

DIVISION C / WORKING GROUP STAR NAMES

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Eric E. Mamajek
Juan Antonio Belmonte Aviles,
Sze-leung Cheung, Beatriz E. García,
Steven Gullberg, Duane Hamacher,
Susanne M. Hoffmann, Alejandro M. López,
Javier Mejuto Gonzalez, Thierry Montmerle,
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Clive Ruggles, B. S. Shylaja,
Robert H. van Gent, Hitoshi Yamaoka
Danielle Adams, Yunli Shi, Doris Vickers

AFFILIATES

TRIENNIAL REPORT 2018-2021

1. Motivation and Enrichment of the Working Group

1.1. *Terms of Reference*

This subsection contains the Terms of Reference for WGSN for the past triennium approved by IAU Division C in 2019.

The Working Group on Star Names (WGSN) consists of an international group of astronomers with expertise in stellar astronomy, astronomical history, and cultural astronomy who research and catalog proper names for stars for the use by the international astronomical community and also to aid the recognition and preservation of intangible astronomical heritage. WGSN maintains the IAU Catalog of Star Names. During the WGSN's first triennium (2015-2018), the group converged on guidelines for IAU star names, and assembled a catalog of 338 unique star names with standardized spellings based on an extensive review of historical catalogs, star atlases, and the cultural astronomy literature. The focus during the 2018-2021 triennium was:

- to continue an exhaustive search of star names from the cultural astronomy literature,
- to adopt new IAU proper names for stars of scientific and historical value for community use following WGSN guidelines,
- to maintain the IAU Catalog of Star Names[†] and assist the IAU with maintaining its web content on celestial nomenclature,
- to add etymological information to the IAU Catalog of Star Names in the interests of further preserving astronomical heritage,
- to construct a new supporting list or name bank of names for stars and associated asterisms which is culturally and geographically diverse,
- to refine the WGSN guidelines for the proposal and adoption of names for stars,
- to provide relevant expertise to support other IAU efforts related to celestial nomenclature, including public naming campaigns like NameExoWorlds[‡] for IAU100.

Following the past triennium, the naming purview for the WGSN continued to be

[†] https://www.iau.org/public/themes/naming_stars/
[‡] <http://www.nameexoworlds.iau.org/>

for stars, substellar objects, and stellar remnants, but specifically exclude exoplanets (purview of IAU public naming campaigns), interstellar medium features (nebulae), and extragalactic objects. Exoplanet names will be catalogued as well so as to avoid duplication with star names. Cultural names of asterisms have been added to the research purview of the WGSN this triennium in the interests of facilitating etymological investigations among Div C members (many traditions name a great number of asterisms and relatively few bright stars). In some cases, ancient asterism names may provide a potential reservoir of new names for individual stars. WGSN will also deliberate on the process by which “new” names for stars and substellar objects of scientific significance can be proposed by members of the international astronomical community.

The 2018 WGSN business meeting clarified the working group’s policy that in the interests of clarity in the nomenclature, names will be assigned to individual stars (components in multiples), rather than multiples. The activities of the Division C WG Star Names are well-aligned with the IAU Strategic Plan 2020-2030 and the activities of IAU Division C. The WGSN is specifically called out on p. 22 of IAU Strategic Plan 2020-2030†: “*The IAU serves as the internationally recognised authority for assigning designations to celestial bodies and their surface features. To do so, the IAU has a number of Working Groups on various topics, most notably on the nomenclature of small bodies in the Solar System and planetary systems under Division F and on Star Names under Division C.*”

1.2. *New Members*

New members and affiliates with strong academic backgrounds in the humanities joined the group in 2019. Danielle Adams (Lowell Observatory), Susanne M. Hoffmann (Friedrich-Schiller-Universität), and Doris Vickers (Ancient Skies). They added expertise in Arabic, Babylonian, and Latin languages and sky cultures to the group.

2. Summary of Activities This Past Triennium

Activities during 2019 and 2020 are discussed in more detail in the WGSN annual reports, posted to the WG’s IAU website‡.

2.1. *Statistical Analysis of Adopted IAU Names*

Doris Vickers led a survey on the etymologies of the approved star names and presented a statistical analysis with regard to their origin in culture and historical epoch. 449 star names adopted by WGSN for the IAU¶ were analysed – with the exception of the 127 names (28%) from the 2015 and 2019 IAU NameExoWorlds campaigns. The results of this analysis were summarized in the 2020 WGSN annual report. Excluding the 28% from the IAU NameExoWorlds campaigns, the original languages of the remaining names came from Arabic (44.3%), Latin (6.5%), Greek (4.9%), and Chinese (2.4%). For 2.2%, it was unclear what language the name came from, and for the remaining 41.9% of IAU star names no single language contributes more than 2%. Besides the Arabic names, there are at least 22 other languages which seem to have contributed names. A preliminary survey of the historical epochs of the names’ origins was also assessed for 375 of the 449 stars (leaving 16.5% for which a historical epoch has not yet been determined). Of the 449 star names, 37.7% are from IAU NameExoWorlds campaigns (2015, 2019), 3.3%

† https://www.iau.org/administration/about/strategic_plan/

‡ https://www.iau.org/science/scientific_bodies/working_groups/280/

¶ https://www.iau.org/public/themes/naming_stars/

are Indigenous, and 16.5% have not yet had a historical epoch determined. Among the remaining 42.5% of the sample with determinable origin epochs||: 7.1% were 'recent' (later than 1800 CE), 35.0% were 'Renaissance' (loosely covering 1500-1800 CE), 11.0% were 'medieval' (500 to 1500 CE), 14.8% were 'ancient' (500 BCE to 500 CE), 0.3% were from earlier in the 1st millenium BCE, and 2.1% were from 2nd millenium BCE.

2.2. IAU100 NameExoWorlds

In 2019, WGSN members Eric Mamajek, Sze-leung Cheung and Hitoshi Yamaoka were drafted to serve on the IAU100 NameExoWorlds Steering Committee (which Mamajek co-chaired with Alain Lecavalier des Etangs), along with members of the IAU Executive Committee, IAU Office for Astronomy Outreach (OAO), and IAU100 Secretariat†. Eduardo Penteadó served as IAU100 NameExoWorlds Project Manager. The campaign achieved broad public participation around the world through 113 successful national public naming campaigns, coordinated through the IAU OAO network of National Outreach Coordinators (NOCs). The IAU100 NameExoWorlds Steering Committee generated the list of exoplanetary systems, drafted naming guidelines, vetted the winning entries, and finalized the names and etymologies for the stars and exoplanets. The final report for the IAU100 activities‡ stated that ”[t]he project with the greatest reach was the IAU100 NameExoWorlds initiative that engaged over 780,000 people in 113 countries in the naming of star and exoplanet systems.” The results of the public naming campaign were announced to the world via a press conference and release¶, with the names and etymologies posted to the website <http://www.nameexoworlds.iau.org/final-results>. The campaign was summarized in an article in the IAU CAP journal (Mamajek et al. 2020). Additional information was presented in the WGSN 2019 annual report.

Following the IAU100 NameExoWorlds campaign, the ad hoc Steering Committee decided a few matters before it disbanded. The purview for deciding any matters of nomenclature for the stars and exoplanets named in the 2019 and 2015 NameExoWorlds campaigns was delegated to WGSN (i.e. cataloguing of the names, any future revisions, citations, system themes, and naming for additional bodies in the systems). Also, naming themes for the systems approved by the 2015 NameExoWorlds campaign were adopted, and presented in the 2019 WGSN annual report.

The 113 new star names were added to the catalog of IAU-approved star names at https://www.iau.org/public/themes/naming_stars/, bringing the total number of entries in the catalog to 449. The IAU100 NameExoWorlds names (Table 1) were the only names added to that catalog during the past triennium. We note some minor revisions and addenda to the IAU100 NameExoWorlds names that were announced in December 2019:

- While 112 pairs of names were announced at the December 17, 2019 IAU press conference, the results of one additional campaign took two more months of deliberation between the IAU100 Steering Committee and the Mongolia NameExoWorlds National Committee to resolve. On February 24, 2020, the Steering Committee approved the 113th pair of names – *Mazaalai* and *Bambaruush* – for the star HAT-P-21 and its exoplanet *b*. The names refer to the Mongolian names for the endangered Gobi bear subspecies, and

|| Historical periods roughly follow Kunitzsch & Smart (2006).

† <http://www.nameexoworlds.iau.org/steering-committee>

‡ <https://iau.org/news/announcements/detail/ann20019/>

¶ <https://www.iau.org/news/pressreleases/detail/iau1912/>

a bear cub of the same subspecies, respectively.

- Responding to a request from Mr. Yukio Sato, the officer in chief of Hokkaido Ainu association, the IAU100 NameExoWorlds Steering Committee revised the spelling of the name for the star HD 145457 from *Kamui* to *Kamuy*.

- In consultation with the Spain National Committee, the accented version of the name for HD 149143 is *Rosalíadecastro* and for HD 149143 b it is *Ríosar*. The original IAU100 NameExoWorlds announcement products included only unaccented versions.

All of these changes have been reflected in WGSN's catalogs.

Table 1: New Star & Exoplanet Names from the IAU100 NameExoWorlds Campaign (2019)

Star Name	Designation	Planet Name (b)	Constellation	Locality
Absolutno	XO-5	Makropulos	Lyn	Czech Republic
Alasia	HD 168746	Onasilos	Ser	Cyprus
Amadioha	HD 43197	Equiano	CMA	Nigeria
Amansinaya	WASP-34	Haik	Crt	Philippines
Anadolu	WASP-52	Göktürk	Peg	Turkey
Aniara	HD 102956	Isagel	UMa	Sweden
Arcalís	HD 131496	Madriu	Boo	Andorra
Atakoraka	WASP-64	Agouto	CMA	Togo
Axólotl	HD 224693	Xólotl	Cet	Mexico
Ayeyarwady	HD 18742	Bagan	Eri	Myanmar
Baekdu	8 UMi	Halla	UMi	South Korea
Belel	HD 181342	Dopere	Sgr	Senegal
Bélénos	HD 8574	Bélisama	Psc	France
Berehynia	HAT-P-15	Tryzub	Per	Ukraine
Bibhā	HD 86081	Santamasa	Sex	India
Bosona	HD 206610	Naron	Aqr	Bosnia & Herzegovina
Bubup	HD 38283	Yanyan	Men	Australia
Buna	HD 16175	Abol	And	Ethiopia
Ceibo	HD 63454	Ibirapitá	Cha	Uruguay
Chaophraya	WASP-50	Maeping	Eri	Thailand
Chasoň	HAT-P-5	Král'omoc	Lyr	Slovakia
Chechia	HD 192699	Khomsa	Aql	Tunisia
Citadelle	HD 1502	Indépendance	Psc	Haiti
Citalá	HD 52265	Cayahuanca	Mon	El Salvador
Cocibolca	HD 4208	Xolotlan	Scl	Nicaragua
Dingolay	HD 96063	Ramajay	Leo	Trinidad & Tobago
Dìwö	WASP-17	Ditsö	Sco	Costa Rica
Diya	WASP-72	Cuptor	For	Mauritius
Dofida	HD 117618	Noifasui	Cen	Indonesia
Dombay	HAT-P-3	Teberda	UMa	Russia
Ebla	HD 218566	Ugarit	Psc	Syria
Emiw	HD 7199	Hairu	Tuc	Mozambique
Felixvarela	BD-17 63	Finlay	Cet	Cuba
Flegetonte	HD 102195	Lete	Vir	Italy

Formosa	HD 100655	Sazum	Leo	China Taipei
Franz	HAT-P-14	Sissi	Her	Austria
Funi	HD 109246	Fold	Dra	Iceland
Gakyid	HD 73534	Drukyul	Cnc	Bhutan
Gloas	WASP-13	Cruinlagh	Lyn	United Kingdom
Gumala	HD 179949	Mastika	Sgr	Brunei
Hoggar	HD 28678	Tassili	Tau	Algeria
Horna	HAT-P-38	Hiisi	Tri	Finland
Hunahpú	HD 98219	Ixbalanqué	Crt	Honduras
Hunor	HAT-P-2	Magor	Her	Hungary
Illyrian	HD 82886	Arber	LMi	Albania
Inquill	HD 156411	Sumajmajta	Ara	Peru
Intan	HD 20868	Baiduri	For	Malaysia
Irena	WASP-38	Iztok	Her	Slovenia
Itonda	HD 208487	Mintome	Gru	Gabon
Kalausi	HD 83443	Buru	Vel	Kenya
Kamuy	HD 145457	Chura	CrB	Japan
Karaka	HD 137388	Kererū	Aps	New Zealand
Kaveh	HD 175541	Kavian	Ser	Iran
Koeia	HIP 12961	Aumatex	Eri	Puerto Rico
Koit	XO-4	Hämarik	Lyn	Estonia
Lerna	HAT-P-42	Iolaus	Hya	Greece
Liesma	HD 118203	Staburags	UMa	Latvia
Lionrock	HD 212771	Victoriapeak	Aqr	Hong Kong, China
Lucilinburhuc	HD 45350	Peitruss	Aur	Luxembourg
Lusitânia	HD 45652	Viriato	Mon	Portugal
Macondo	HD 93083	Melquíades	Ant	Colombia
Mago	HD 32518	Neri	Cam	Germany
Mahsati	HD 152581	Ganja	Oph	Azerbaijan
Malmok	WASP-39	Bocaprins	Vir	Aruba
Márohu	WASP-6	Boinayel	Aqr	Dominican Republic
Mazaalai	HAT-P-21	Bambaruush	UMa	Mongolia
Moldoveanu	XO-1	Negoiu	CrB	Romania
Mönch	HD 130322	Eiger	Vir	Switzerland
Montuno	WASP-79	Pollera	Eri	Panama
Morava	WASP-60	Vlasina	Peg	Serbia
Moriah	HAT-P-23	Jebus	Del	Palestine
Mouhoun	HD 30856	Nakanbé	Eri	Burkina Faso
Mpingo	WASP-71	Tanzanite	Cet	Tanzania
Muspelheim	HAT-P-29	Surt	Per	Denmark
Naledi	WASP-62	Krotoa	Dor	South Africa
Násti	HD 68988	Albmi	UMa	Norway
Natasha	HD 85390	Madalitso	Vel	Zambia
Nenque	HD 6434	Eyeke	Phe	Ecuador
Nervia	HD 49674	Eburonia	Aur	Belgium
Nikawiy	HD 136418	Awasis	Boo	Canada
Nosaxa	HD 48265	Naqaŷa	Pup	Argentina
Nushagak	HD 17156	Mulchatna	Cas	USA
Nyamien	WASP-15	Asye	Cen	Ivory Coast

Parumleo	WASP-32	Viculus	Psc	Singapore
Petra	WASP-80	Wadirum	Aql	Jordan
Phoenicia	HD 192263	Beirut	Aql	Lebanon
Pincoya	HD 164604	Caleuche	Sgr	Chile
Pipoltr	TrES-3	Umbäassa	Her	Liechtenstein
Poerava	HD 221287	Pipitea	Tuc	Cook Islands
Rapeto	HD 153950	Trimobe	Sco	Madagascar
Rosalíadecastro	HD 149143	Ríosar	Oph	Spain
Sagarmatha	HD 100777	Laligurans	Leo	Nepal
Sāmaya	HD 205739	Samagiya	PsA	Sri Lanka
Sansuna	HAT-P-34	Ġgantija	Sge	Malta
Shama	HD 99109	Perwana	Leo	Pakistan
Sharjah	HIP 79431	Barajeel	Sco	United Arab Emirates
Sika	HD 181720	Toge	Sgr	Ghana
Solaris	BD+14 4559	Pirx	Peg	Poland
Sterrennacht	HAT-P-6	Nachtwacht	And	Netherlands
Stribor	HD 75898	Veles	Lyn	Croatia
Taika	HAT-P-40	Vytis	Lac	Lithuania
Tangra	WASP-21	Bendida	Peg	Bulgaria
Tapecue	HD 63765	Yvaga	Car	Bolivia
Tevel	HAT-P-9	Alef	Aur	Israel
Timir	HD 148427	Tondra	Oph	Bangladesh
Tislit	WASP-161	Isli	Pup	Morocco
Tojil	WASP-22	Koyopa'	Eri	Guatemala
Tuiren	HAT-P-36	Bran	CVn	Ireland
Tupã	HD 108147	Tumearandu	Cru	Paraguay
Tupi	HD 23079	Guarani	Ret	Brazil
Uklun	HD 102117	Leklsullun	Cen	Pitcairn Islands
Uruk	HD 231701	Babylonia	Sge	Iraq
Xihe	HD 173416	Wangshu	Lyr	China Nanjing

2.3. Highlights of WGSN Research and Outreach Activities

WGSN members continued to answer inquiries from the public, astronomical community, and IAU leadership on celestial nomenclature and IAU history and policy on the topic.

Work spanning multiple regions: Steven Gullberg, Alejandro Martín Lopez, Javier Mejuto, Duane Hamacher completed a cultural comparison of 'dark constellations', published in Gullberg et al. (2020). Susanne M. Hoffmann joined the developer team of Stellarium desktop planetarium software and revised most of the sky culture descriptions therein. She also added two Babylonian and (with her students) the Almagest sky culture to Stellarium. The fundamental paper on Stellarium software just appeared in March 2021 (Zotti et al. 2020).

Americas: Steven Gullberg is researching Peruvian Inca/Quechua names. In South America, especially in Argentina, at the University of La Plata and the University of Buenos Aires, extensive research has been carried out on the celestial cultures of the aboriginal groups of the Chaco for several decades. Alejandro Martín López recently published a paper (López et al. 2020) researching dark asterisms and areas of diffuse brightness and the role of contrast.

Arabic: Danielle Adams has researched Arabic star names and presented them in public outreach at Lowell Observatory, cf. Adams (2018, 2021). She began writing her first monograph on Arabian astronomy, and she gave several virtual presentations on Arabian astronomy, including one for the Grand Canyon Star Party.

Australian: Duane Hamacher is researching and cataloguing Australian Aboriginal star and asterism names. The WGSN started a dialogue with the Wergaia peoples through the Barengi Gadjin Land Council (in Victoria, Australia) regarding usage and spelling of the star name Unurgunite (σ CMa) and other stars. The name was originally adopted by the WGSN in 2017 based on recorded historical usage in the 19th century by the Boorong clan (which no longer exists), but free, prior and informed consent is being requested from their descendants.

Babylonian: Steve Gullberg & Susanne M. Hoffmann are working on a complete visualisation of Babylonian constellations in MUL.APIN for Stellarium. This is the base for future identification of Babylonian star names. Susanne M. Hoffmann investigated the transfer and transformation of Babylonian names for all types of asterisms (stars, constellations, alignments). Besides publishing some recent related papers (Hoffmann 2020; Hoffmann & Krebernik 2020), she is currently finalizing a book on this topic.

Indian: B.S. Shylaja is working on a comprehensive compilation of historical star and asterism names from India with an outcome of six papers within the past two years: Shylaja (2019); Venketeswara Pai & Shylaja (2019); Shylaja & Venketeswara Pai (2019a,b,c); Venketeswara Pai & Shylaja (2021).

Polynesian: Clive Ruggles is working on researching and updating the existing Hawaiian and Polynesian star name catalogues, and together with John Mahelona is working on a third edition of *Nā Inoa Hōkū: Hawaiian and Pacific Star Names* by Johnson, Mahelona and Ruggles, due for publication in 2022.

3. Closing Remarks

We plan to add etymological information for the IAU star names to the IAU website, and set up a database of Indigenous star names that will serve for preserving their heritage. The statistical survey of star name etymologies suggests that additional efforts should be made to survey names from Indigenous cultures and ancient sky cultures of e.g. Asia, near East, etc., and where possible add new entries from diverse sky cultures to the growing list of IAU star names. We encourage experts on these sky cultures to reach out to share their findings, and a new online form has been added to facilitate input to the WGSN†. The Stellarium project should be a helpful resource as that project had attracted content relevant to about 40 sky cultures - including Arabic, Greek (Almagest), Babylonian (MUL.APIN), several historical European ones (Belarussian, Macedonian, Norse, Romanian, Sami, Sardinian), Hawaiian, Polynesian (Tongan, Vanuatu), Indian (Vedic), Mongolian, Siberian, two Australian ones (Boorong, Kamilaroi/Euahlayi), Chinese (Suzhou, Song, Contemporary Chinese), Korean, Japanese, and various native American traditions (Inuit, Aztec, Maya, Navajo, Northern Andes, Ojibwe, Tukano, Tupi-Guarani).

WGSN members were saddened to learn of the passing of Prof. Paul Kunitzsch (1930-2020) who was a leading historian of medieval astronomy and prolific author of many works relevant to the history of star names and the Almagest.

† <http://www.pas.rochester.edu/~emamajek/WGSN/>

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