

# Developing an Arabic Equivalent of the Planetary Nomenclature: a draft for a standardized system

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## Abstract

This paper describes the making process aiming to develop the first basis for an Arabic equivalent of the planetary nomenclature that have been produced in many other languages, we have developed priorities for the Arabic translation and conversion of the original Latin forms of planetary specific and descriptor terms. It also shows the main difficulties and some recommendations. This work will hopefully serve as a draft and preparatory base for a standardized system of the Planetary nomenclature in Arabic script.

*Keywords*—Cartography, Gazetteer, Nomenclature, Planetary.

## 1. Introduction

Planetary science has been for the last decades a ground of research restricted only for space faring nations that are capable to develop and operate planetary spacecrafts, and thus are able to discover new surface features and send missions to the outer space in the case of few countries citing the United states, Russia, China, Japan... But as the interest with astronomy and planetary science grows up and the access to information and technology became easier for scientists from other countries. Then groups and research teams from different countries emerged in order to collaborate with Space agencies and are closely involved in studying the enormous amounts of data from previous works or planning the science programs of future spacecraft missions.

In this context we can encounter scientific communications and many research results published in different languages, following those researchers official mother tongue or due to governmental obligations to publish in their own language to address the local public. Although English is the predominant language in today's scientific communications, we can find Russian, Chinese, French, German or Japanese research results in local

websites used for local development or educational purposes.

This conduct us to talk about The Arabic language which is spoken today by over 420 million people in the Middle East and North Africa. but actually it is also used as a religious language by the world's Muslims, who total around one billion people, making it the fifth most spoken language in the world. 'By analyzing the number of Planetary Science Papers by the First Author's City of Affiliation (Published in JGR, PSS and Icarus in 2009-2012) we can assume that the United state, Russia and European countries are the most active nations alongside with other nations from Asia (China India and Japan), on the other hand we can observe the absence of any publication from other continents in the case of South America, Australia and Africa, Although we are focusing on Middle eastern and North African countries that are Arabic speakers.'"[1] The fact that centuries ago, during the Golden age of Islam, the contributions islamic science in the making of the european renaissance.

"Islamic astronomy played a significant role in the revival of Byzantine and European astronomy following the loss of knowledge during the early medieval period, notably with the production of Latin translations of Arabic works during the 12th century. Islamic astronomy also had an influence on Chinese and Malian astronomy. A significant number of stars in the sky, such as Aldebaran, Altair and Deneb, and astronomical terms such as Alidade, Azimuth, and nadir, are still referred to by their Arabic names. 10,000 Arabic manuscripts scattered throughout the world is the number of Astronomy related literature. [4]

"Given the awareness of the potential of space applications, countries are aware of the benefits of including space capabilities in their national development programs, and this has been an important development in recent years, with countries moving forward seeking to take advantage of space and promote their national development towards joining the scene of space technology, Such

as Japan, India, Brazil, Canada, and South Africa, proved the success of their programs, and took the recent emerging countries such as Venezuela, Thailand, Turkey, Algeria, Malaysia, Taiwan, Indonesia, the United Arab Emirates, Egypt and others Through small and low-cost satellite technology transfer programs through cooperation with countries that are already in the process It has a long history in space technology." [2]

In this context the United Arab Emirate has entered the space race with a project to send an unmanned probe to Mars by 2021 under the oversight of its own Outer space federal agency becoming the Arab world's first foreign space mission. "The UAE space agency will become the ninth country in the world with space programs to explore the Red Planet, according to the statement. Mohammad Bin Rashid Space Centre".[3]

Given the opportunity to contribute to the space community with this mission, it will be a chance for Arabic speaking nations to aim for the new Amateur public interested in Astronomy and space industry with their Mother tongue language and especially the younger ones by communicating the passion in the most simple and understandable way.

## 1.1 Gazetteer of Planetary Nomenclature

Every last one of three crewed space faring nations (the USA, china and Russia) use different writing systems, in spite of the fact that the International Astronomical Union's Gazetteer of Planetary Nomenclature (GPN) has proper and specific names originating from more than 300 ethnic groups and nations. "So Instead of being international, the GPN should be considered "supra-national", giving all nations an equal right to use the names determined by IAU WGPSN in their respective languages and writing systems, while maintaining the standardized, single IAU forms in international communication." [2]

"The Latin-based planetary nomenclature may be more or less transparent for the well educated Euro-American reader, but it is obscure for most young students in Europe and is as alien for the Arabic or Chinese readers, as alien Arabic or Chinese is for the Euro-American readers." [2]

For young amateurs in this field, dominated by English language, the focus of the apprentices should be on acquiring the information and not just in learning exotic words. The linguistic barrier can be

tackled after years of learning but the first interest of the person can change to another science or activity, so why not paving the road for the young educated children and students and target a more general audience in event and public conferences or just news broadcasting where a more popularized and vulgarized language can be used and make it understandable for them as it is for the professionals.

"The authors of previous papers participated in efforts to transform the international standard forms in the GPN into their respective languages (Chinese, Russian and Hungarian). This processes also called localization: the creation of a local variant, in this case, the local equivalent of the GPN." [2]

In contrast with the fact that the Russian version has been under development since the 1960s, the Chinese variant has been created only in recent years, answering the needs connected to the successful Chinese Moon program. And with the upcoming event of the first Emirati and Arabic Hope probe project the scientific community has no more excuses not to work on a localized Arabic GPN, where this work can be a pilot effort aiming to engage future efforts and contributions by professionals in other fields.

## 2. Materials

### A) The Arabization process

The process of the "Arabization" has been commonly used in many educational programs but the need to generalize the use of Arabic as the language of academic teaching, research and publication can be a challenge and a good prospective with the upcoming events for the UAE space agency in order to communicate the results and last updates to the general public audience and especially young students and Amateurs fascinated by space and Astronomy in general and planetary science as one of its most attractive fields.

### B) Benefiting from Romanization works

Romanization is often termed "transliteration", but this is not technically correct. "Transliteration is the direct representation of foreign letters using Latin symbols, while most systems for romanizing Arabic are actually transcription systems, which represent the sound of the language." [6]

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| ء | ا | ب | ت | ث | ج | ح | خ | د | ذ  | ر  | ز  | س  | ش  | ص  | ض  | ط  | ظ  | ع  | غ  | ف  | ق  | ك  | ل  | م  | ن  | هـ | و  | ي  |    |
|   | ا | ب | ت | ث | ج | ح | خ | د | ذ  | ر  | ز  | س  | ش  | ص  | ض  | ط  | ظ  | ع  | غ  | ف  | ق  | ك  | ل  | م  | ن  | هـ | و  | ي  |    |
|   | ا | ب | ت | ث | ج | ح | خ | د | ذ  | ر  | ز  | س  | ش  | ص  | ض  | ط  | ظ  | ع  | غ  | ف  | ق  | ك  | ل  | م  | ن  | هـ | و  | ي  |    |

<sup>A</sup> Not romanized word-initially.  
<sup>B</sup> Not romanized, but see romanizations accompanying *alif()* in the table for vowels.  
<sup>C</sup> In certain endings, an original *tā'* (ت) is written *ṭ*, i.e., like *hā'* (هـ) with two dots, and is *k* *tā' marbūṭah*. It is romanized *h*, except in the construct form of feminine nouns, where it is romanized *t*, instead.

### C) Modern Standard Arabic (MSA)

Most printed material by the Arab League—including most books, newspapers, magazines, official documents, and reading primers for small children—is written in MSA standing for Modern Standard Arabic. It is considered the literary standard across the Middle East and North Africa, and it is one of the six official languages of the United Nations. It is considered relatively new and was developed in the early part of the 19th century. [7]

### D) Translation from Latin and English

The movement of Arabic translation have played a significant role in the revival of Byzantine and European astronomy following the loss of knowledge during the early medieval period. The fact that Latin-Arabic glossaries and dictionaries existed for centuries and were used in scientific progress provided this work with a good reliability and is considered the main and most accurate process in this product. [9]

## 3. Methods

### A) Structure of the nomenclature:

"A planetary name is generally binominal: it consists of two elements, a specific part (e.g., Imbrium) and a generic part called "descriptor term" (e.g., Mare). Descriptor terms are in Latin language. The specific parts are in the original language (for personal names, terrestrial geographical names and in some exceptional cases), or in Latin or in English. Some names (e.g., crater names) are composed of one element only, having no descriptor term (e.g., Tycho)."[1]

### B) Transformation methods:

"Two principle methods are used to transform a toponym:

1) Translation: finding the equivalent denotative and connotative meaning in the other language's vocabulary

2) Conversion: which includes

2.1) Transcription, which is a phonetic conversion between different languages, in which the sounds of a source language are recorded in terms of a specific target language and its particular script.

2.2) Transliteration, which is a conversion between different alphabetic scripts and syllabic scripts, in which each character or di-, tri- and tetragraph of the source script is represented in the target script in principle by one character or di-, tri-, or tetragraph, or a combination of these. It aims at complete reversibility, and must be accompanied by a transliteration key (Kadmon, 2000)." [1]

"Several of the planetary names are eponyms: named after a person. Two or more toponyms employed in reference to a single topographic feature are called allonyms. IAU recognizes only one single name and form for each feature: there are no official allonyms allowed. However, there are several informal or historic names that are allonyms of the same planetary feature." [1]

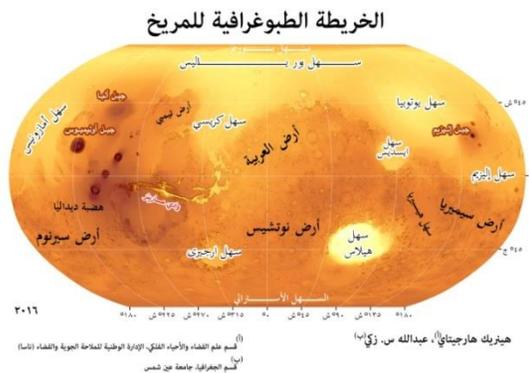


Figure 1 Arabic Topographic Map of Mars (MOLA data). [7]

| Latin name (sing.plur.)  | Arabic name    | Type of conversion                                       | Arabic pronunciation | Original Geographic examples                 | Arabic translation |
|--------------------------|----------------|--|----------------------|--|--------------------|
| Arcus, arces             | قوس            | translation from latin                                   | qaws                 |  |                    |
| Astrum, astra            | نجم            | translation from latin                                   | nad ʕm               |  |                    |
| Catena, catenae          | سلسلة          | translation from latin                                   | silsila              |  |                    |
| Cavus, cavi              | تجويف          | translation from latin                                   | tad ʕwif             |  |                    |
| Chaos, chaoses           | كاوس           | Conversion (transcription)                               | kaios                |  |                    |
| Chasma, chasmata         | شازما          | Conversion (transcription)                               | kazma                | Coprateschasma (on Mars)                     | كوبراتس شازما      |
| Corona                   | تاج            | translation from latin                                   | taj                  |  |                    |
| Collis, Colles           | تل             | translation from latin                                   | tel                  | Arena Dorsum                                 | قم دورسم           |
| Dorsum, dorsa            | قمة قمم        | english translation refers to ridge                      | qimma                | Solarfaculae (the sun)                       | صياخد شمسية        |
| Facula, faculae          | صياخد          | translation from latin                                   | s'ayakhid            | Carmentafarra (on venus)                     | كارمنتا فارا       |
| Farrum, farra            | فاروم، فيرا    | Conversion (transcription)                               | farrumfarra          | Delphi Flexus(on Europa)                     | انحناء يوروبا      |
| Flexus, flexūs           | انحناء         | translation from the original meaning                    | inhina               | Karesosflumen(on Titan)                      | نهر كاريسوس        |
| Flumen, flumina          | نهر أنهار      | translation from latin                                   | nahr, anhar          | Olympicafossae (on Mars)                     | خندق أولمبيكا      |
| Fluctus, fluctūs         | موجة، أمواج    | translation from latin                                   | mawd ʕa, amwad ʕ     | Hardin Fretum (on Mars)                      | قناة هاردن         |
| Fossa, fossae            | خندق           | translation from latin                                   | khandaq              | Bimini insula (on Titan)                     | جزيرة بيمينى       |
| Fretum, freta            | قناة           | translation of meaning from channel                      | qanat                | Candorlabes (on Mars)                        | انزلاق كاندور      |
| Insula, insulae          | جزيرة          | translation from latin                                   | jazira               | Adamas labyrinthus                           | اداماس لابيرانت    |
| Labes, labēs             | انزلاق         | translation from english equivalent 'landslide'          | inzilaq              | Solislacus (on Mars)                         | سهل سوليس          |
| Labyrinthus (labyrinthi) | لابيرانت/مناهة | translation  | labyrinth/mataha     | Balaton lacus (On Titan)                     | بحيرة بالاتون      |
| Lacus (lacūs)            | سهل            | translation according to the IAU description small plain | sahl                 | Adonis linea (on Europa)                     | أدونيس لينيا       |
| Lacus (lacūs)            | بحيرة          | translation according to the IAU description 'lake'      | bouhaira             | UltimaLingula (on Mars)                      | أولتيميا لينغولا   |
| Linea, lineae            | لينيا          | Conversion (transliteration)                             | linea                | No examples on theGazetteer (only on Europa) | //////////         |
| Lingula, lingulae        | لينغولا        | Conversion (transliteration)                             | lingoula             |  |                    |
| Mare, maria              | بحر            | translation from latin                                   | bahr                 | Olympusmons                                  | جبل أولمبيس        |

Table 1: Table presenting the attempt to find the most accurate Arabic equivalent to some Latin names and the Type of conversion used.

## 4. Summary and Conclusions

This work being a first attempt to implement a basis for Developing an Arabic Equivalent of the Planetary Nomenclature, we came to a conclusion that creating such a standardized system will require the collaboration of a team of experts, this is why we can recommend the creation of a working group composed of Planetary scientists, Cartographers, planetary geologists and use the previous experience of the United Nations Group of Experts[5] on Geographical names and include a recognized Institute of translation.

Direct Translation from the Latin name can sometimes cause an ambiguity or confusion with the real meaning which have been the case of Labyrinthus translated to labyrinth or Maze structure where in Arabic it's more accurate to use the translation of a maze. those problems provided a good reason to think about a system of hierarchy by priority:

- 1) Latin name.
- 2)original meaning in Latin.
- 3)English translation.
- 4)conversion by transliteration.

Transcription is used when the proposed translation from latin or english is either confusing, can't contribute in the field of geology & planetary science or just isn't widely used in the Arabic language to refer to that meaning so we adopt this conversion method. Conversion by transliteration should take in consideration the same order of Translating Latin before English term (eg: Chasma should be transliterated to kazma).

The next step would be the creation of detailed topographic and geologic planetary maps in Arabic similar in quality to those produced by renowned agencies to the benefit of both the public and research community in the Arab world.

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