#### WORKING GROUP

### EXOPLANETARY SYSTEM NOMENCLATURE

Functional Working Group

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# WORKING GROUP EXOPLANETARY SYSTEM NOMENCLATURE TRIENNIAL REPORT 2021-2024

## 1. The creation of the Working Group Exoplanetary System Nomenclature in 2021

The IAU has a long tradition of naming celestial bodies, like minor planets, comets, planetary features, and some stars. In the past decade it was decided to formally adopt proper names for celestial bodies in at least some exoplanetary systems. The IAU's mechanism for naming exoplanets thus far had been public naming campaigns with great access. These campaigns had demonstrated that they can yield high quality and diverse names with sufficiently strong guidelines.

At the end of the previous triennium, the Division F Steering Committee realized that the IAU requires a long-term solution to the process for adopting proper names for celestial bodies in exoplanetary systems (e.g., exoplanets, their host stars, stellar and substellar companions), since the public naming campaigns were run by ad-hoc committees that disbanded after the campaigns concluded.

It was noted that buy-in for adopting IAU proper names for exoplanets and host stars among exoplanet astronomers has been very low thus far. In contrast to this, the trend for naming of other types of "worlds" in astronomy has been for proper names to come into ubiquitous usage after their adoption by the IAU, and that the case for exoplanets may eventually move in this direction in the long term. In addition, it was noted that there had been recent interest from outside entities in running naming campaigns whose results they wish to be recognized by the IAU.

The IAU has established WG for naming other types of "worlds" in astronomy, like the Division F WGs Planetary System Nomenclature (WGPSN), Division F WG Small Bodies Nomenclature (WGSBN) and the Division C WG Star Names. These WGs are classified as 'Functional Working Groups', because their "scope and purpose are institutional and naturally extend beyond the IAU three-year cycle". In view of these considerations, the Division F Steering Committee proposed in 2021 to the Executive Committee to create the WG Exoplanetary System Nomenclature, as a functional IAU WG. The WG should have close relation with the Divisions C, F and G, especially with the Commission F2 "Exoplanets & the Solar System" and the Division C WG Star Names, as well as the IAU Office for Astronomy Outreach (OAO) and the IAU Press Office.

The Working Group Exoplanetary System Nomenclature was approved at the Executive Meeting #106 in August 2021.

The initial tasks of this WG were:

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- Propose the future process for naming exoplanets and their host stars, which should be elevated to the Division F, C and G SCs, and lately to the IAU EC for their consideration and final approval.
- Set up the rules for selecting the planetary systems that are in a situation to be named.
- Produce guidelines for who can make a proposal of names and the general criteria for the names. (The WG should seek advice from the other IAU Nomenclature WGs.)
- Analyze the reasons for the low adoption of the IAU approved names among the exoplanets research community.
- In case part, or all, of the naming process is done through future public campaigns, the WG will set up the specific campaign rules, create the committees, and supervise the operation of the campaign.

The Working Group, with the members listed above, begans its function in November, 2021.

### 2. NameExoWorlds 2022 Campaign

(https://nameexoworlds.iau.org/2022edition)

In 2021, the IAU Office for Astronomy Outreach (OAO) proposed to the Executive Committee and the WGESN to organize a new exoplanet naming contest within the framework of the celebrations of the 10th anniversary of the OAO to be held in 2022. The WGESN enthusiastically accepted the proposal adopting the name: NameExoWorlds 2022 campaign. It was officially launched at the IAU General Assembly in August 5th, 2024 in Busan, Republic of Korea.

Following the experience of the previous exoplanets naming campaigns (https://nameexoworlds.iau.org/), the NameExoWorlds 2022 contest invited communities across the globe to connect their own cultures to these distant worlds. Each team could propose a name for an exoplanet and its host star from a list of confirmed objects (referred to collectively as "ExoWorlds" in the competition). The systems to be named by NameExoWorlds 2022 were of special interest, as they were among the first exoplanet targets of the James Webb Space Telescope (JWST). The exoplanets were discovered through a mix of techniques, mostly via the transit method and direct imaging.

NameExoWorlds 2022 was a collaboration between the Working Group on Exoplanetary Systems Nomenclature and the IAU Office for Astronomy Outreach.

The proposals went through a two-step process of selection. First, a national selection panel, led by the National Outreach Coordinators (NOCs), selected a national candidate and two backup names. Then, a final selection committee – composed of the Working Group on Exoplanetary Systems Nomenclature and the exoplanet discoverers –considered the candidates proposed by each country and selected a name for each ExoWorld. The committee had the invaluable logistic support of the OAO.

The NameExoWorlds 2022 contest selected 20 pairs of names for exoplanets and their host stars. With 603 entries from 91 countries, the campaign attracted over 8,800 individuals working in teams, who put forward outreach initiatives that stimulated the direct participation of almost 12 million people worldwide. The contest attracted over professional and amateur astronomers, students and teachers, and astronomy enthusiasts in teams that hosted astronomy events. From intimate events for neighbours to large online lectures, the astronomy outreach events created for NameExoWorlds 2022 showcased the diversity and creativity that is possible in astronomy outreach practices.

At the core of the decision process to select these 20 names were members of the WG Exoplanetary System Nomenclature, in consultation with the discoverers of the planets,

who joined for the selection of the new names from 134 national entries. The lead author of the discovery paper for the exoplanet, or a coauthor (either delegated by the first author, or selected by the panel if the first author did not respond), was invited by the panel to participate in the NameExoWorlds 2022 campaign. They were given the choice of either providing input to the panel on the naming selection (after reviewing the leading naming proposals for that system) or participating on a team that proposed names for the system — but they could not do both. Most elected to provide input to the panel on the top proposals for a particular system from the various national campaigns. Their contributions were greatly appreciated.

On June 7th, 2023, the IAU announced the results of the NameExoWorlds 2022 campaign (https://iau.org/news/pressreleases/detail/iau2304/).

Hereby is the list of approved names for the 20 exoplanets and their respective host stars. Detail information about the motivation for the names can be found at: https://nameexoworlds.iau.org/2022approved-names.

Star catalog ID	Constellation	$egin{array}{c} Namer \\ Star \end{array}$	Exoplanet catalog ID	$egin{array}{c} Name \ Exoplanet \end{array}$	Language	Country
GJ 1214	Ophiuchus	Orkaria	GJ 1214 b	Enaiposha	Maa	Kenya
GJ 3470	Cancer	Kaewkosin	GJ 3470 b	Phailinsiam	Thai	Thailand
GJ 367	Vela	Añañuca	GJ 367 b	Tahay	Spanish	Chile
GJ 436	Leo	Noquisi	GJ 436 b	Awohali	Cherokee	United States
GJ 486	Virgo	Gar	GJ 486 b	Su	Basque	Spain
HAT-P-12	Canes Venatici	Komondor	HAT-P-12 b	Puli	Hungarian	Hungary
HAT-P-26	Virgo	Guahayona	HAT-P-26 b	Guataubá	Taino	Puerto Rico
HATS-72	Aquarius	Zembra	HATS-72 b	Zembretta	Arabic	Tunisia
HD 95086	Carina	Aiolos	HD 95086 b	Levantes	Greek	Greece
HIP 65426	Centaurus	Matza	HIP 65426 b	Najsakopajk	Zoque	Mexico
L 168-9	Tucana	Danfeng	L 168-9 b	Qingluan	Chinese	China
LHS 3844	Indus	Bats`ũ	LHS 3844 b	Kua'kua	Bribri	Costa Rica
LTT 9779	Sculptor	Uúba	LTT 9779 b	Cuancoá	U'wa (Tunebo)	Colombia
WASP-121	Puppis	Dilmun	WASP-121 b	Tylos	Sumerian	Bahrain
WASP-166	Hydra	Filetdor	WASP-166 b	Catalineta	Catalan	Spain
WASP-19	Vela	Wattle	WASP-19 b	Banksia	English	Australia
WASP-43	Sextans	Gnomon	WASP-43 b	Astrolábos	Greek	Romania
WASP-63	Columba	Kosjenka	WASP-63 b	Regoč	Croatian	Croatia
WASP-69	Aquarius	Wouri	WASP-69 b	Makombeé	Duala	Cameroon
WD 0806-661	Volans	Maru	WD 0806-661 b	Ahra	Korean	Korea

Table 1. List of approved names in the NameExoWorlds 2022 campaign.

Explanation of the catalog acronyms: GJ - Gliese-Jahreiß Catalogue of Nearby Stars; HAT - Hungarian Automated Telescope Network; HD - Henry Draper Catalogue; HIP - Hipparcos catalogue; L, LHS, LTT - different Luyten catalogues; WASP - Wide Angle Search for Planets; WD - White Dwarf Catalog; Wolf - Wolf catalog of stars with large proper motions.

The 20 sets of approved names came from groups of 19 different countries and 19 different languages.

Through the NameExoWorlds initiatives, the IAU recognized the importance of the connections between the sky and our diverse cultures. In recognition of this link and of the UN International Year of Indigenous Languages 2019, speakers of Indigenous languages were encouraged to propose names from those languages. Seven of the selected names are of Indigenous etymology. Several of the newly adopted names honored native fauna and flora with cultural significance. Selected names also highlight significant geographical landmarks, celebrate literary works, or celebrated folktales, mythologies and lore from around the world. The selection committee out special effort to choose names that resembles or have some connection to the exoplanetary system.

Several notable exoplanets were named in this campaign, like sub-Neptune' exoplanets,

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hot-Neptune exoplanets, hot sub-Earth-sized exoplanet including an ultra-short-period exoplanet. Some of these exoplanets are orbiting nearby red dwarf stars within a few tens light-years of Earth.

This new campaign demonstrates the success of this naming procedure that achieves the involvement of thousands of people from very diverse cultures and different ages.

Participants of the selection committee for this campaign:

- From the WGESN: Eric E. Mamajek (Chair of NameExoWorlds 2022 Campaign), Gonzalo Tancredi (WG Chair), Saeko Hayashi, Alain Lecavelier des Etangs, Jack Lissauer. EC Liaison: Debra Elmegreen, José Rodriguez Espinosa
  - Various exoplanets discoverers.
- From the IAU Office for Astronomy Outreach: Lina Canas (Coordinator), Matipon Tangmatitham (Project Manager until October 2022), Suzana Filipeki Martins (Project Manager from October 2022).
  - $\bullet$  From the IAU Press Office: Lars Lindberg Christensen.