.
- Museum of Modern Art (MOMA)** (2018) Various Artists with Andy Warhol, Claes Oldenburg, David Novros, Forrest Myers, Robert Rauschenberg, John Chamberlain – The Moon Museum 1969. Museum of Modern Art website. Retrieved on 13 June 2018, Available at <https://www.moma.org/collection/works/62272>.
- NASA** (1969) Apollo 11 Goodwill Messages. NASA Press Kit for Apollo 11 Goodwill Messages. NASA. Retrieved on 16 January 2016, Available at https://history.nasa.gov/ap11-35ann/goodwill/Apollo_11_material.pdf.
- NASA** (1999) *Stardust Launch: Press Kit*. NASA. Retrieved on 4 April 2017, Available at <https://www2.jpl.nasa.gov/files/misc/stardust.pdf>.
- NASA** (2004) *DVD with Signatures on Way to Saturn*. NASA. Retrieved on 9 October 2017, Available at <https://saturn.jpl.nasa.gov/news/2803/dvd-with-signatures-on-way-to-saturn/>.
- NASA** (2007) *Dawn Community: All Aboard the Dawn Spacecraft*. NASA. Retrieved on 14 May 2017, Available at <https://dawn.jpl.nasa.gov/DawnCommunity/>.
- NASA** (2008) *NASA Kepler Mission Offers Opportunity to Send Names Into Space*. NASA. Retrieved on 14 June 2016, Available at <https://www.jpl.nasa.gov/news/news.php?release=2008-073>.
- NASA** (2010) Send Your Name to Mars. Mars.NASA.gov. Retrieved on 14 July 2017, Available at <https://mars.nasa.gov/msl/participate/sendyour-name/>.
- NASA** (2014) *NASA Invites Public to Send Names on an Asteroid Mission and Beyond*. NASA. Retrieved on 17 October 2017, Available at <https://www.nasa.gov>.

- gov/press/2014/january/nasa-invites-public-to-send-names-on-an-asteroid-mission-and-beyond/.
- NASA** (2018) *More Than 1.1 Million Names Installed On NASA's Parker Solar Probe*. NASA. Retrieved on 2 May 2018, Available at <https://www.nasa.gov/feature/goddard/2018/more-than-11-million-names-installed-on-nasa-s-parker-solar-probe>.
- NASA Content Administrator** (2008) *NASA Beams Beatles' 'Across the Universe' Into Space*. NASA. Retrieved on 14 September 2016, Available at https://www.nasa.gov/topics/universe/features/across_universe.html.
- NASA Content Administrator** (2011) *Juno Jupiter Mission to Carry Plaque Dedicated to Galileo*. NASA. Retrieved on 17 February 2017, Available at https://www.nasa.gov/mission_pages/juno/news/galileo20110803.html.
- National Aeronautics and Space Administration** (1978) *The Martian Landscape*. Washington: NASA, U.S. Government Printing Office (Catalogue No. 1.21:425).
- National Geographic** (2012) *The Wow Signal: How We'll Reply*. Retrieved on 16 April 2017, Available at <http://web.archive.org/web/20120819043043/http://channel.nationalgeographic.com/channel/chasing-ufos/the-wow-signal-how-we-ll-reply/>.
- Naubaum A** (2005) *Intergalactic Communications: Tele-Spamming our Alien Brethren*. Popular Science (online). Retrieved on 14 May 2017, Available at <http://www.popsci.com/military-aviation-space/article/2005-05/intergalactic-communications>.
- NBC News** (2008) *NASA beaming Beatles tune to the stars*. Retrieved on 13 September 2016, Available at <http://www.nbcnews.com/id/22951001#.WWuzR-ko-Uk>.
- NBC News** (2014) *Maven and MOM Orbiters Close In on Their Moments of Truth at Mars*. NBC News. Retrieved on 3 March 2017, Available at <http://www.nbcnews.com/science/space/maven-mom-orbiters-close-their-moments-truth-mars-n207616>.
- New Horizons Message Initiative** (2015) *New Horizons Message Initiative*. New Horizons Message.com. Retrieved on 12 March 2017, Available at <https://www.newhorizonsmessage.com/>.
- Osborne D** (2009) *Send a text message to ET via Hello From Earth*. Geek.com. Retrieved on 17 August 2016, Available at <https://www.geek.com/news/send-a-text-message-to-et-via-hello-from-earth-871361/>.
- O' Donnell B and Worrell D** (1976) *NASA Press Kit for Project LAGEOS*. NASA. Retrieved on 16 October 2015.
- Oglethorpe University** (1990) *International Time Capsule Society*. Retrieved 12 March 2017, Available at <https://crypt.oglethorpe.edu/international-time-capsule-society/>.
- O' Grady M** (2017) *Art for a Post-Surveillance Age*. The New York Times (online). Retrieved on 29 August 2017, Available at <https://www.nytimes.com/2017/08/29/t-magazine/art/trevor-paglen.html>.
- Orbital Reflector** (2017) *The Orbital Reflector*. Orbital Reflector.com. Retrieved on 19 November 2017, Available at <http://orbitalreflector.com/>.
- Orwig J** (2015) *Apollo 16 astronaut explains hidden message behind the family portrait he left on the moon*. Independent (online). Retrieved on 17 April 2016, Available at <http://www.independent.co.uk/news/science/apollo-16-astronaut-explains-hidden-message-behind-the-family-portrait-he-left-on-the-moon-a6718111.html>.
- Overbye D** (2008) *One Alien to Another: A Broadcast to the Stars*. The New York Times (online). Retrieved on 2 March 2017, Available at <http://www.nytimes.com/2008/12/12/science/space/12earth.html>.
- Paglen T** (2012) *The Last Pictures*. Los Angeles/London: Creative Time Books (New York) & University of California Press (ISBN: 9780520275003)
- Par R** (2010) *IKAROS. Onward to Venus!* Parman.blogspot (public blog). Retrieved on 2 November 2017, Available at <http://parman.blogspot.com/2010/05/jaxa-onward-to-venus-at-258-pm-pacific.html>.
- Pearlman RZ** (2007) *The Untold Story: How One Small Disc Carried One Giant Message for Mankind*. Space.com. Retrieved on 14 September 2017, Available at <https://www.space.com/4655-untold-story-small-disc-carried-giant-message-mankind.html>.
- Pickard G** (2014) *Was Lone Signal Tweets to Space Project Just a Scam? Top Secret Writer (See Article & Comments)*. Retrieved on 14 August 2017, Available at <http://www.topsecretwriters.com/2014/02/was-lone-signal-tweets-to-space-project-just-a-scam/>.
- Pink Tentacle** (2008) *Alien e-mail reply to arrive in 2015?* Retrieved on 24 March 2017, Available at <http://pinktentacle.com/2008/05/alien-e-mail-reply-to-arrive-in-2015/>.
- Planetary Society** (2010) *The IKAROS Names Disc*. The Planetary Society. Retrieved on 14 February 2017, Available at http://www.planetary.org/multi-media/space-images/spacecraft/ikaros_names_disc.html.
- Planetary Society** (2014) *Messages from Earth: Hayabusa 2*. The Planetary Society. Retrieved on 28 January 2017, Available at <http://www.planetary.org/get-involved/messages/hayabusa-2/>.
- Planetary Society** (2016) *OSIRIS-Rex: Messages to Bennu!* Retrieved on 2 November 2017, Available at <http://www.planetary.org/get-involved/messages/bennu/>.
- Planetary Society** (2016) *Selfie to Space*. The Planetary Society. Retrieved on 16 January 2017, Available at <http://www.planetary.org/get-involved/messages/lightsail/>.
- Planetary Society** (2017) *Members' Names Flying to Space*. The Planetary Society. Retrieved on 2 November 2017, Available at <http://www.planetary.org/get-involved/messages/namesinspace.html>.
- Planetary Society** (2018) *Visions of Mars*. Planetary Society. Retrieved on 16 January 2018, Available at <http://www.planetary.org/explore/projects/vom/>.
- Press Trust of India** (2015) *Rover to carry Earth's art, poetry, music to the Moon*. India Express (online). Retrieved on 24 August 2017, Available at <http://indianexpress.com/article/trending/rover-to-carry-earths-art-poetry-music-to-the-moon/>.
- Puli Space** (2016) *MOM on the MOON*. Puli Space website. Retrieved on 18 January 2018, Available at <http://pulispace.com/en/mom-on-the-moon>.
- Quast P** (2017) *A Human Perspective of Earth: An overview of dominant themes to emerge from global 'A Simple Response...' messages*. Researchgate (doi: 10.13140/RG.2.2.36341.78563).
- Quast P** (2018) *Beyond the Earth – Preliminary Specifications*. Researchgate (doi: 10.13140/RG.2.2.34111.00169). Retrieved on 10 February 2018, Available at <https://www.researchgate.net/project/Beyond-the-Earth-Foundation>.
- Real Time** (2008) *Cynthia Troup: Silloh S. Weiland and Yelling at the Stars*. Real Time Arts (online). Retrieved on 4 November 2017, Available at <http://www.realttimearts.net/article/88/9233>.
- Redazione ASI** (2012) *Curiosity has landed on Mars*. ASI- Agenzia Spaziale Italiana News. Retrieved on 21 February 2017, Available at <http://www.asi.it/en/news/curiosity-has-landed-mars>.
- Red Encounter** (2003) *What is Red Encounter?* RedEncounter.ESA.Net. Retrieved on 28 November 2017, Available at <http://redencounter.esa.int/>.
- Reddy F** (2005) *Hayabusa owns a piece of the rock*. Astronomy.com. Retrieved on 11 June 2018, Available at <http://www.astronomy.com/news-observing/news/2005/11/hayabusa%20owns%20a%20piece%20of%20the%20rock>.
- Reid M** (2009) *Immortality Drive*. Gandt Blog. Retrieved on 6 April 2017, Available at <http://gandt.blogs.brynmawr.edu/2009/04/19/immortality-drive/>.
- Rein H, Tamayo D and Vokrouhlicky D** (2018) *The random walk of cars and their collision probabilities with planets*. Cornell University Library (arXiv: 1802.04718v1). Retrieved on 21 February 2018, Available at <https://arxiv.org/pdf/1802.04718.pdf>.
- Rense** (2008) *Fox to Beam Day The Earth Stood Still Into Space*. Rense.com. Retrieved on 17 April 2017, Available at <http://www.rense.com/general84/fox.htm>.
- Reuters** (2010) *Klingon opera prepares for interstellar debut*. Reuters.com. Retrieved on 14 August 2017, Available at <http://www.reuters.com/article/us-klingson-idUSTRE6891EZ20100910>.
- Richards J** (2014) *HELENA – Oxygen Production & Art Time Capsule*. Mars One Community (online). Retrieved on 10 November 2016, Available at <https://community.mars-one.com/projects/helena>.
- Rogers S** (2017) *This Tiny Little Disk Contains a Microscopic Archive of All Languages in the World*. Interesting Engineering (online). Retrieved on 19 June 2017, Available at <https://interestingengineering.com/this-tiny-little-disk-contains-a-microscopic-archive-of-all-languages-in-the-world>.
- Sagan C** (1978) *Murmurs of Earth: The Voyager Interstellar Record*. USA: Ballantine Books (ISBN: 978-0345315366).
- Sagan C, Salzman-Sagan L and Drake F** (1972) *A message from earth*. *Science* 175, 881–884.

- Saint-Gelais R** (2014) Beyond linear B; the metasemiotic challenge of communication with extraterrestrial intelligence. In Vakoch DA (ed.), *Archaeology, Anthropology, and Interstellar Communication*. Washington DC: NASA, pp. 79–94.
- Salce C** (2015) Sam Klemke's Time Machine Review: A Brutally Honest Time Capsule. Nuke the Fridge. Retrieved on 19 October 2017, Available at <http://nukethefridge.com/sam-klemkes-time-machine-review-a-brutally-honest-time-capsule/>.
- Scharf CA** (2012a) Tweets in space are go – today! Scientific American. Retrieved on 23 September 2017, Available at <https://blogs.scientificamerican.com/life-unbounded/tweets-in-space-are-go-today/>.
- Scharf CA** (2012b) Tweets in Space! Scientific American. Retrieved on 23 September 2017, Available at <https://blogs.scientificamerican.com/life-unbounded/tweets-in-space/>.
- Schulze-Makuch D** (2016) *Is Beaming Messages to Other Stars a Wise Idea?* Smithsonian Air & Space Magazine (online). Retrieved on 9 October 2016, Available at <https://www.airspacemag.com/daily-planet/beaming-messages-other-stars-wise-idea-180960723/?no-ist>.
- Scuka D** (2016) A Simple Response. ESA Rocket Science Blog. Retrieved on 28 July 2016, Available at <http://blogs.esa.int/rocketscience/2016/07/28/a-simple-response/>.
- Sent Forever** (2009) Personal Messages Sent into Space at the Speed of Light. Send2press.com. Retrieved on 2 May 2017, Available at <https://www.send2press.com/wire/2009-07-0716-002/>.
- Shanks S** (2016) One Earth is working to keep the legacy alive. Planetarium (online). Retrieved on 14 June 2017, Available at http://c.ymcdn.com/sites/www.ips-planetarium.org/resource/resmgr/Opportunities/One_Earth_Message.pdf.
- Shiner L** (2013) First Man on Mars: Leonardo di Vinci. Smithsonian Air & Space Magazine (online). Retrieved on 22 November 2016, Available at <https://www.airspacemag.com/daily-planet/first-man-on-mars-leonardo-da-vinci-7012414/>.
- Shujiro S** (2003) With the Hopes of 880,000 People: Hayabusa Target Markers. Japan Aerospace Exploration Agency (JAXA). Retrieved on 5 February 2016, Available at http://global.jaxa.jp/article/special/hayabusa/sawai_e.html.
- Smithsonian Air & Space Museum** (2017) Sculpture, Fallen Astronaut. Smithsonian Air & Space Museum website. Retrieved on 3 July 2016, Available at https://airandspace.si.edu/collection-objects/sculpture-fallen-astronaut?object=nasm_A19860035000.
- Smithsonian Institution** (2018) Apollo 11 Plaque (ID: S69-38749). Smithsonian National Air and Space Museum. Retrieved on 10 June 2018, Available at <https://airandspace.si.edu/multimedia-gallery/5515hjpg>.
- Sónar** (2017) Sónar celebrates 25 years of the festival by contacting intelligent extraterrestrial life. Sónar Music Festival Press Release (online). Retrieved on 29 March 2018, Available at <http://intranet.sonar.es/mailling/1128/en.html>.
- Southern G** (2010) *The Eerie Silence - winning messages!* Sky at Night Magazine (online). Retrieved on 17 July 2017, Available at <http://www.skyatnightmagazine.com/forum/the-eerie-silence-winning-messages-t110073.html>.
- Space Daily** (2008) Doritos Makes History With World's First ET Advert. Space Daily (online). Retrieved on 2 November 2016, Available at http://www.spacedaily.com/reports/Doritos_Makes_History_With_World_First_ET_Advert_999.html.
- Spivack N** (2016a) *Let's Put Wikipedia in Space: The Arch Project*. Nova Spivack (blog). Retrieved on 7 February 2018, Available at <http://www.novaspivack.com/uncategorized/wikipedia-in-space>.
- Spivack N** (2016b) The ARCH Foundation. Space Talk: The Next Generation, Autumn/ Winter 2016. Retrieved on 7 February 2018, Available at <https://drive.google.com/file/d/10-LXJ2ZKFPc0L6LKvD4nbAOLvg-6EXFm/view>.
- Studio for Creative Inquiry** (2017) *MoonArk*. Carnegie Mellon University. Retrieved on 15 September 2017, Available at <http://studioforcreativeinquiry.org/grants/moonark>.
- Sutherland P** (2015) *Has Britain's lost Mars probe been found after 11 Years? UK Space Agency mysteriously announces it will give 'update' on missing Beagle spacecraft on Friday*. Daily Mail (online). Retrieved on 4 June 2017, Available at <http://www.dailymail.co.uk/sciencetech/article-2907441/Missing-Mars-probe-Beagle-2-s-status-updated-UK-Space-Agency-Friday.html>
- Svec J** (2013) "BANG, ZOOM! Straight to the Moon!" Kickstarter.com. Retrieved on 14 February 2016, Available at <https://www.kickstarter.com/projects/87824834/nanorosetta-own-a-print-of-the-human-genome/posts/452964>.
- Talk2ETs** (2015) Talk2ETs. Retrieved on 4 August 2017, Available at <http://www.talk2ets.com/>
- Than K** (2005) Craigslist gets beamed into space. CNN.com. Retrieved on 3 December 2016, Available at <http://edition.cnn.com/2005/TECH/space/03/23/craigslist.space/>.
- The Arch Mission** (2018) The ARCH Mission. The Arch Mission website. Retrieved on 7 February 2018, Available at <https://www.archmission.com/>.
- The Editors of Sky & Telescope** (2015) "Behind the Scenes" with New Horizons. Sky & Telescope Magazine (online). Retrieved on 18 January 2017, Available at <http://www.skyandtelescope.com/sky-and-telescope-magazine/beyond-the-printed-page/behind-the-scenes-with-new-horizons-05142015/>.
- The Long Now Foundation** (2009) The Rosetta Project. The Long Now Foundation. Retrieved on 6 April 2017, Available at www.rosettaproject.org
- Thomason C** (2008) Radio Ensures Memorable Messages are Sent Forever. Press Dispensary website. Retrieved on 1 May 2017, Available at <https://press-dispensary.co.uk/releases/c991699/Radio-Ensures-Memorable-Messages-are-Sent-Forever.html>.
- Tweets in Space** (2012) Tweets in Space. Tweets in Space website. Retrieved on 11 September 2017, Available at <http://tweetsinspace.org/>.
- UKSEDS** (2015) "Time Capsule to Mars" Aims for 2018 Mars Landing. UKSEDS.org. Retrieved on 4 February 2017, Available at <http://ukseds.org/2015/02/tc2m/>.
- University of Colorado** (2012) Maven: Send your name & message to Mars! University of Colorado, Boulder: Laboratory for Atmospheric and Space Physics. Retrieved on 6 July 2017, Available at <http://lasp.colorado.edu/maven/goingtomars/send-your-name/>.
- U-The Opera** (2010) Official invitation sent to Qo'nos. U-The Opera (online). Retrieved on 14 August 2017, Available at <http://www.u-theopera.org/official-invitation-sent-to-qo%E2%80%99nos>.
- Vakoch DA** (2009) Asymmetry in active SETI: a case for transmissions from earth. *Acta Astronautica* **68**, 476–488
- Vakoch DA** (2017) The message we're sending to nearby aliens is no threat to Earth. New Scientist (online). Retrieved on 29 March 2018, Available at <https://www.newscientist.com/article/2153948-the-message-were-sending-to-nearby-aliens-is-no-threat-to-earth/>.
- Valentine G** (2011) An Awkward History of our Space Transmissions. Gizmodo. Retrieved on 19 July 2017, Available at <https://gizmodo.com/5780084/an-awkward-history-of-our-space-transmissions>.
- Van Damme C, Van Eeckhaut M, Scherlippens B and Willems S** (2009) *Look! Alike: Kunstenaarsprofielen en Artistiek Rollenspel in Hedendaagse Kunst*. Gent, Belgium: Academia Press (9789038215228).
- Wall M** (2014) Private Moon Mission Aims to Drill Into Lunar South Pole by 2024. Space.com. retrieved on 3 October 2016, Available at <https://www.space.com/27807-private-moon-mission-lunar-one.html>.
- Washburn M** (2015) New Horizons One Earth Message. The Planetary Society. Retrieved on 22 June 2017, Available at <http://www.planetary.org/blogs/guest-blogs/2015/0424-new-horizons-one-earth-message.html>.
- Wayne G** (2011) A Short History of Long-Term Thinking, for Our Fifty Thousand Year Time Capsule. Motherboard. Retrieved on 16 September 2016, Available at https://motherboard.vice.com/en_us/article/3dd7xk/a-short-history-of-long-term-thinking-for-our-50-000-year-time-capsule.
- Weltraum Kunst** (2003–2016) The Project. Weltraum Kunst.de. Retrieved on 12 July 2016, Available at <http://www.weltraumkunst.de/inhalte/project.htm>.
- Woods A** (1992) OURS – The Orbiting Unification Ring Satellite: A Global Artwork in Space for the Year 2000. Conference Paper; 1st European Space Art Symposium, Montreux, Switzerland. Retrieved on 20 January 2018, Available at <http://www.ours.ch/publications.php>.
- Yoshikawa M, Hosoda S, Sawada H, Ogawa N, Tsuda Y, Kishi A, Asakura H and Hayabusa2 Public Outreach Team** (2015) Public Outreach of Hayabusa2 Mission. 46th Lunar And Planetary Science Conference [2015]. Retrieved on 14 July 2017, Available at <https://www.hou.usra.edu/meetings/lpsc2015/pdf/1644.pdf>.
- Zaitsev AL** (2002a) *A Teen-Age Message to the Stars*. SETI League. Retrieved on 16 September 2016, Available at <http://www.setileague.org/articles/tam.htm>.

- Zaitsev AL** (2002b) *Design and Implementation of the 1st Theremin Concert for Aliens*. Kotel'nikov Institute of Radio-engineering and Electronics. Retrieved on 24 August 2015, Available at <http://www.cplire.ru/html/ra&sr/irm/Theremin-concert.html>.
- Zaitsev AL** (2006) *Messaging to Extra-Terrestrial Intelligence*. Moscow, Russia: Cornell University Library (arXiv: physics/0610031).
- Zaitsev AL** (2008) The first musical interstellar radio message. *Journal of Communications Technology* **53**, 1107–1113.
- Zaitsev AL** (2011) *Rationale for METI*. Cornell University Library (arXiv: 1105.0910 9 physics.gen-ph). Retrieved on 16 December 2017, Available at <https://arxiv.org/abs/1105.0910>.
- Zaitsev AL** (2012) Classification of interstellar radio messages. *Acta Astronautica* **78**, 16–19
- Zaitsev AL and Ignatov SP** (1999) Broadcast for Extra-Terrestrial Intelligence from Evpatoria Deep Space Centre. Kotel'nikov Institute of Radio-engineering and Electronics. Retrieved on 29 July 2015, Available at <http://www.cplire.ru/html/ra&sr/irm/report-1999.html>
- Zeluck SR** (1996) 'Send Your Messages to Saturn' Draws Huge Response. JPL.NASA.gov. Retrieved on 11 June 2017, Available at <https://www.jpl.nasa.gov/releases/96/cdsign2.html>.
- Zhorov I** (2016) *An Artistic Time Capsule Prepares To Hitch A Ride To The Moon*. National Public Radio (online). Retrieved on 6 December 2016, Available at <http://www.npr.org/2016/01/03/461795258/arts-capsule-to-hitch-a-ride-to-the-moon-on-carnegie-mellon-s-rover>.
- Zimmer T** (2009) The DVD on the Kepler Telescope. TorstenZimmer.com. Retrieved on 28 January 2017, Available at <http://www.torstenzimmer.com/pages/kepler.htm>.
- Журнал Житомира** (2009) В Евпатории отправили эмблему города Житомира в космос на 70 лет (Ukrainian). Журнал Житомира (online). Retrieved on 14 May 2017, Available at <http://zhzh.info/news/2009-09-15-5762>.