**"VIRTUAL MOON ATLAS 7" © FREEWARE.** Christian Legrand[1] and Patrick Chevalley[2], [1]Software designer / Ch. Legrand 668 Rue du Tour de Préaux 76160 PREAUX (France) / chlegrand@free.fr ,
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**INTRODUCTION:** Since 2002, we develop a freeware  to help Moon observing, to improve interest for Moon in general public, and to provide a basic lunar tool for professionals.

**PRESENTATION:** VMA uses datas coming from NASA, USGS, JPL and  from Dr Robinson, Binder, Gaddis, Zuber, Salamuniccar, Foing and Robbins teams, and from Kaguya, Chandrayann 1 Smart-1,and Chang'é missions

The software includes management of a complete database (Near 1 400 000 entries) of named, satellite, anonymous or human features on the  Moon.

Pictures libraries presenting each named formations from LPI resources and best amateurs shootings are associated and contain more than 8 000 pictures.

VMA Pro 7.0 is only available for Windows.

VMA software has been reviewed in main amateur astronomy magazines (Sky & Telecope, Astronomy , Ciel & Espace, L'Astronomie…) and downloaded more than 1 800 000 times worldwide since 2002.

French, English and others languages (GE / ES / IT /…) .translations are included.

VMA software is used by several professional organizations such as IAP Paris, Kitt Peak Observatory, National Japan Observatory, Athen Observatory / University College London, BBC Sky at night, several astronomy magazines and astronomy writers (P. Harrington…). Recommended by ESA (B. Foing), registered as educational software by French ministry for education, it has also yet been presented to professionals at 2006 & 2007 LPSC, PCC2 in 2011 and EPSC 2015 and to amateurs at 2012, and 2018 RCE. Also used in NELIOTA program by ESA / Athens Observ. and for SCHIAMACHY on ENVISAT by DLR / ESA



**Picture 1 : Double windows with Kaguya / LRO and Unified geologic 2020 textures**

**MANUAL** : A complete PDF manual  is provided.

**VMA 7 SOFTWARE FEATURES :**
- « Map » window with thumbnails  « Information », « Ephemeresis », « Notes», « Tools », « Setup», …
- Complete rotating Moon globe with coordinates grid
- Second window opening permitting comparisons
- Map and thumbnails display on separate monitors
- Real time or choosen phase and librations display
- Orientation of the lunar disk with powerful zoom
- Formations search function starting from name
- Formations names display according to zoom power
- Orbital viewing simulation
- Integrated notepad for personal notes on formations
- Size and distance measurement tool on maps
- Context menu on right mouse click
- Maps and databases printing with captions setup
- Eyepieces and CCD cameras field simulation
- Full screen display for public videoprojections
- Possible display on two separated monitors
- 3D profile of choosen formation when available

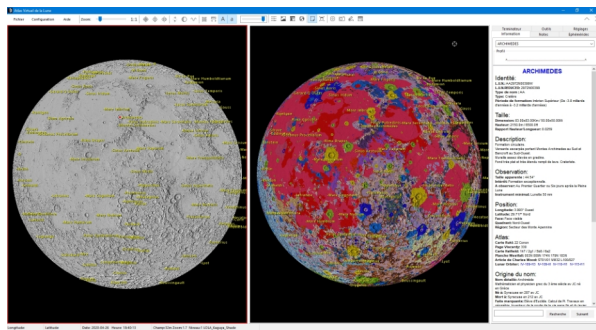**DATABASES :**  Included databases contains more than 1 300  000 formations:
- Named formations
- Satellites formations
- Anonymous craters (From S. Robbins & G. Salamuniccar teams)
- Human exploration sites (Historical)
- Lisa Gaddis pyroclastic deposits
- ALPO domes databases
- NELIOTA meteoritic impacts database

For each formation, included informations about :
- Formation geology (except historical)
- Formation localization on lunar disk
- Formation detailed description
- Detailed formation name origin
- Official IAU 2012 datas

All these databases include the "LUN / Lunar Universal Number" conceived by us and permitting quick "naming" and localization of any lunar formation more than 100 m wide.

DATLUN© is a specific database manager using menus or SQL requests for sortings and extractions on every word of  all the databases (600 Mo datas).
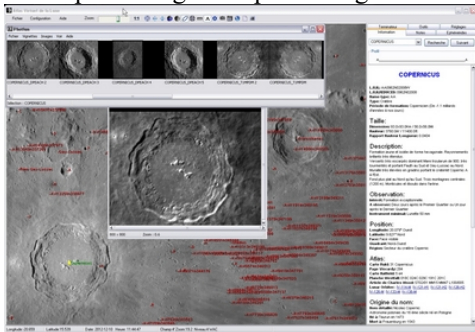


**Picture 2 : DATLUN main screen**

**MAPPING TEXTURES :** Mapping textures : JPL reliefwith (1500 m/pix) and without albedo (1000 m / pix), USGS Unified geologic (600 m / pix) LAC/LPI/USAF/O'Brien (300m / pix), Clementine (200 m / pix), USGS LRO, Lunar Orbiter and CNSA Chang'é 2 (60 m / pixel), USGS LOLA-Kaguya-Shaded (60 m / pix).

**HISTORICAL TEXTURES :** Permitting easy comparisons of pioneers works with present datas: (Langrenus 1645 / Rheita 1645 / Hevelius 1647 / Divini 1647 / Riccioli 1651 / Cassini 1679 / Tobias Mayer 1791 / Beer & Maädler 1841 / Fauth 1936 )

**SCIENTIFIC OVERLAYS :** 44 different ones : Gravity, temperature, altimetric, geologic, various elements as thorium, iron, several neutrons varieties… overlays can be applied on each texture. Double window feature permits comparisons between 2 overlays.

**PICTURES LIBRARIES :** VMA includes lunar pictures libraries (Near 8 500 pictures) from :
- Lunar Orbiter PAM & other Lunar probes
- Apollo missions mapping and 70 mm
- Consolidated Lunar Atlas
- Lunar Astronautical Charts and Lunar Maps
- Best amateur lunar imagers (Peach / Cathala / Wirths / Higgins / Dauvergne...)

**PHOTLUN©** specific pictures manager with editing possibilities permitting basic processing included.


**Picture 3 : PHOTLUN main screen**

**INTERNET CONNECTION :** The WEBLUN© module using a special lunar Internet sites database permits connection and interactivity while using VMA.

**DISTRIBUTION :** VMA Pro 7 version and all add-ons collection are freeware and downloadable free from our Web site  http://www.ap-i.net/avl/en/start

A SD card complete version can also be ordered. We maintain a discussion forum and we encourage other languages translations. We also listen continuously to our users requests, (including professionals), trying to update the software with new useful functionalities.
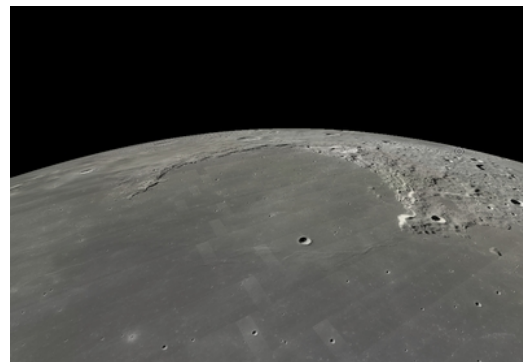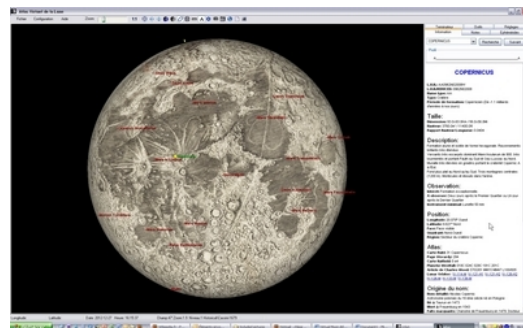
**OTHERS SCREEN CAPTURES :**
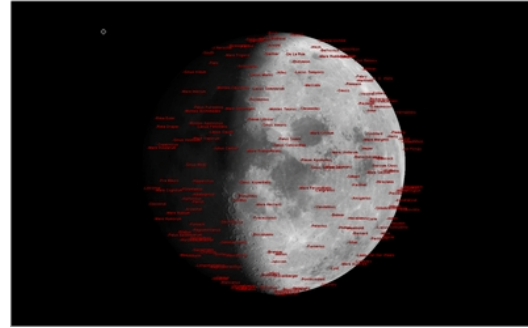

**Picture 4 : Full screen for public education events**
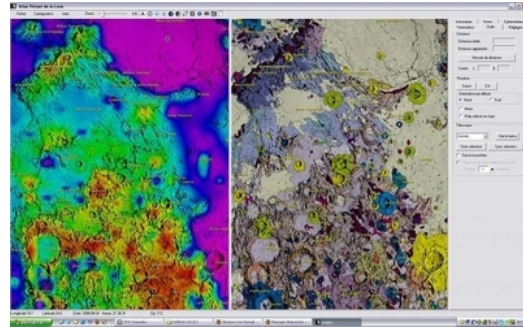

**Picture 5 : Double window with altitude & geology overlay for correlation search**


**Picture 6 : Sinus Iridum fly over with LRO texture**


**Picture 7 : Cassini 1679 historical texture**

We thank a lot all the amateur and professional persons that support the development of VMA with the permission of using datas, maps or pictures they produce.