

## Ground-based observations of northern spiral clouds on Mars

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### Abstract

Shortly before mid northern summer on Mars, an area close to the north polar cap (NPC) located around 30° of longitude and 60°N of latitude, commonly called “Baltia” begins to develop a repeating activity of white spiral clouds. They sometimes look like terrestrial hurricanes and as been popularized as “polar cyclones” after some Hubble space telescopes observations in 1999.

During the 2014 opposition Mars was at the beginning of the relevant season and the activity has been observed in detail from the ground. It's then possible to shape its daily behavior as well as possible (Martian) yearly variations.

### 1. Introduction

This year Mars reached opposition on April 8<sup>th</sup> at a diameter of 15,2" and a season of 114°Ls. This was a good opportunity for terrestrial observers to image the Baltia area at the relevant season of 120 to 130°Ls, that was reached after opposition, when the crucial morning side becomes visible from Earth.

### 2. Observing methods

Observing Mars from the ground requires different methods than for other planets:

1. A global network is required, due to the particular rotation of the planet, no single observer or country can observe the whole planet at the same season (40 days are needed)
2. Repeated imagery is needed during one imaging session, to detect hourly cloud evolution

3. To image north polar clouds, imaging in blue light is necessary.

The SAF and ISMO have released repeated public alerts on what could be observed this year [1] [2], using both mailing lists and Facebook imagers groups, and how it should be observed. As a result more quality data has been gathered.

### 3. Results for 2014 and daily following of the activity

In 2014, the activity began around Ls 120° by the appearance of thick front-shaped clouds, before the classical “spiral” shape with its eye could be detected a few days later. The question is to detect seasonal evolution here, as well as daily evolution: spiral clouds may slightly weaken or dissipate during the Martian day, and again thicken during the night.

### 4. Results for yearly comparisons

The aphelion (cold) climate of Mars is renewed for its yearly stability of weather forecast. However, it can be interesting to compare yearly activity, as it can be made now from several databases (amateurs, HST, space probes). A quick look on past data strongly suggests that the timeline of activity may vary from year to year of around 10°Ls.

## Acknowledgements

The authors would like to thanks all amateurs that have contributed to the international campaigns of Mars imaging, especially those who submitted data to the SAF and ISMO galleries, and those who share data on the various Facebook groups [3] that now prove to be essential to make the information circulate.

## References

- [1] Pellier.C, A Pre-Polar Spiral Cloud at Early Northern Summer (ISMO 11/12 Mars Note (15)) [CMO#412](#)
- [2] Minami.M, Murakami.M, How about in 2014 Such Cyclones near Baltia Which was Chased in 1999? (Forthcoming 13/14 Mars (5)), [CMO#416](#)
- [3] Especially “Astronomy planetary imaging” and “CIOC\_SidingSPring”