DATLUN

Databases manager of the Virtual Moon Atlas

Documentation for the version 8

Welcome in "DATLUN" (c) the "Virtual Moon Atlas" databases manager.

As amateur astronomers, we continue to improve VMA for conceiving a useful software for lunar observer also efficient "on the field". We try to add new functions and a user friendly interface. This is why Patrick Chevalley has coded a database manager called "*DATLUN*" (copyrighted name) that allows you to select precisely lunar formations that seems you interesting for your own studies and that allows you to localize them on the VMA map.

These extended possibilities are permited by the fact that Christian legrand processes "formated" databases, that allows specific extractions based on precise terms or expressions.

This version includes the functions that have seemed us the more useful. Sure, we are yet thinking to new possibilities that will be included in the next versions.

"*DATLUN*" (c) is a dedicated to the Moon software which is very powerful since it uses SQL requests. This manual is necessary to discover all its possibilities. We advice you to read it carefully while testing the described functions.

Good use and we haope that you will appreciate this new software and recommand it around you.

Thank you very much for your confidence.

Christian Legrand & Patrick Chevalley

DATLUN SCREEN

DATLUN screen is in a Windows frame. As all the Windows frames, you can minimize, maximize or adapt its size if you click on the upper right buttons in the title bar.

It's possible to open together *ATLUN* (c) and *DATLUN* (c) modules allowing formations localisation on the map, while accessing to all the datas about thes formations.. You can also launch *DATLUN* (c) from the *ATLUN* (c) module in clicking on the associated button on buttons bar.

DATLUN (c) window features :

- The menus bar
- The window "List"
- The state bar

THE MENUS BAR

This bar contains the menus giving access to functions lists.

THE "FILES" MENU
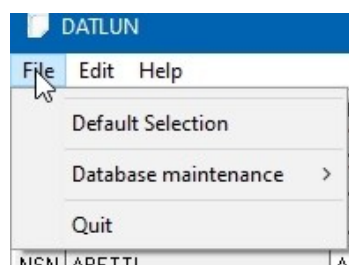
As a tradition in all Windows (r) sofwares, in DATLUN it's used to select and maintain the databases and to exit the software.

"Default selection" FUNCTION

This function allows you to come back to the maximum selection which is the "default" selection. All the databases and all the columns are selected and there is no SQL request running in background.

"Database maintenance" FUNCTION

This function conducts to a new sub-menu :
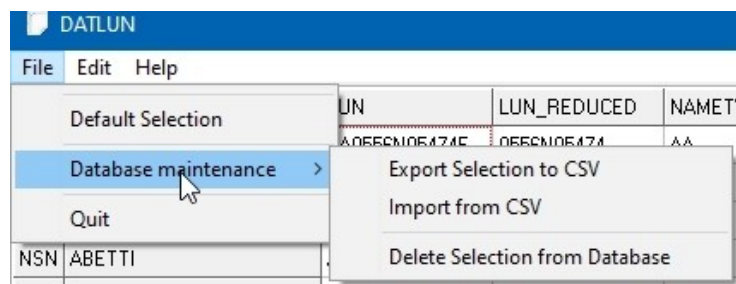
"Export selection to CSV" FUNCTION

This function allows you to export the selected formations list which is visible in the "List" window into a CSV file usable in the major calc softwares as Microsoft Excel (r)

The classic Windows "record files" window will appear. Record your extraction in the directory you have choosen.

Beware, databases informations are copyrighted and can be used only for personal use and not in a commercial goal.

"Import selection from CSV" FUNCTION

This function allows you to import a personal formations list compiled in a CSV file and import it as a VMA database.

Please, have a look at the detailed description here to see how it works.

"Delete selection from database" FUNCTION

BE CAREFUL WHEN USING THIS FUNCTION !

If you click on this function, the selection realized in "DATLUN" will be immediatly deleted from the involved databases and cannot be recovered, but if you reinstall VMA.

"Quit" function

This function allows you to quit "DATLUN" and closes all the databases. The setup about selected databases, columns and selection will be kept for your next session.

THE "SELECTION" MENU

This menu opens a window which permits you :- to select the databases to be used.
- to select formations types that you want to study.
- to select a formations list based on a specific value in a single field.
- to select a formations list based on several crossed criterias.
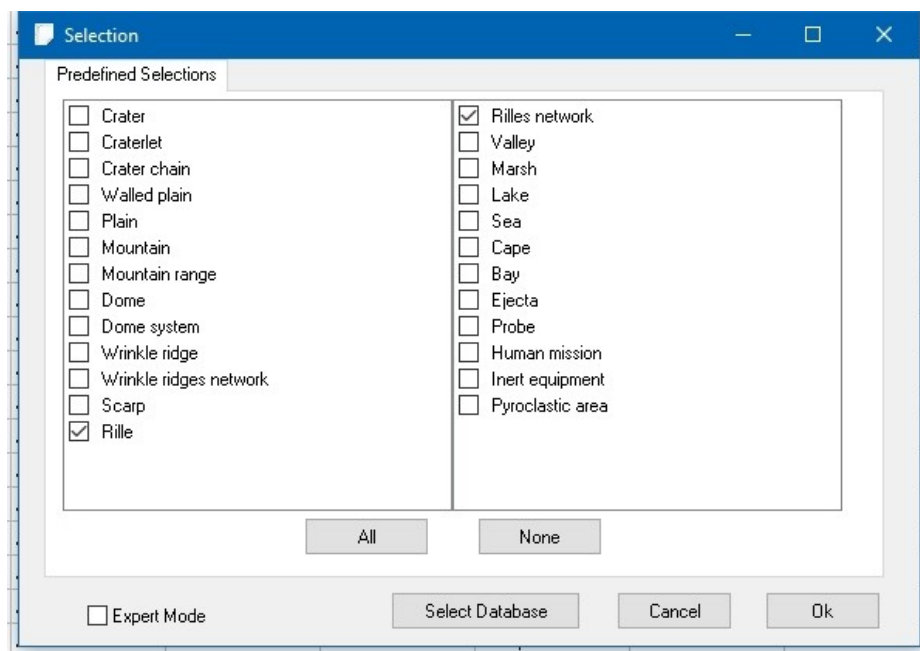
On first time, the window opens in "basic" mode. After that, it's possible to use the "Expert" mode.

"Select databases" function

When pressing the "Select database" button opens a new window :
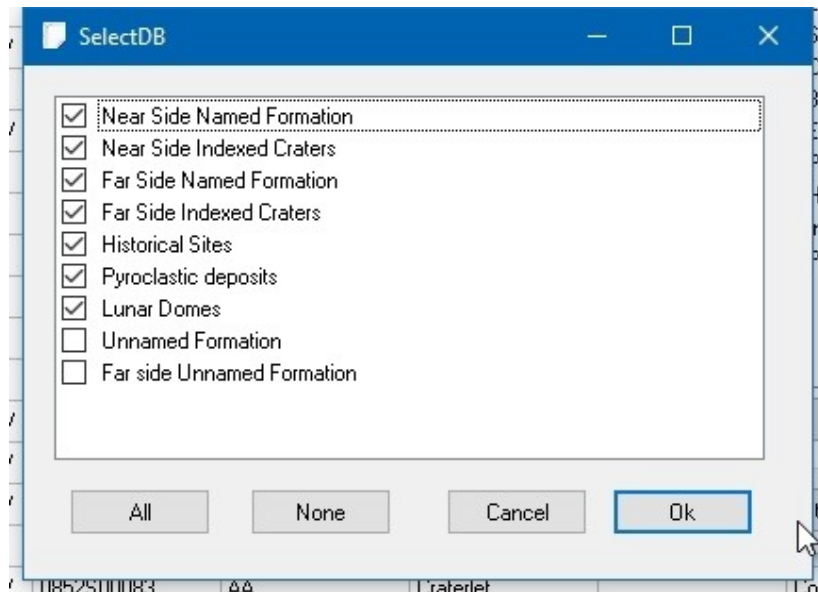
Fill boxes of all the databases you want to open. The more opened, the more longer for managing them. If your computer is not too powerful, select useful minimum. It's, sure, necessary to have downloaded and / or installed these databases before. New databases are on work and could be incorporated in VMA and DATLUN in the future.

The version 7 database is the largest existing lunar database to date. The files represent nearly 300 MB of text in French and as much in English! It contains the descriptive files of more than 1 million lunar formations with varying amounts of data depending on the official bases from which they originate.
It is separated into twelve distinct bases:

- **NAMED FORMATIONS** : The formations of the visible & hidden faces which have a specific name validated by the UAI (ex: Clavius, Rima Hyginus, Montes Alpes ...): (1,800 entries approximately)

- **SATELLITE FORMATIONS:** The formations of the visible & hidden faces which do not have a specific name, but a lettered index backed by an official name and which are validated by the UAI (ex: Clavius D, Hyginus A .. .): (Around 7000 entries)

- **SALAMUNICCAR UNNAMED FORMATIONS:** The formations of the visible & hidden faces which do not have a specific name or an index and which are not validated by the UAI. These are from the work carried out by Goran Salamuniccar of the Faculty of Electrical Engineering and Computing, University of Zagreb and his team (Base LU 78 287) who gave us permission to include them in the VMA (Thanks to him!) . The name of these courses is represented by the LUN (Lunar Universal Number) developed by Christian Legrand specially for the VMA: (approximately 69,600 entries)

WARNING ! Given the extremely large number of formations listed in this database that the software must display, it is advisable to use it only with zoom levels corresponding to levels L4 to L6. The display of all formations may take some time. We also recommend checking the "Short label" box in the "Configuration / Display" menu so as not to clutter the map too much with labels.

- **ROBBINS UNNAMED FORMATIONS:** The formations of the visible & hidden faces which do not have a specific name or an index and which are not validated by the UAI. These are from the work of Stuart J. Robbins of the Southwest Research Institute (Robbins Lunar Crater Database 2018-08-15) who gave us permission to include them in the AVL (Thanks to him!). The name of these courses is represented by the LUN (Lunar Universal Number) developed by Christian Legrand specially for the AVL: (approximately 1,300,000 entries). This base contains only 4 fields taken from the base of S. J. Robbins so as not to weigh down the display performance of the VMA.

WARNING ! Given the extremely large number of formations listed in this database that the software must display, it is advisable to use it only with zoom levels corresponding to levels L4 to L6. The display of all formations may take some time. We also recommend checking the "Short label" box in the "Configuration / Display" menu so as not to clutter the map too much with labels.

- **HISTORICAL SITES** : Historical sites on both sides: The sites of all voluntary or accidental impacts of human origin compiled specially for VMA by Christian Legrand (ex: Apollo 15 Base, Ranger 7, Luna 9, Apollo 17 S-IVB, Chang'é, Chandrayann 2 ...) (59 entries)

- **PYROCLASTICS FORMATIONS** : The list of pyroclastic deposits compiled by Lisa Gaddis and her team (80 entries)

- **DOMES**: A list of lunar volcanic domes compiled by the members of the ALPO association (700 entries)

- **NELIOTA IMPACTS** : The list of contemporary meteoritic impacts on the lunar surface listed by the Athens National Observatory as part of the NELIOTA (Near Earth objects Lunar Impacts and Optical TrAnsients) program piloted by the European Space Agency (ESA).

- **SINUOUS RILLES** : A list of lunar sinuous volcanic rilles compiled by Debra Hurwitz Needham who gave us permission to incorporate it into the VMA. Thank her! Specific information from this original database has been introduced in the description paragraphs.

- **IMP**: A list of "Irregular Mare Patches" listed by Le Qiao in 2019 which gave us permission to incorporate it into the VMA. Thank him! IMPs are formations probably of recent volcanic origin (10 million years) with a very special geological facies and of small size. Only the largest of them (Ina, Sosignenes, Hyginus...) are perceptible in amateur instruments. Specific information from this original database has been introduced in the description paragraphs.

- **LUNAR PITS**: A list of "Lunar Pits" put online by Mark robinson and the LROC team listing the lunar cavities giving access to lava tubes. Thanks to them! These cavities are sought after because they could shelter hypothetical Exploration Bases. This database is associated with the "Lunar Pits" image library which shows what these pits, which are inaccessible to observation, look like due to their small size (a few

tens of meters).

- IMPACT BASINS: An early list of the large impact basins that later gave rise to the lunar seas. A first list was compiled by Charles Wood in 2004. Since then, other lists have been produced, including those of the GRAIL probe team (Maria Zuber et al.) and especially that of Charles Byrne in 2016. In order to agglomerate the maximum of information concerning these essential formations, we gathered these two bases in the VMA base. Given that a number of impact basins remain putative, this arrangement maximizes research possibilities. It is recommended to use this database with the functionality of tracing the contours of formations or with the scientific layer "Impact basins" in order to clearly visualize their respective extents. Specific information from the original bases has been introduced in the description paragraphs.

For each formation, available information is :
- the formation name origin.
- the main lunar atlases for amateur astronomers page where to find the formation.
- the formation location on the lunar disc.
- the formation description.
- various useful information for serious observing.
- official 2012 IAU datas about this formation

Given the mixed sources of the various databases, certain information may not be available in a given database.

Warning : In such detailed work, the data will certainly contain some mistakes
- mainly input mistakes. You can also report them to Christian Legrand so that he can correct the database.

The authors thank you in advance for your cooperation. They will be corrected as soon as possible.

Informations of the VMA databases are copyrighted "(c) Christian Legrand" and can't be used outside of the software. For any other use, please contact the author.

"Predefined selections" THUMBNAIL
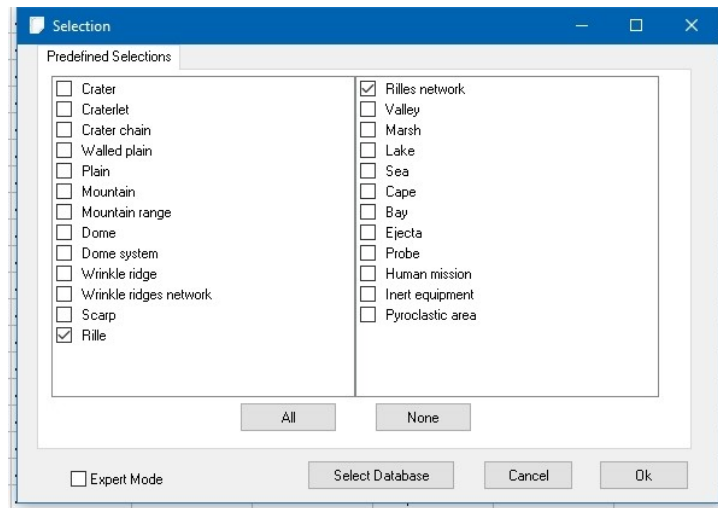
Fill boxes of all the formations types that you want to select. The more selected, the more longer for managing them. If your computer is not too powerful, select useful minimum.

The "All" button select all the types in a single operation and the button "None" is for the reversed operation.

"Expert" mode

If you fill the "Expert" mode box, two new thumbnails appear.
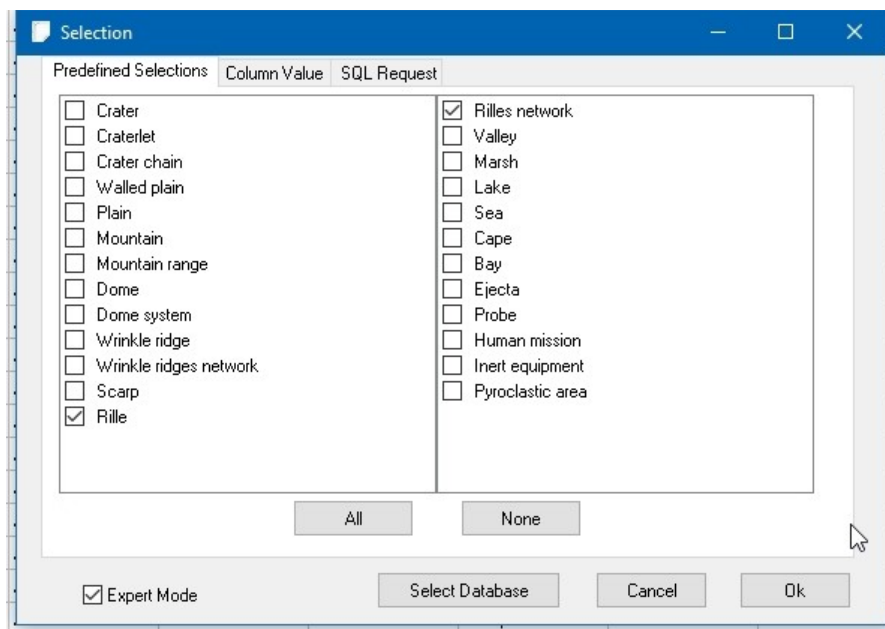
"Column value" THUMBNAIL

When you click on this thumbnail, you can select all the formations that incorporate the EXACT value that you specify in the field that you have choosen.
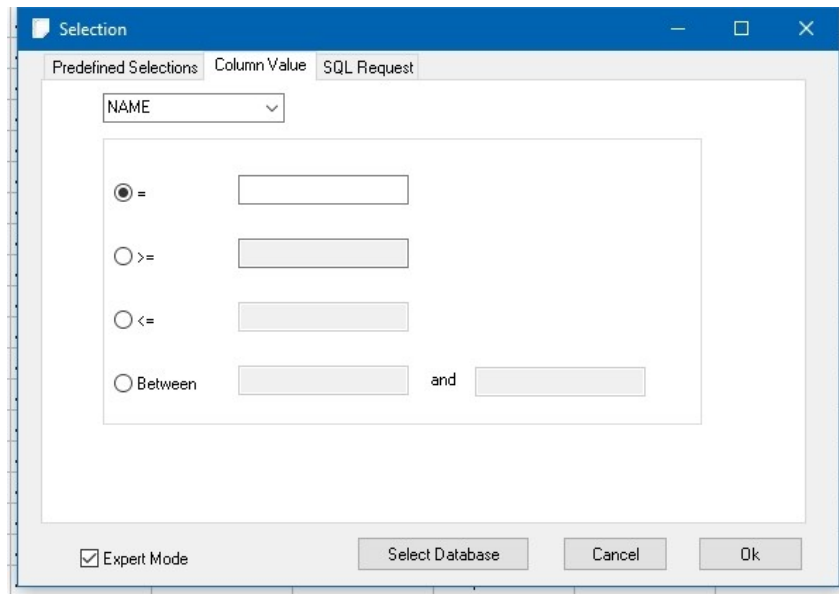
The upper scrolling list allows you to choose the column.

Then fill the bow corresponding to your single request :

- "=" is for "Choosen column value equal to". For example, if you choose the RUKLN column that corresponds to the map number in the Antonin Rükl, "Atlas of the Moon", you will see in the "List" window, only the formations that are on this map of that Atlas.

- ">=" is for "Choosen column value upper or equal to"

- "<=" is for "Choosen column value lower or equal to"

- "Between" allows you to enter a value interval to respect in the choosen column.

Exemple : if you choose the LENGTHKM column that is the formation length in km, that after you fill the box "Between" and that you enter 30 in the field to the right of "Between" and 40 in the field to the right of "and", you will see in the "List" window only the formations that are between 30 and 40 km length.

For each query, it is possible to search for a text extract using the % wildcard. For example NAME = B% selects all formations whose name begins with the letter B.

It is possible to refine a search by combining several conditions. To do this, enter the first condition as above and click Add, enter the following condition and click Add. When the query is complete click OK.

To start a new query click Delete.

Beware : there must have an exact correspondance between your extraction writing and the field value. This function does not allows you to build a selection on a part of the value of a field. This is the following "SQL Request" goal.

"SQL Request" THUMBNAIL

When clicking on this thumbnail, you can select formations whose datas include values or extracts you will specify in one or several fields that you have choosen. You will have to know a minimum about SQL syntax language.

The buttons under the typing window make easier the request writing and avoid syntax mistakes.

The scrolling list at lower right allows you to choose a column.
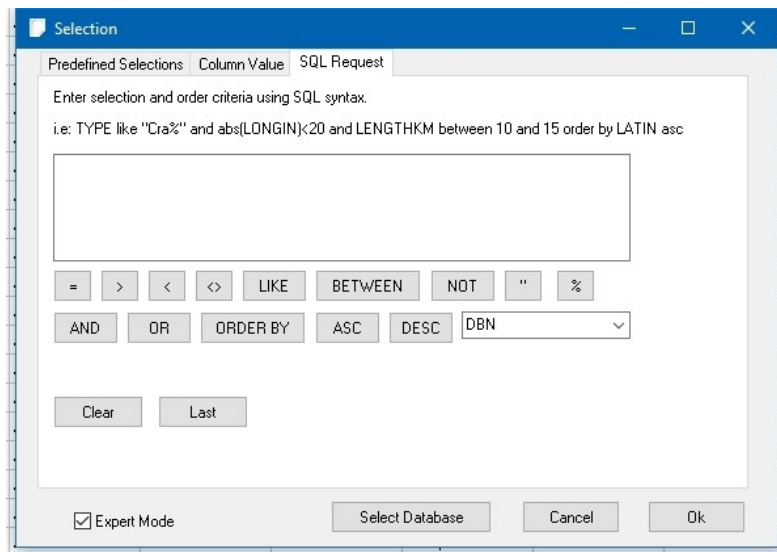
- "=" is for"equal to".

- ">" is for "upper than"

- "<" is for "lower than"

- "<>" is for "is different of"

- "<=" is for "Choosen column value lower or equal to"

- ">=" is for "Choosen column value upper or equal to"

- "LIKE" is for "contains".

- "BETWEEN" is for "between".

- "NOT" is for "not".

- The "quotes" are use to delimit an alphanumerical chain.

- % is a "joker" that is used to replace a part of an alphanumerical chain

- "AND" is for "and".

- "OR" is for "or".

- "ORDER BY" is for "ordered by".

- "ASC" is for "ASCII", that's to say an alphanumerical chain.

- "DESC" signifie "".

Beware : there must have an exact correspondance between your request text and the SQL language syntax, or mistakes notes will appear.

For example, the following request :

TYPE LIKE "Cra%" AND LENGTHKM BETWEEN 30 AND 35 ORDER BY LATIN

will select IN ALL THE DATABASES PREVIOUSLY CHOOSEN, the formations for which the field TYPE contains the letters "Cra" (as the cra-ters and the cra-terlets), withe the field LENGTHKM (lenght in km) value is comprised between 30 and 35 (km) and will sort them according to growing LONGIN field value (growing longitude).

The following request :

COUNTRY = "France" AND WORK LIKE "%ician"

will select IN ALL THE DATABASES PREVIOUSLY CHOOSEN, the formations for which the field COUNTRY (Orignin country of the character of the name) is equal to France and whose work field will contain "ician" (And mathematiciens, geophysicians, musicians...)

These two examples show well the power of the SQL request on correctly formated databases. To use completely this power, we have to remain the fields databases contents :

Quick description of fields names (The link conducts to a detailed description) :

DBN = Name of the database containing the formation
NAME = Official name of the formation
LUN = Identification number of the formation in VMA
LUN_REDUCED : Reduced identification number for craters in VMA
TYPE = Type of theformation
PERIOD = Creation period of the formation
GEOLOGY = Special geological features of the formation
NAMEDETAIL = Detailed name of the formation
NAMEORIGIN = Name of the creator of the name of the formation
LANGRENUS = Name given by Langrenus to the formation
HEVELIUS = Nom given by Hevelius to the formation
RICCIOLI = Nom given by Riccioli to the formation
WORK = Work of the character whose name has been given to the formation
COUNTRY = Nation of the character whose name has been given to the formation

NATIONALTY = Nationalty of the character whose name has been given to the formation

CENTURYN = Century (Number) of living of the character whose name has been given to the formation

CENTURYC = Century (Letters) of living of the character whose name has been given to the formation

BIRTHPLACE = Birth place of the character whose name has been given to the formation

BIRTHDATE = Birth year of the character whose name has been given to the formation

DEATHPLACE = Death place of the character whose name has been given to the formation

DEATHDATE = Death year of the character whose name has been given to the formation

FACTS = Important facts during the life of the character whose name has been given to the formation

LONGIN = numerical value of the longitude of the formation

LONGIN_360 = numerical value of the longitude of the formation computed on 360°

LONGIC = Alphanumerical value of the longitude of the formation

LATIN = numerical value of the latitude of the formation

LATIC = Alphanumerical value of the latitude of the formation

QUADRANT = Lunar quadrant where is situated the formation

AREA = Large Moon area where is situated the formation

RUKL = Number of the map of Rükl's atlas where is situated the formation

RUKLC = Title of the map of Rükl's atlas where is situated the formation

VISCARDY = Number of the map of Viscardy's atlas where is situated the formation

HATFIELD = Number of the map of Hatfield's atlas where is situated the formation

WESTFALL = Number of the map of Westfall's atlas where is situated the formation

WOOD = Indication of Charles Wood articles about the formation

LOPAM = Number of the map of the atlas of Lunar Orbiter where is situated the formation

CLEMENTINE = Clementine Atlas of the Moon map number containing the formation

CENTURY_21ST = Number of the 21st Century Moon Atlas map containing the formation

REISE = Reise Mond Atlas map number containing the formation

CHANGE1 = Map number of the atlas of the Chang'é 1 probe containing the formation

DISCOVER_MOON = Number of the page of the Discover the Moon book containing the formation

TIMES = Time Life atlas map number containing the formation

KAGUYA = Map number from the Kaguya probe atlas containing the formation

BYRNE_NEAR = Map number from the LOPAM atlas Visible face containing the formation

BYRNE FAR = Number of the LOPAM face down atlas map containing the formation

SIX INCH = Six inch Lunar Atlas map number containing the formation

DASE = Lunar Atlas DASE map number containing the formation

PAU = Map number of the KC PAU Lunar Atlas containing the formation

LUNA COGNITA = Page number of the 3 Luna Cognita volumes containing the formation

LAC = Number of the LAC card containing the formation

LENGTHKM = Length of the formation in kmLENGTHKM = Formation length in km

<u>LENGTHMI</u> = Formation length in miles
<u>WIDEKM</u> = Formation width in km
<u>WIDEMI</u> = Formation width in miles
<u>HEIGHTM</u> = Formation height in m
<u>HEIGHTFE</u> = Formation height in feet
<u>RAPPORT</u> = numerical ratio Length / Height of the formation
<u>PROFIL</u> = Visualization of theprofile of the formation
<u>GENERAL</u> = General description of the formation
<u>SLOPES</u> = = Description of the surroundings of the formation
<u>WALLS</u> = Description of the interior of the formation
<u>FLOOR</u> = Description of the bottom of the formation
<u>INTERESTN</u> = numerical value of the interest of the observation of the formation
<u>INTERESTC</u> = Description of the interest of the observation of the formation
<u>LUNATION</u> = Lunation day making easier observation of the formation
<u>MOONDAYS</u> = Lunation day making easier observation of the formation on the evening
<u>MOONDAYM</u> = Lunation day making easier observation of the formation on the morning
<u>DIAMINST</u> = Diameter in mm of the theoritical instrument necessary to observe the formation
<u>THINSTRU</u> = Name of the theoritical instrument necessary to observe the formation
<u>PRINSTRU</u> = Name of the practical instrument necessary to observe the formation
<u>IAU_FEATURE_NAME</u> = Formation name given by International Astronomical Union (IAU)
<u>IAU_CLEAN_FEATURE_NAME</u> = Formation name given by International Astronomical Union without accents, umlout, tildes...
<u>IAU_FEATURE_ID</u> = Formation number given by International Astronomical Union
<u>IAU_DIAMETER</u> = Formation diameter
<u>IAU_CENTER_LATITUDE</u> = Formation center latitude
<u>IAU_CENTER_LONGITUDE</u> = Formation center longitude
<u>IAU_NORTHERN_LATITUDE</u> = Formation North latitude
<u>IAU_SOUTHERN_LATITUDE</u> = Formation South latitude
<u>IAU_EASTERN_LONGITUDE</u> = Formation East longitude
<u>IAU_WESTERN_LONGITUDE</u> = Formation West longitude
<u>IAU_COORDINATE_SYSTEM</u> = Official lunar coordinates system used
<u>IAU_CONTINENT</u> = Continent name from which comes formation name.
<u>IAU_ETHNICITY</u> = Native nationalty of official name
<u>IAU_FEATURE_TYPE</u> = Formation type in IAU nomenclature
<u>IAU_FEATURE_TYPE_CODE</u> = Code of formation type in IAU nomenclature
<u>IAU_QUAD_NAME</u> = Lunar disk quadrant where is the formation
<u>IAU_QUAD_CODE</u>= Code of lunar disk quadrant where is the formation
<u>IAU_APPROVAL_STATUS</u> = Name approval by IAU status
<u>IAU_APPROVAL_DATE</u> = Date de l'approbation du nom par l'UAI
<u>IAU_REFERENCE</u> = Reference book having given name of the formation
<u>IAU_ORIGIN</u> = Datas about name origin with an abstract of charcater's life
<u>IAU_LINK</u> = Link towards formation page on Web site of IAU

When a selection criteria is based on a numerical field (ex : RUKL, LENGTHKM, INTRESTN, etc...), the value to find must be in the request without quotes (ex : RUKL = 45). When a selection criteria is based on an alphanumerical field (ex : COUNTRY, FACTS, GENERAL, INTERESTN, etc...), the value to find must be in the request with

quotes and jokers (ex : GENERAL LIKE = "%flat floort%").
Upper or lower case letters must be also respected (Ex : "%Flat%" is different of "%flat%").
For a detailed description of the databases fields contents, please go to the special chapter at the end of this manual.

THE "COLUMNS" MENU

This menu opens a special window for selecting the columns to be displayed for the selection list. It's possible that some kinds of informations don't interest you and that you don't wish to scan all the "width" of the list to see those that you are looking for.
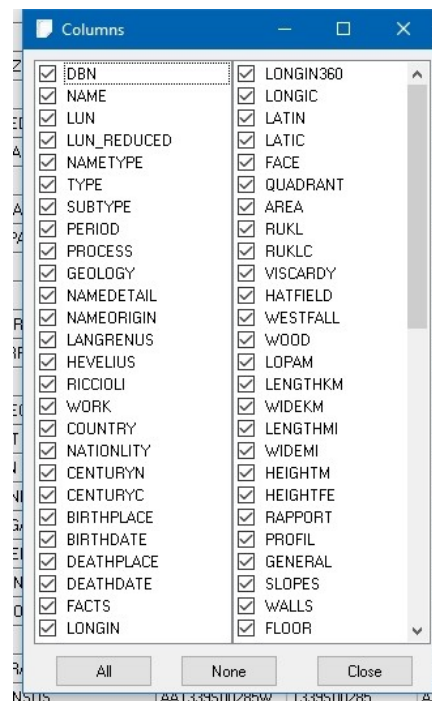
Fill the boxes of the columns that you want to display. The more you select, the more important for the display delay. If your computer is not too powerful, select the useful minimum.

The "All" button select all the columns in a single operation and the button "None" is for the reversed operation.

Close the window once the selection operation is done with the button "Close"

THE "MARK SELECTION ON MAP" MENU

This menu is not really a menu, but a direct command that will show you the power of the association between DATLUN and VMA. When you click on it, you will open the Virtual Moon Atlas and see all the formations that you have selected in DATLUN on the displayed map marked with big squares.

For example, if you have selected the Nearside volcanic domes here is what you

obtain:
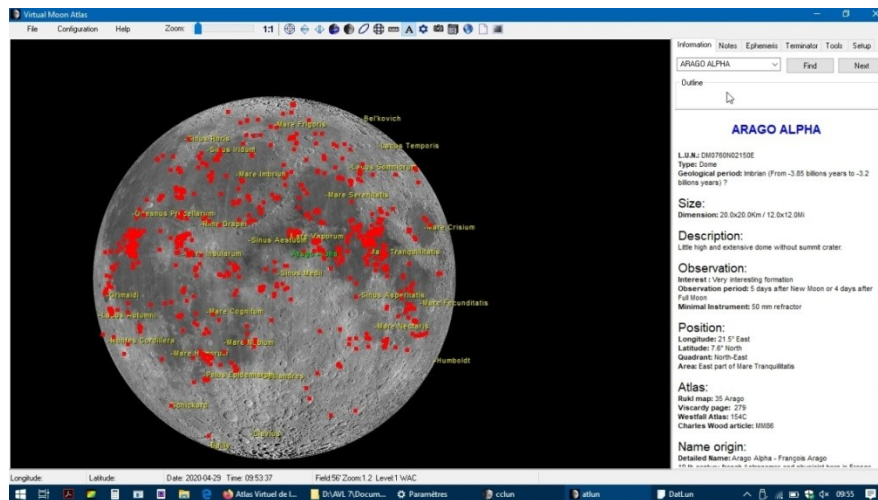
Other example :

You can also, for example select for study (because you can't observe them, all the craters chains (CATENA) of the Nearside and mark them on the map :
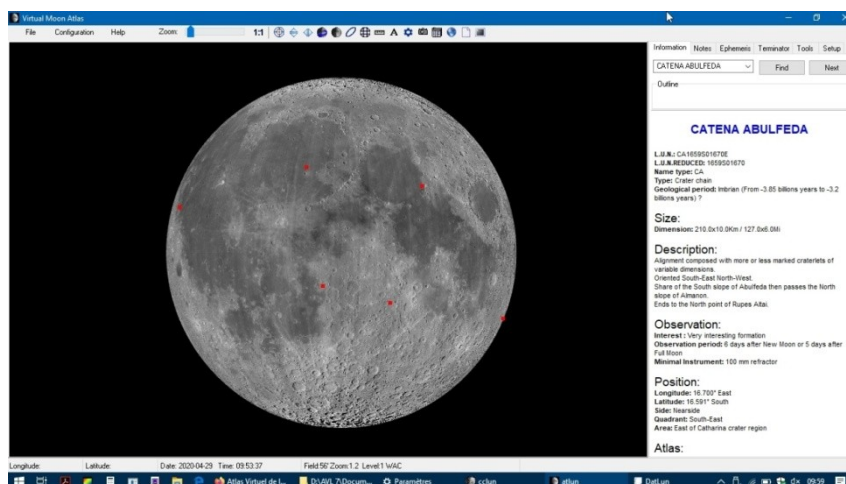
After that, when clicking on one of the squares, this formation will be selected in VMA and you will be able to access all its informations and pictures.

This two exemples have certainly showed you the possible studies because of the unique informations contained in the databases of VMA compiled by Christian Legrand.

THE "HELP" MENU

As a classic in all the Windows (c) software, it's used in DATLUN to launch the present documentation with" Help" and display the credits with "About".

THE "SELECTION LIST" WINDOW

The list window owns some functions that improve the previous ones.

First, you can note the two left columns in grey. They are mandatory and cannot be deleted. Horizontal and vertical lifters allows you to "travel" in the list..

If you click on the greyed title of one columns in the upper line, this liste will be sorted in the numerical growing order (if the field is numerical) or alphanumerical (if the field is alphanumeric). If you click a second time on the same title, the list will be sorted in the decreasing order.

"COLUMN WIDTH" FUNCTION

You can also adjust the columns width when you put the cursor on grey titles bar, to the border between two columns. A new cursor then appears.

Cick on the left mouse button, stay clicked and go on left or right to increase or decrease the column width.

OTHER FUNCTIONS

If you can't display all the length of a field because it's too long (FACTS, GENERAL...), put the cursor on it. A bubble will appear with all the field text in it.

In the list, you can select in grey, by clicking one time on it, one line so that you will not loose it when you go on the right of the list.

If after that, you double_click on the selected line, VMA will shows you directly the selected formation.

THE STATE BAR

Row: 1/9 Selection: DBN in (3) AND NAME LIKE "CATENA%"

The state bar indicates you several things :

It can be the number of the line of the selected line compared to total number of lines of the selection list

Or it can be the text of the SQL request that generates the list.

DETAILED DESCRIPTION OF THE IMPORT OPERATION

 This function allows you to import a personal formations list compiled in a CSV file and import it as a VMA database. When selecting this function, a new window appears :
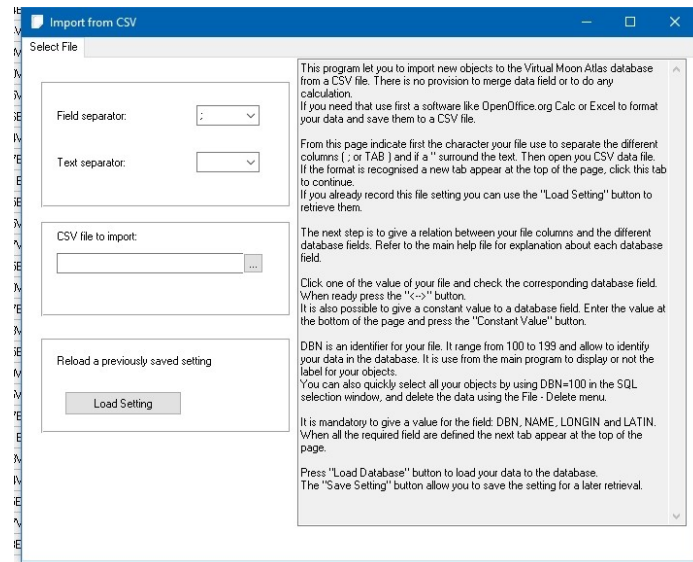
This program let you to import new objects to the Virtual Moon Atlas database from a CSV file.

There is no provision to merge data field or to do any calculation. If you need that use first a software like OpenOffice.org Calc or Excel to format your data and save them to a CSV file.

From this page indicate first the character your file use to separate the different columns (; or TAB) and if a " surround the text. **We suggest to record the file with the "csv" format and "Unicode (UTF-8)".**

If you have precedently recorded parameters for one file, you can use the "Load setting" button. If it's not the case, you must open the file with your personal datas. Indicate the directory of the file to import in the frame.

If you have not saved any settings previously, you need to open the file containing

your personal data. Indicate the path of the CSV file to import into frame:

When the file is found, its records number is indicated. If the format is recognised a new thumbnail appear at the top of the page :

Click this tab to display the "Select data field" window".

The next step is to give a relation between your file columns and the different database fields. Refer to "Databases fields" lower for explanations about each database field.

Click one of the value of your file to mark it in the left frame :

and check the corresponding database field in the right frame :

. When ready press the button.

It is also possible to give a constant value to a database field. Enter the value at the bottom of the page and press the "Constant Value" button.

 DBN is an identifier for your file. It range from 10 to 99 and allow to identify your data in the database. It is use from the main program to display or not the label for your objects. You can also quickly select all your objects by using DBN=10 in the SQL selection window, and delete the data using the File - Delete menu.

It is mandatory to give a value for the field: DBN, NAME, LONGIN and LATIN. When all the required field are defined the next tab "Load to Database" appear at the top of the page.

Click on it to display the backup frame :

Press "Load Database" button to load your data to the database.

The "Save Setting" button allow you to save the setting for a later retrieval.
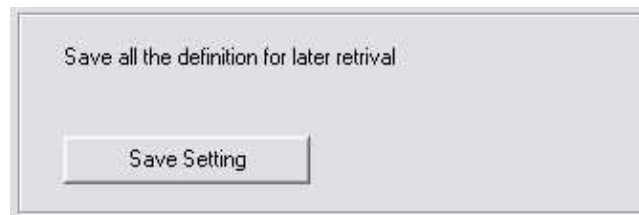
The software informs you of the operations during them.
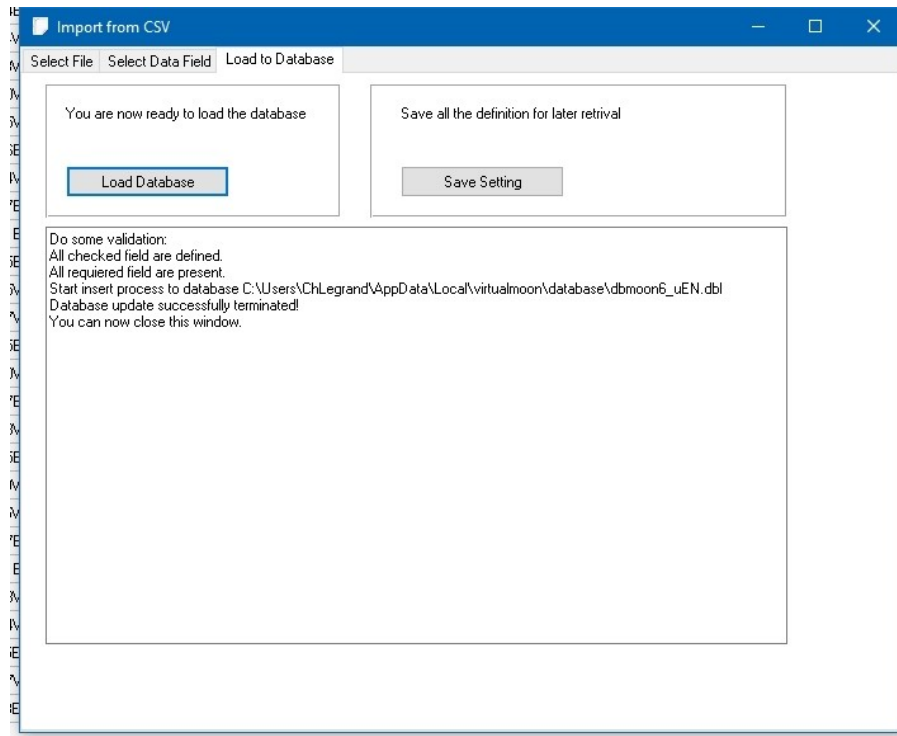
Import operation is then finished..

DETAILED DESCRIPTION OF THE DATABASES INFORMATIONS

DBN = DATABASE NAME :

It's a short name for each name of databases uses by DATLUN.

- NSN = "Nearside named", for named formations of Nearside.
- FSN = "Farside named", for named formations of Farside.
- NSI = "Nearside indexed", for named with letters formations of the Nearside.
- FSI = "Farside indexed", for named with letters formations of Farside.

About the personal databases that you would have imported, DBN is a number comprised between 10 to 99 permiting their identification. It's also used to choose the label display of your objects. It allows also to visualze your objects if entering DBN = 10 to 99 in the SQL request, and to delete your datas with the "File - Delete" menu.

NAME = OFFICIAL NAME :

This field presents the formation main name in Latin used officially by the International Astronomical Union in capital letters. In the "Historical sites" database, it's the name of the mission (eg : Apollo 15 *Base*, Ranger 7, Luna 9, Apollo 17 *S IV B*...)
For anonymous craters, the "name" uses the L.U.N. © which is defined below. For domes, pyroclastic deposits, sinuous rilles, IMP, NELIOTA and impacts basins, the name is taken from the original base.

LUNAR UNIVERSAL NUMBER / L.U.N. © :

In order to be able to recognize formations that do not yet have an official name and to standardize the denominations used in the new databases, Christian Legrand has developed the "Lunar Universal number" (LUN) making it possible to know the nature and position training just by reading it.

Here are the LUN description :

The LUN is composed by the assembling of the following characters chain :

XX : 2 letters corresponding tothe "Descriptor term" of IAU. These 2 letters are officially used by IAU. Attention, they are less numerous than the original VMA formations types, so several VMA types can have the same "descriptor term".

Here is the official list of IAU Descriptor Terms (Some of them are not used on the Moon presently) :

Albedo Feature (AL)	Geographic area distinguished by amount of reflected light
Arcus, arcūs (AR)	Arc-shaped feature
Astrum, astra (AS)	Radial-patterned features on Venus

Catena, catenae (CA)	Chain of craters
Cavus, cavi (CB)	Hollows, irregular steep-sided depressions usually in arrays or clusters
Chaos, chaoses (CH)	Distinctive area of broken terrain
Chasma, chasmata (CM)	A deep, elongated, steep-sided depression
Collis, colles (CO)	Small hills or knobs
Corona, coronae (CR)	Ovoid-shaped feature
Crater, craters (AA)	A circular depression
Dorsum, dorsa (DO)	Ridge
Eruptive center (ER)	Active volcanic centers on Io
Facula, faculae (FA)	Bright spot
Farrum, farra (FR)	Pancake-like structure, or a row of such structures
Flexus, flexūs (FE)	A very low curvilinear ridge with a scalloped pattern
Fluctus, fluctūs (FL)	Flow terrain
Flumen, flumina (FM)	Channel on Titan that might carry liquid
Fossa, fossae (FO)	Long, narrow depression
Insula, insulae (IN)	Island (islands), an isolated land area (or group of such areas) surrounded by, or nearly surrounded by, a liquid area (sea or lake).
Labes, labēs (LA)	Landslide
Labyrinthus, labyrinthi (LB)	Complex of intersecting valleys or ridges.
Lacuna, lacunae (LU)	Irregularly shaped depression on Titan having the appearance of a dry lake bed
Lacus, lacūs (LC)	"Lake" or small plain; on Titan, a "lake" or small, dark plain with discrete, sharp boundaries
Landing site name (LF)	Lunar features at or near Apollo landing sites
Large ringed feature (LG)	Cryptic ringed features
Lenticula, lenticulae (LE)	Small dark spots on Europa
Linea, lineae (LI)	A dark or bright elongate marking, may be curved or straight
Lingula, lingulae (LN)	Extension of plateau having rounded lobate or tongue-like boundaries
Macula, maculae (MA)	Dark spot, may be irregular
Mare, maria (ME)	"Sea"; large circular plain; on Titan, large expanses of dark materials thought to be liquid hydrocarbons
Mensa, mensae (MN)	A flat-topped prominence with cliff-like edges
Mons, montes (MO)	Mountain
Oceanus, oceani (OC)	A very large dark area on the moon
Palus, paludes (PA)	"Swamp"; small plain
Patera, paterae (PE)	An irregular crater, or a complex one with scalloped edges
Planitia, planitiae (PL)	Low plain
Planum, plana (PM)	Plateau or high plain
Plume, plumes (PU)	Cryo-volcanic features on Triton
Promontorium, promontoria (PR)	"Cape"; headland promontoria
Regio, regiones (RE)	A large area marked by reflectivity or color distinctions from adjacent areas, or a broad geographic region
Reticulum, reticula (RT)	reticular (netlike) pattern on Venus
Rima, rimae (RI)	Fissure
Rupes, rupēs (RU)	Scarp

Satellite Feature (SF)	A feature that shares the name of an associated feature. For example, on the Moon the craters referred to as "Lettered Craters" are classified in the gazetteer as "Satellite Features."
Scopulus, scopuli (SC)	Lobate or irregular scarp
Serpens, serpentes (SE)	Sinuous feature with segments of positive and negative relief along its length
Sinus, sinūs (SI)	"Bay"; small plain
Sulcus, sulci (SU)	Subparallel furrows and ridges
Terra, terrae (TA)	Extensive land mass
Tessera, tesserae (TE)	Tile-like, polygonal terrain
Tholus, tholi (TH)	Small domical mountain or hill
Unda, undae (UN)	Dunes
Vallis, valles (VA)	Valley
Vastitas, vastitates (VS)	Extensive plain
Virga, virgae (VI)	A streak or stripe of color

YYYYYYYN or YYYYYYYS for the digital value of latitude in 1/10000 ° deg. N and S indicate North or South and are used to deparate latitude and longitude to clarify the characters chain. The last 4 digits on the right are those of the 1/10000 ° deg and are always present, even if they are zeros. The first 2 left digits are absent if the latitude is 00 °.

ZZZZZZZZ for the digital value of longitude in 1/10000 ° deg. The last 3 digits on the right are those of the 1/10000 ° deg and are always present, even if they are zeros. The first 4 left digits are absent if the longitude is 000 °.

Here are two examples of LUN (AAYYYYYNZZZZZZ) :

- AA27410S1142200 : Crater located at 02,7410° South and 114,2200° East

- RI850000N0000 : Rill which middle is situated about at 85,00° North et 0,00° East.

Avec all thes features, the LUN is always the shorter possible and it's always easily "readable". and this structure garantees always a lone LUN for each formation.

>>>> With the L.U.N. , you can find each lunar formation and this allows you to share observations of this formation with others colleages without any error

LUNAR UNIVERSAL NUMBER / L.U.N. REDUIT © :

It exists a reduced LUN which is the LUN without the « descriptor term ».

NAME TYPE :

This field contains the category of the name type of the training among:
- Named formation
- Satellite formation

- Listed formation
- Anonymous formation (Unnamed)

FORMATION TYPE :

This field contains formation type according with tradition or International Astronomical Union, plus some specific additions :

- Cape
- Cliff
- Crater
- Craterlet
- Crater chain
- Dome
- Gulf
- Lake
- Marsh
- Mountain
- Mountains range
- Plain
- Probe
- Rille
- Rilles system
- Sea
- Tray
- Valley
- Walled plain
- Wrinkle ridge
- Wrinkle ridges system

The "Historical site" database contains specific types :

- Human mission / soft landing
- Inert equipment / voluntary impact
- Inert equipment / unvoluntary impact
- Probe / voluntary impact
- Probe / unvoluntary impact
- Probe / soft landing

IAU TYPE :

This field contains the abbreviation of the type of formation in accordance with the definitions of the International Astronomical Union (Cf "Descriptor term" of the LUN) or traditional plus some specific adaptations:
- TH (Tholus) was chosen to characterize volcanic domes.
- Pyroclastic deposits do not have a directly applicable UAI formation type. They have been assigned the PD (Pyroclastic deposit) type.

- "Historical" sites do not have a type of UAI training that can be applied directly. They have been assigned the type HS (Historical Site).

SUB-TYPE :

This field contains type categories specific to each type of formation (Example: Craterlet / Crater / Walled plain for craters). This field has not yet been fully documented in version 7.

FORMATION PROCESS :

This field contains information on the geological process at the origin of the formation (Example: Meteorite impact / Extrusive volcanism / Tectonic extension...)

FORMATION PERIOD :

This field contains information on the lunar geological period which saw the appearance of the formation concerned. This information is for the most part from the "Improved lunar craters database" produced by Charles Byrne, Don E. Wilhelms (USGS) and their team which allow the re-use of this data (Thanks to them).

The 6 periods generally accepted in current literature are:
The Pre-Nectarian: (-4550 MA to -3920 MA)
The Nectarian: (-3920 MA to -3850 MA)
Lower Imbrian: (-3850 MA to -3800 MA)
Upper Imbrian: (-3800 MA to-3200 MA)
The Eratosthenian: (-3200 MA to-1100 MA)
The Copernician: (-1100 MA to the present day)
MA = Millions of years
For some formations, it was not possible to find information concerning the implementation period.
"Formation period not found" is then indicated.
For the "Historical sites" database, the mission launch date is indicated in this field.

SOURCE OF THE FORMATION PERIOD :

This field contains information on the source which cites the probable lunar geological period which saw the appearance of the formation considered. This information is for the most part from the "Improved lunar craters database" produced by Charles Byrne, Don E. Wilhelms (USGS) and their team which allow the reuse of this data.

GEOLOGY :

This field contains interesting geological information on the formation concerned found in various sources.

SIZE :

The following four fields contain data relating to the dimensions of the formations. These vary from source to source. We can therefore find values different from those of other works. Priority was given to data from the International Astronomical Union, then to data from other sources when they seemed plausible. Finally, certain

dimensions were directly measured on maps or atlases when they could not be found in the literature. In the "Historic sites" database, these fields are empty.

Dimensions :

This field gives the length in kilometers of the formation and the width. In the case of crater-like formations, the length is in most cases equal to the width since it is in fact the average diameter of the formation.
This field has been revised with the values from the "Improved lunar craters database" produced by Charles Byrne, Don E. Wilhelms (USGS) and their team which allow the reuse of this data. Many thanks to them!

Height :

You find here relative altitudes, not absolute ones referring to the mean lunar sphere. It gives the formation height when it's known.

For craters, it's the difference between the upper part of the internal slopes and the floor.

For other formations, it's the difference between the formation summit and surrounding land.

For mountains and mountain ranges, it's a mean height and higher summits height is generally detailed in description fields.

For rilles and scarps, it's the difference between surrounding lands and the formation lower floor.

The field has been revised with the values from the "Improved lunar craters database" produced by Charles Byrne, Don E. Wilhelms (USGS) and their team.

Ratio :

This data is only indicated for formations whose height is known. It's very often given for craters where it means the diameter / height ratio.

NAME ORIGIN :

NAMEDETAIL = Real name :

This field presents the real name of the person whose name has been given to the formation. When it also exists, a nickname is indicated between parentheses.

For other formations than craters, the official name is first translated in English, and then you can find the real name of the person whose name has been given to the formation.

NAMEORIGIN = Name author :

This field indicates, when it's known or supposed, the organization or person name that has given the name to the formation. Also included in this chapter is the year of nomination when it has been found. In this paragraph, IAU means" International Astronomical Union ". You can find mainly 3 origins:

- Hevelius
- Riccioli
- IAU

But also others selenographers as Schröter, Schmidt...

When the origin has not been found, the field contains (??). Additionally, some uncertain origins end with "?".

These name origins are purely indicative and are not to be held as rigorously exact because of numerous additions made during all periods to the lunar nomenclature.

In the "Historical sites" base, it's the country and the agency which conceived the mission that are indicated.

LANGRENUS = Name given by Langrenus:

This field indicates the name given by Michel Florent Van Langren on his Moon map in 1644. When the formation has not received a name, "Not named" is indicated.

HEVELIUS = Name given by Hevelius :

This field indicates the name given by Johannes Hevelius on his Moon map in 1647. When the formation has not received a name, "Not named" is indicated.

RICCIOLI = Name given by Riccioli :

This field indicates the name given by Riccioli on the Moon map drawn in 1651 by Francesco Grimaldi. When the formation has not received a name, "Not named" is indicated.

WORK = Works :

This field indicates, for craters, the activities of the person whose name has been given to the formation.

Here is the list of the"works" you can find in the database:

- Agronomist
- Alchemist
- Admiral
- Anthropologist

- Archaeologist
- Archbishop
- Architect
- Artist
- Astronaut
- Astronomer
- Astrophysicist
- Aviator
- Banker
- Biologist
- Botanist
- Calif
- Cartographer
- Chemist
- Clockwork
- Consul
- Cosmographer
- Egyptologist
- Engineer
- Engraver
- Explorer
- Geodesist
- Geographer
- Geologist
- Geometer
- Geophysicist
- God
- Hero
- Historian
- Humanistic
- Hydrographer
- Inventor
- Jurist
- King
- Manufacturer
- Mathematician
- Meteorologist
- Mineralogist
- Missionary
- Mythological fame
- Naturalist
- Navigator
- Oceanographer
- Optician
- Paleontologist
- Pharmacist
- Philologist
- Philosopher
- Physicist
- Physiologist
- Poet

- Political man
- Priest
- Printer
- Professor
- Scientist
- Sailor
- Saint
- Sismologist
- Sponsor
- Stateman
- Technician
- Theologian
- Writer
- Zoologist

Please note that some people have been credited with 2 or 3 works.

COUNTRY = Country:

This field contains the country where has lived the character whose name has been given to the formation. You can find disapeared countries. See also the list of nationalties here below.Ce champ indique le pays d'origine du personnage ayant servi à nommer la formation. On peut trouver des nations disparues aujourd'hui. Cf la liste des nationalités ci-dessous.

NATIONALTY = Nationalty :

This field indicates the nationality generally attributed to the person whose name has been given to the formation. It can be the birth nationality. You can also find nationalities no longer in existence.

Here is the list of nationalities present in the database:

- American
- Arabian
- Australian
- Austrian
- Babylonian
- Belgian
- British
- Byzantine
- Brazilian
- Canadian
- Carthaginian
- Castillan
- Chinese
- Cretian
- Dalmatian
- Danish
- Dutch
- Egyptian

- English
- Finnish
- French
- Greek
- German
- Hungarian
- Indian
- Irish
- Italian
- Japanese
- Jewish
- Macedonian
- Mexican
- Norwegian
- Persian
- Polish
- Portuguese
- Roman
- Russian
- Scottish
- Soviet
- South African
- Spanish
- Swedish
- Swiss
- Czech
- Venetian

CENTURYN = Number of life century :

This field indicates the number of the century during which the character whose name has been given to the formation most spent most of his life. For example : 19 for "19 th century".

CENTURYC = Life century :

This field indicates clearly the century during which the character whose name has been given to the formation most spent most of his life. For example : "19 th century".

BIRTHPLACE = Birth place :

This field indicates the birth place of the person whose name has been given to the formation when it has been possible to find it. If not found, it is indicated " ? ". Please note that for imaginary persons, there is no birth place.

BIRTHDATE = Birth year :

This field indicates the birth year of the person whose name has been given to the formation if it has been possible to find it. If not found, it is indicated " ? ". Please note that for imaginary persons, there is no birth year.

DEATHPLACE = Death place :

This field indicates the place of death for the person whose name has been given to the formation when it has been possible to find it. If not found, it is indicated " ? ". Please note that for imaginary persons, there is no place of death.

DEATHDATE = Death year :

This field indicates the year of death for the person whose name has been given to the formation if it has been possible to find it. If not found, it is indicated " ? ". Please note that for imaginary persons, there is no year of death.

FACTS = Prominent facts :

This field describes prominent facts during the life of the person whose name has been given to the formation if it has been possible to find it. If not found, it has been indicated " ?? " . This information is adapted from information given by the International Astronomical Union, and additional data coming from various bibliographical sources.

Generally, you can find the discoveries, inventions and important works attributed to the person, as well as distinctions obtained during life (nominations, price. ..) with associated dates when they have been found.

POSITION :

LONGIN = Numerical longitude :

This field gives the numerical value of the selenographic longitude of the formation with a tenth of degree precision. This data is provided by International Astronomical Union. Longitude is negative to the West of central meridian. About craters, it's the center longitude. For lengthened or irregular formations, it's an internal point the closest to central.

LONGIC = Alphanumerical longitude :

You can find here the alphanumerical selenographic longitude of the formation with a tenth of degree precision. This data is provided by International Astronomical Union. Longitude is negative to the West of central meridian. About craters, it's the center longitude. For lengthened or irregular formations, it's an internal point the closest to central.

LATIN = Numerical latitude :

You can find here the numerical selenographic latitude of the formation with a tenth of degree precision. This data is provided by International Astronomical Union. Latitude is negative to the South of lunar Equator. About craters, it's the center longitude. For lengthened or irregular formations, it's an internal point the closest to

central.

LATIC = Alphanumerical latitude :

You can find here the alphanumerical selenographic latitude of the formation with a tenth of degree precision. This data is provided by International Astronomical Union. Latitude is negative to the South of lunar Equator. About craters, it's the center longitude. For lengthened or irregular formations, it's an internal point the closest to central.

QUADRANT = Quadrant :

Information has been included to make easier the location of the formation on the lunar disk. The location system is that of the International Astronomical Union since 1988. When you look at the lunar disk with the naked eye, the North is up and the East is right.

This first field indicates the lunar quadrant where is situated the formation according to the "Lunar Quadrant Charts" by Arthur and Agnieray by the University of Arizona :

- North-East
- South-East
- North-West
- South-East

AREA = Area :

This field indicates clearly the lunar region where can be found the formation according to a more known one (sea, mountain or large crater) or according to the position on the edge of the lunar disk (limb) or according to the center of the lunar disk.

ATLAS :

This field contains pages, maps or picture of the main paper atlases presently available on which the selected formation is indicated.
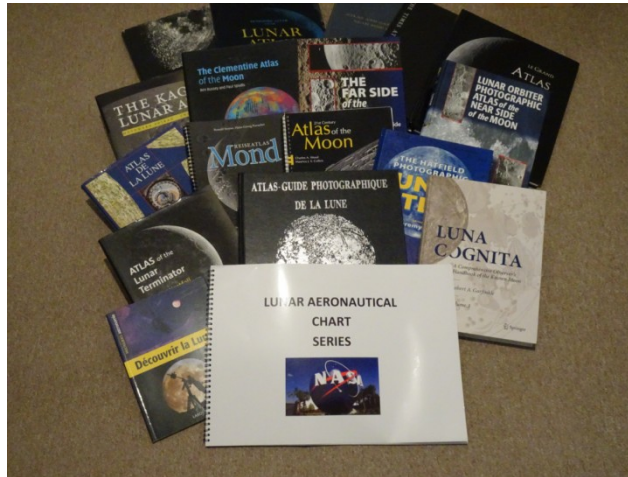
RUKL = Number of the page of "Atlas of the Moon" by Antonin Rükl :

In honor to its author for his contribution to Astronomy popularization, we have mentioned the map number of the "Atlas of the Moon" by Antonin Rükl on which is found the formation.
We have also mentioned the map number of the "Atlas of the Moon" by Antonin Rükl on which is found the formation.

VISCARDY = Page of the "Atlas photographique lunaire à haute résolution" by Georges Viscardy :

Also in honor to its author for his contribution to Astronomy popularization, we have also mentioned the page number of the "High resolution photographic Atlas of the Moon" by Georges Viscardy on which the formation is found with a text on it, or on which a photograph shows the place where is situated the formation.

For this last work, when the formation does not figure on at least one photograph, there is no page indicated. Similarly, if the formation appears on, at least, a photograph, but is not described in the text, it is the page of the best photograph where it is normally visible that is indicated.

WESTFALL = Page of the "Atlas of the lunar terminator" by Westfall :

In honor to its author for his unique work, we have mentioned the maps numbers of the "Atlas of the Lunar Terminator" from Professor John E. Westfall on which the formation is found, because it's the only one that shows all librations variations.

WOOD = Articles and books by Charles Wood :

We mentioned Charles Wood's articles on numerous formations edited in Sky and Telescope and the number of his "Lunar 100 list", with his courtesy.

LOPAM = Lunar Orbiter Photographic Atlas of the Moon :

Adding to downloadable picture of the LOPAM, we have indicated numbers of "Lunar Orbiter Photographic Atlas of the Moon" pages on which you can find the selected

formation. Just click on this link and go to the Internet site of Jeff Gillis of Lunar and Planetary Institute and you will admire the entire picture from which was extracted the picture.

Nevertheless, if you are not permanently connected to the Internet, another possibility is offered.

You can modify the "lopamidx.txt" file which is in the "Database" sub-directory of the "Virtualmoon" install directory with a text editor as "Windows notepad". After, you can access directly to the LOPAM pages copied on your hard drive or on a recorded CD.

In this file, you have just to indicate after "Local URL=" the path of your support where are stored your LOPAM pages, and the pictures type after "SUFFIX=". For example :

Local:URL=c:\Program files\Virtualmoon\LOPAM pages\SUFFIX=.jpg

can access to LOPAM pages stored in the sub-directory "LOPAM pages" of the install directory "Virtual moon" as ".jpg" files.

New example :

Local: URL=d:\ SUFFIX=.bmp

can access to LOPAM pages stored in the root of a CD placed in a CD reader called "d:" as ".bmp" files.

CLEMENTINE :

We have mentioned the pages of the atlas established from the images of the American probe CLEMENTINE and written by the late Paul Spudis & Ben Bussey and published in 2004 by Cambridge University Press, pages on which the selected formation appears.

CENTURY_21ST:

We have mentioned the pages of the atlas "21ST CENTURY ATLAS OF THE MOON" established by Charles Wood & Maurice Collins from images of the LRO probe and published by the two authors in 2005, pages on which the selected formation appears.

HATFIELD = Page of "Photographic Atlas of the Moon" by Hatfield :

In honor to its author for his contribution to Astronomy popularization, we have mentioned the map number of the "Hatfield Atlas of the Moon" republished by Jeremy Cook on which the formation is found.

REISE:

We have mentioned the pages of the "REISE ATLAS MOND" atlas written by Ronald Stoyan & Hans-Georg Purucker and published in 2012 by Oculum, pages on which

the selected formation appears

CHANGE1:

We have mentioned the pages of the atlas established from the images of the Chinese probe CHANG'E 1 and written by Chunlai Li & al. and published in 2016 by Springer Verlag, pages on which the selected formation appears

DISCOVER_MOON:

We have mentioned the pages of the observation guide "DECOUVRIR LA LUNE" written by Christian Legrand and Jean Lacroux, and published in 1995 by Bordas then Larousse, pages on which the selected formation appears.

TIMES_ATLAS:

We mentioned the pages of the atlas "THE TIMES ATLAS OF THE MOON" published in by Times Life in 1969, pages on which appears the selected formation.

KAGUYA_EN:

We have mentioned the pages of the atlas "THE KAGUYA LUNAR ATLAS" established from the pictures of the Japanese probe SELENE / KAGUYA and written by Charles Wood & Motomaro Shirao., and published in 2011 by Springer Verlag, pages on which appears the selected training

BYRNE_NEAR:

We have mentioned the pages of the atlas "LUNAR ORBITER PHOTOGRAPHIC ATLAS OF THE NEAR SIDE OF THE MOON" established from the images of the American LUNAR ORBITER probes written by Charles Byrne, and published in 2005 by Springer Verlag, pages on which appears the selected training

BYRNE_FAR:

We have mentioned the pages of the atlas "LUNAR ORBITER PHOTOGRAPHIC ATLAS OF THE FAR SIDE OF THE MOON" established from the pictures of the American LUNAR ORBITER probes written by Charles Byrne, and published in 2008 by Springer Verlag, pages on which appears the selected training.

SIX_INCH:

We have mentioned the pages of the "SIX INCHES LUNAR ATLAS" written by Don Spain in 2009 and published by Springer on which the selected formation appears.

DASE:

We have mentioned the pages of the "FREE LUNAR FIELD ATLAS" written and

published by Fred Dase on which the selected formation appears.

PAU :

We have mentioned the pages of the Atlas "PHOTOGRAPHIC LUNAR ATLAS FOR MOON OBSERVERS" written by K. C. Pau and published in 2016 on which the selected formation appears.

LUNA_COGNITA:

We have mentioned the pages of the three volumes of the remarkable work "LUNA COGNITA" by Robert Garfinkle and published in 2020 by Springer on which the selected formation appears.

LAC :

We have mentioned the numbers of the "Lunar Astronautical Charts" published in 1967 by NASA's "Aeronautical Chart and Information Center" on which the selected formation appears.

SIZE :

The four following fields contain data about formation dimensions. These vary from different bibliographic sources.

First indicated is data provided by International Astronomical Union, then those coming from other sources when they seem more accurate.

Some of them have been also directly measured on atlases or photographs when they were not found in literature.
In the "Historical sites" database, these fields are empty.

LENGTHKM = Length in km :

This first field indicates the formation length in km. For craters, length is very often equal to width because it's the mean diameter.

WIDEKM = Width in km :

This first field indicates the formation width in km. For craters, length is very often equal to width because it's the mean diameter.

HEIGHTM = Height in meters :

You find here relative altitudes, not absolute ones referring to the mean lunar sphere. It gives the formation height in meters when it's known.

For craters, it's the difference between the upper part of the internal slopes and the

floor.

For other formations, it's the difference between the formation summit and surrounding land.

For mountains and mountain ranges, it's a mean height and higher summits height is generally detailed in description fields.

For rilles and scarps, it's the difference between surrounding lands and the formation lower floor.

RATIO = Ratio :

This data is only indicated for formations whose height is known. It's very often given for craters where it means the diameter / height ratio.

PROFIL = Formation profile visualization :

In this frame, outline of the formation selected within your search and whose description is in the "Database window" is displayed. Here is a semi-graphic field presenting the formation profile. This information is only provided when height is known. Profile has not be constructed for some formations types :

- Sea
- Lake
- Gulf
- Marsh
- Ocean
- Probe
- Human mission

The profile is generated according to the following description :

Crater outline :

Crater is presented so :

<div align="center">

A_____A

< n characters>

</div>

"A" characters show the slope height. The number of "_" characters shows the crater width with the same scale as height.

Because the "A" character is twice high than wide on an html screen, in the above example, the width / height crater ratio is 1/8.

The central mountain of crater has not been represented because their height has

often not been found.

Don't forget that each formation has its own profile. You can't compare two craters dimensions using their profile representation.

A_____A Profile of (Length =20 km & height = 4000 m)

A_____A Profile of (Length = 5 km & height = 1000 m)

On screen, these two profiles are identical, but as you can see, dimensions are different.

Relief outline :

For mountains, mountains ranges, wrinkle ridges or domes, an other viewing mode is selected :

___A___

"A" character shows the formation maximum height. The number of "_" characters shows the formation width with the same scale as height.

Rille outline :

For rilles, rilles system and valleys, profile is shown like this :

___ ___
V

"V" character shows the formation maximum depth. The number of "_" characters shows the formation width with the same scale as depth

DESCRIPTION :

This field is divided in four sections for the formation detailed description. But this division is not really visible when consulting the
formation form on screen or printing it.

Cardinal points are reference to indicate where the different details are situated according to formation center. For a crater, reference point is the area center.

If observed with naked eye, on the Moon, North is up, South is down, West is left and East is right.

North

North-West_____North-East

Formation
center

South-West_____South-East
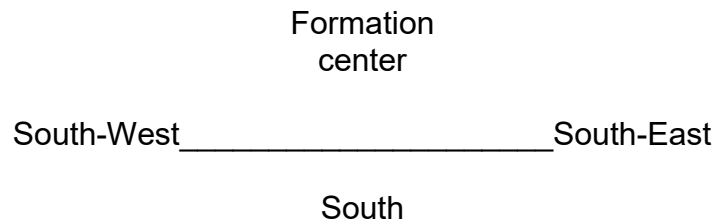
South

For example, a craterlet located on a crater wall down left will be described as "Walls ridden by a craterlet at South-West".

Craters are the most numerous formations. Their description is well divided in four parts.

GENERAL = General description

First, information about shape, location and preservation of the formation.

In the "Historical sites" database, specific description are present :

- Lauch date and hour
- Names of astronauts if it's a human mission
- Spaceship or probe description
- Main dates and hours of the mission
- Main scientific results

SLOPES = External slopes description

Then, the external "slopes" are described. Generally, the comments are about their inclination. If radial valleys are present, slopes are described as "tormented". This part also indicates craters and craterlets situated on external slopes.

WALLS = Internal walls description

The "walls" which are described are the internal ones. They link the upper rim of the slopes to the crater floor. The walls are described as "little high when the altitude difference is less than 2,000 m, "pretty high" between 2,000 and 3,000 m, "high" between 3,000 and 4,000 m and "very high" if more than 4,000 m. The indicated information is that which seem the most believable according to important variations in different bibliographical sources. This part also indicates craters and craterlets situated on internal slopes.

FLOOR = Crater floor description

The crater "floor" is described as "flat" if no hills can be found to "tormented" if it's very irregular. The non circular shape is mentioned. If lava seems to have flooded

the crater floor, it has been indicated. This part also indicates craters and craterlets situated on the floor.

OBSERVATION

INTERESTN = Interest cotation :

This field gives a numerical indication on the interest of the formation. It will help you to determine which formations to observe. It gives you information on the formation interest. It has been defined by the authors according to their own experience. Sure, you can disagree with them.

Formations are indicated as :

- Low interest formation (1)
- Pretty interesting formation (2)
- Very interesting formation (3)
- Exceptionally interesting formation (4)

INTERESTC = Text of interest cotation :

This field gives a numerical indication on the interest of the formation. It will help you to determine which formations to observe. It gives you information on the formation interest. It has been defined by the authors according to their own experience. Sure, you can disagree with them.

Formations are indicated as :

- Non observable
- Low interest formation
- Pretty interesting formation
- Very interesting formation
- Exceptionally interesting formation

LUNATION = Lunar month day :

This gives an indication on the day of the first half (From New Moon to Full Moon) during which, a favorable observation of the selected formation on the terminator is possible. It's built on the formation longitude.

"3" is for "3 days after New Moon"
"7" is for "7 days after New Moon", it's First Quater
"14" is for "14" days after New Moon", it's Full Moon

MOONDAYS = Lunar month day for evening observation :

This expression means "Day of lunar month permitting an evening observation of the formation". It has been observed that Eastern limb formations can only be well observed 2 days after New Moon.

The indicated day is the one for a null libration. It has been computed from formation longitude. According of the real libration value, it can be shifted by one day more or less.

MOONDAYM = Lunar month day for morning observation :

This expression means "Day of lunar month permitting an morning observation of the formation". It has been observed that Western limb formations can only be well observed 2 days before New Moon.

The indicated day is the one for a null libration. It has been computed from formation longitude. According of the real libration value, it can be shifted by one day more or less.

DIAMINST = Diamètre de l'instrument théorique :

This field gives a numerical value of the diameter of the theoritical instrument needed to observe the whole selected formation.It's built on the formation diameter and the theoritical resolution of the instruments based on the Dawes formula.

THINSTRU = Minimal instrument :

This field presents the smallest instrument needed to theoritically observe the formation. It has been computed from the formation width and from theoritical resolution power (TRP) of the instruments. It is supposed to be obtained when using a magnification equal to instrument diameter in centimeters.

This data is provided for a Moon mean distance of 202,000 miles. An arc second is then about 1 mile on the Moon.

- Naked eye (PRP = 50 miles)
- x10 binoculars (PRP = 10 miles)
- 2" refractor (PRP = 2.5 miles)
- 4" reflector (PRP = 1.5 miles)
- 6" reflector (PRP = 1.1 miles)
- 8" reflector (PRP = 0.9 mile)
- 10" reflector (PRP = 0.6 mile)

INTERNATIONAL ASTRONOMICAL UNION DATAS

IAU Feature Name :

Official name given by IAU to the formation with all the additives on letters (Accents, tilde, etc...) as they have been given to the honored character.

IAU Clean Feature Name

It's official IAU name above without all the additives on letters (Accents, tilde, etc...) so that they can be managed internationally by computers.

IAU Diameter

Approximate diameter or biggest dimension in kilometers.

IAU Center Latitude

Latitude of the center of the formation. Positive numbers indicates that the formation is localized in northern hemisphere and negative numbers indicate that the formation is localized in the southern hemisphere.

IAU Center Longitude

Longitude of the center of the formation. On the Moon, positive numbers indicates longitudes towards East and negative numbers indicate longitudes towards West.

IAU Northern Latitude

Latitude the most on North of the formation. Positive numbers indicates that the formation is localized in northern hemisphere and negative numbers indicate that the formation is localized in the southern hemisphere.

IAU Southern Latitude

Latitude the most on South of the formation. Positive numbers indicates that the formation is localized in northern hemisphere and negative numbers indicate that the formation is localized in the southern hemisphere.

IAU Eastern Longitude

Longitude the most on the East of the formation. On the Moon, positive numbers indicates longitudes towards East and negative numbers indicate longitudes towards

West.

IAU Western Longitude

Longitude the most on the West of the formation. On the Moon, positive numbers indicates longitudes towards East and negative numbers indicate longitudes towards West.

IAU Coordinates System

Coordinates system used for latitudes and longitudes. For the Moon, it's planetographic with east longitudes as positive and counted from 0 to -180° and from 0 to 180° from the meridian 0. It's ULCN 2005(Unified lunar coordinates network de 2005). Mean lunar sphere is considered withe a radius of 1737,4 km

IAU Continent

Continent or great geographic divisin associated to the name.

Africa (AF)
Antarctica (AN)
Asia (AS)
Europe (EU)
North America (NA)
Oceania (OC)
South and Central America (SA)

IAU Ethnicity

Ethnic or cultural or nationalty associated to the name.

AFRICA

Algeria	AL
Angola	AN
Bantu	BA
Benin	BE
Botswana	BT
Burkina Faso (Upper Volta)	BF
Burundi	BR
Bushman	BU
Bushongo	BH
Cameroon	CR
Canary Is.	CI
Dahomean	DH

Egypt	EG
Ethiopia	ET
Gabon	GB
Gambia	GA
Ghana	GH
Gold Coast	GC
Guinea	GU
Hottentot	HO
Ivory Coast	IC
Kenya	KY
Lesotho	LE
Liberia	LI
Libya	LB
Madagascar	MD
Malawi	MW
Mali	ML
Mande	MN
Mauritania	MU
Mauritius	MA
Mbundu	MB
Mende	ME
Morocco	MR
Mozambique	MZ
Namibia	NM
Niger	NG
Nigeria	NI
Pygmy	PY
Republic of Chad	CH
Republic of Seychelles	SY
Rwanda	RW
Semitic	SE
Senegal	SN
Sierra Leone	SL
Somalia	SO
South Africa	SA
Sudan	SU
Swaziland	SW
Tanzania	TA
Togo	TO
Tunisia	TN
Uganda	UG
Unknown	--
Yao	YA
Zaire	ZA
Zambia	ZM
Zimbabwe	ZI
Zulu	ZU

ASIA

Afghanistan	AF
Akkadian (Accadian)	AK
Altai	AL
Arabian	AR
Armenian	AM
Assyrian	AY
Assyro-Babylonian	AB
Azerbaijan	AZ
Babylon	BY
Bangladesh	BA
Bhutan	BH
Buriat	BR
Burma	BU
Cambodia	CM
China	CH
Chukchi	CU
Elamite	EL
Evenki	EV
Georgia	GE
Hebrew	HE
Hindu	HI
India	IN
Indonesia	ID
Iran	IR
Iraq	IQ
Israel	IS
Itelmen	IT
Japan	JA
Jewish	JW
Jordan	JO
Kashmir	KA
Kazakhstan	KZ
Ket	KT
Korea	KR
Kuwait	KU
Kyrgyzstan	KY
Laos	LA
Lebanon	LE
Malaysia	MA
Mansi	MS
Mesopotamian	ME
Minyong	MY
Mongolia	MO
Monguor	MG

Nanai	NA
Neghidhian	NG
Nepal	NE
Nganasan	NS
Oman	OM
Ostyak	OS
Pakistan	PK
Persian	PE
Philippines	PH
Phoenician	PO
Sanskrit	SA
Saudi Arabia	SB
Scythian	SC
Semitic	SE
Siberia	SI
Sri Lanka	SR
Sumerian	SU
Syria	SY
Taiwan	TW
Tajik	TJ
Thailand	TH
Tibet	TB
Tungu	TN
Turkey	TU
Turkmenistan	TK
Tuva	TV
Ulci	UL
Unknown	--
Urartu	UR
Uzbekistan	UZ
Vietnam	VT
Yakutian	YK
Yemen	YE

EUROPA

Albania	AL
Andorra	AN
Austria	AS
Bashkir	BS
Belarus	BL
Belgium	BE
Bosnia-Herzegovina	BH
Bulgaria	BU
Byzantine	BZ
Caucasus	CC
Celtic	CE

Chuvash	CH
Croatia	CR
Cyprus	CY
Czechoslovakia	CZ
Denmark	DE
England	EN
Eskimo (Greenland)	EK
Estonia	ES
Finland	FI
Flemish	FL
France	FR
Germany	GE
Great Britain	GB
Greek	GR
Greenland	GL
Gypsy	GY
Hungary	HU
Iceland	IC
Ireland	IR
Italy	IT
Kalmyk	KL
Karelia	KA
Komi	KO
Lapp	LP
Latin	LA
Latvia	LV
Liechtenstein	LE
Lithuania	LI
Luxembourg	LU
Macedonian	MA
Malta	ML
Mari	MR
Moldova	MD
Mordvinian	MO
Netherlands (Dutch)	DU
Norse	NS
Norway	NO
Oscan	OS
Ostrogoth	OG
Poland	PO
Portugal	PG
Roman	RM
Romania (Rumania)	RO
Russia	RU

Scandinavian	SD
Scotland	SC
Scythia	SY
Slavic	SL
Slovakia	SV
Slovenia	SI
Soviet	SO
Spain	SP
Sweden	SW
Switzerland	SZ
Tartar	TT
Teutonic	TU
Udmurtian	UD
Ukraine	UK
Unknown	--
Wales	WA
Yugoslavia	YU

NORTH AMERICA

Aleutian	AU
Algonquin	AL
American	AM
Arikara	AR
Blackfoot	BL
Canada	CA
Cherokee	CE
Cheyenne	CY
Chickasaw	CH
Chinook	CI
Choktaw	CO
Chumash	CU
Creek	CR
Dakota	DA
Dominica	DO
Eskimo	ES
Hopi	HO
Iroquois	IR
Klamath	KL
Lakota	LA
Mandan	MA
Mexico	ME
Navajo	NV
Osage	OS
Pawnee	PW
Pequot	PE
Potawatomi	PO
Pueblo	PU

Salish	SA
Seneca	SE
Shoshoni	SH
Sioux	SX
Tlingit	TL
United States	US
Unknown	--
Zuni	ZU

OCEANIA

Australia	AU
Caroline Is.	CI
Cook Islands	CO
Fiji	FJ
Guam	GM
Hawaii	HA
Marquesas Islands	MA
Marshall Is.	MI
Melanesia	ME
Micronesia	MC
Nauru	NA
New Britain	NB
New Guinea	GU
New Zealand	NZ
Papua New Guinea	PN
Polynesia	PO
Republic of Palau	PA
Samoa	SA
Society Is.	SI
Toamotu	TU
Tonga	TO
Unknown	--
Vanuatu	VA

CENTRAL AND SOUTH AMERICA

Argentina	AR
Auracanian	AC
Aztec	AZ
Barbados	BB
Bolivia	BO
Bororo	RR
Brazil	BR
Chile	CH
Chimalateco	CI

Colombia	CO
Costa Rica	CR
Cuba	CU
Dominican Republic	DR
Ecuador	EC
El Salvador	ES
Falkland Islands	FI
French Guiana	FG
Grenada	GR
Guatemala	GU
Guyana	GY
Haiti	HA
Honduras	HO
Inca	IN
Jamaica	JM
Mayan	MY
Nahuatl	NA
Netherland (Dutch) Antilles	DA
Nicaragua	NI
Panama	PM
Paraguay	PA
Peru	PE
Puerto Rico	PR
Suriname	SU
Unknown	--
Uruguay	UR
Venezuela	VE
Virgin Islands	VI

IAU Feature Type

IAU descriptor term ein greek or latin (cf Lunar Universal Number above)

IAU Feature Type Code

Code in two letters of the IAU descriptor term (cf Lunar Universal Number above)

IAU Quad Name

Specific quadrant where is localized the formation center.

IAU Quad Code

Two letters code of the specific quadrant where the formation center is localized.

IAU Approval Status

Approval level of the formation in 2023.

1	Proposed (not currently used)
2	Task Group approval (not currently used)
3	WGPSN approval (not currently used)
4	Executive Committee approval (not currently used)
5	Adopted by IAU
6	Dropped, no longer in use
7	Never approved by the IAU

IAU Approval date

Date when the name has been approved by IAU. Complete dates begin at half september 2006 and are recorded as (YYYY-MM-DD).

IAU Reference

Reference book from where the origin and the orthograph of the name are given.

IAU Origin

Short explanation of the formation name.

IAU Link

Internet link towards the official IAU site formation page.

END OF "DATLUN" USER'S MANUAL

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The authors thank users to indicate them all mistake they found in this manual with a message on the Web site forum