

## Making Lunar Lemonade – Tips, Tricks, and Targets for the Observing the Full Moon

By Chris Vaughan, March, 2018

### Visual Ray Systems

**Tycho** – South central location; asymmetrical rays, 1500 km long, 108 Ma old

**Copernicus** – Northwest central location; symmetrical rays, ragged, 800 km long, 800 Ma old

**Kepler** – Midwest location; symmetrical rays, 300 km long, <800 Ma old

**Anaxagoras** – Near northern limb; symmetrical rays, 900 km long, <few hundred Ma old

Others - **Aristillus, Aristarchus, Olbers, Byrgius, Stevinus, Langrenus**

### Telescope Ray systems

**Proclus** – Recently formed asymmetrical Ray System, west of Mare Crisium; white floored crater is 28 km wide; rays consistent with extremely low angle impact from SW

**Messier Complex** – In Mare Fecunitatis; Recently formed pair of comet-like bright rays 120 km long; each crater ~11 km long; very bright crater floors around full moon; consistent with extremely low angle impact from E at 1.7 km/s

### Dark Ray Systems

**Dionysius** – SW edge of Mare Tranquillitatis; crater is 18 km wide; very bright floor around full moon; Symmetrical dark rays are excavated Mare Tranquillitatis basalt

### Terraced Craters

**Copernicus** - At high sun illumination exhibits bright terraces on rim due to avalanching

### Dark Craters (not maria, magma flow was triggered by impact)

**Plato** – In far north, but central; dark, basalt-filled crater 100 km across

**Grimaldi** – Near western limb; dark, basalt-filled crater 175 km across

### Bright Spots

**Cassini's Bright Spot** – NNE of Tycho; Cassini claimed he saw clouds there; One of the moon's brightest locations; About 100 Ma old; 90° fan shaped rays extending East (Don't confuse with Cassini Crater)

### Lunar Swirl

**Reiner Gamma** – In Oceanus Procellarum, near western limb, north of Grimaldi and west of Aristarchus; High albedo feature composed of ancient lunar basalt that has not been darkened by weathering due to a strong localized magnetic field! One of the strongest magnetic anomalies on the moon!

### Dark Halo Craters (DHC)

**Copernicus Region DHC** – Small craters with bright floors and black haloes; impacts through Copernicus' white ejecta excavated dark Oceanus Procellarum basalt and even deeper highlands anorthosite; younger than Copernicus' age of ~800 Ma

## Pyroclastic Volcanic Stains

**Alphonsus** – Just west of Mare Cognitum; ancient crater ~4 Ga old and 119 km across; three dark volcanic cones with haloes likely ~3.2-3.5 Ga old; rich in Iron and Titanium; unconfirmed venting events sighted

**Atlas** – Located SE of Mare Frigoris, not far from NE limb; crater ~4 Ga old and 87 km across, with terraced edges; contains two dark volcanic cones with haloes likely ~3.2-3.5 Ga old; look for volcanic rilles on crater floor; bright young crater Hercules G is inside larger Hercules to the west

## Colored Areas

**Aristarchus** Region – Located in Oceanus Procellarum, not far from NW limb; Crater has a bright floor and asymmetrical ray system to east; highly tinted brown and orange areas to north and west of crater; orbiting probes have detected sulphur compounds and radioactive radon-222 emissions

**Mare Tranquillitatis** – darker, titanium-enriched basalt gives the mare a bluish tint

## Observing Tips

Days before and after full are just as good

Use large aperture for resolving power, but filters to control brightness

Smartphone and video imaging works well on the moon

Use charts flipped to match your optics, or use app settings to flip display

## Outreach Activities

Observe the special features listed above

Note varying Mare Crisium & Grimaldi positions (explain effect of libration)

Ask what “pictures/shapes” do the maria make?

Look at the moon upside down!

Cover the moon with your pinky finger

Smartphone imaging

## Resources

LunarMap HD app (about \$2, many very powerful features, options)

SkySafari (Plus or Pro versions)

The Cambridge Photographic Moon Atlas by Chu et al

Fred Dase’s Lunar Field Atlas (free download of your choice of chart orientation)

The Lunar Sourcebook by Heiken et al

The Geologic History of the Moon (free download from USGS)

Photographic Moon Book by Alan Chu (free download)

Planetary Society, NASA, LRO sites

