Projet SQM du CAAS

La qualité du ciel des sites d’observation du CAAS

Historique

- Martin AUBÉ I Professor (Full) I Ph.D. remote sensing - M.Sc. Physics (Astrophy) I Physique I Research profile
- François Gaudreau coordonnateur, département de physique, CEGEP Sherbrooke
- Alex Mavrovic , Enseignant-chercheur, CEGEP de Sherbrooke

http://obsand.org/wiki/index.php/Prof/IlluMartin AUBÉ I Professor (Full) I Ph.D. remote sensing - M.Sc. Physics (Astrophy) I Physique I Research profilemEn

Suivi du projet

- Présentation d’Alex, 7 Février 2025, sur la pollution lumineuse
- Identification des sources de pollution
- Différents projets effectués:
  - Serres du Saguenay,
  - LAN Cube, identification sur rues
- Projets en cours
  - Demande de subventions pour documenter au Québec
  - Besoin de collaboration citoyenne

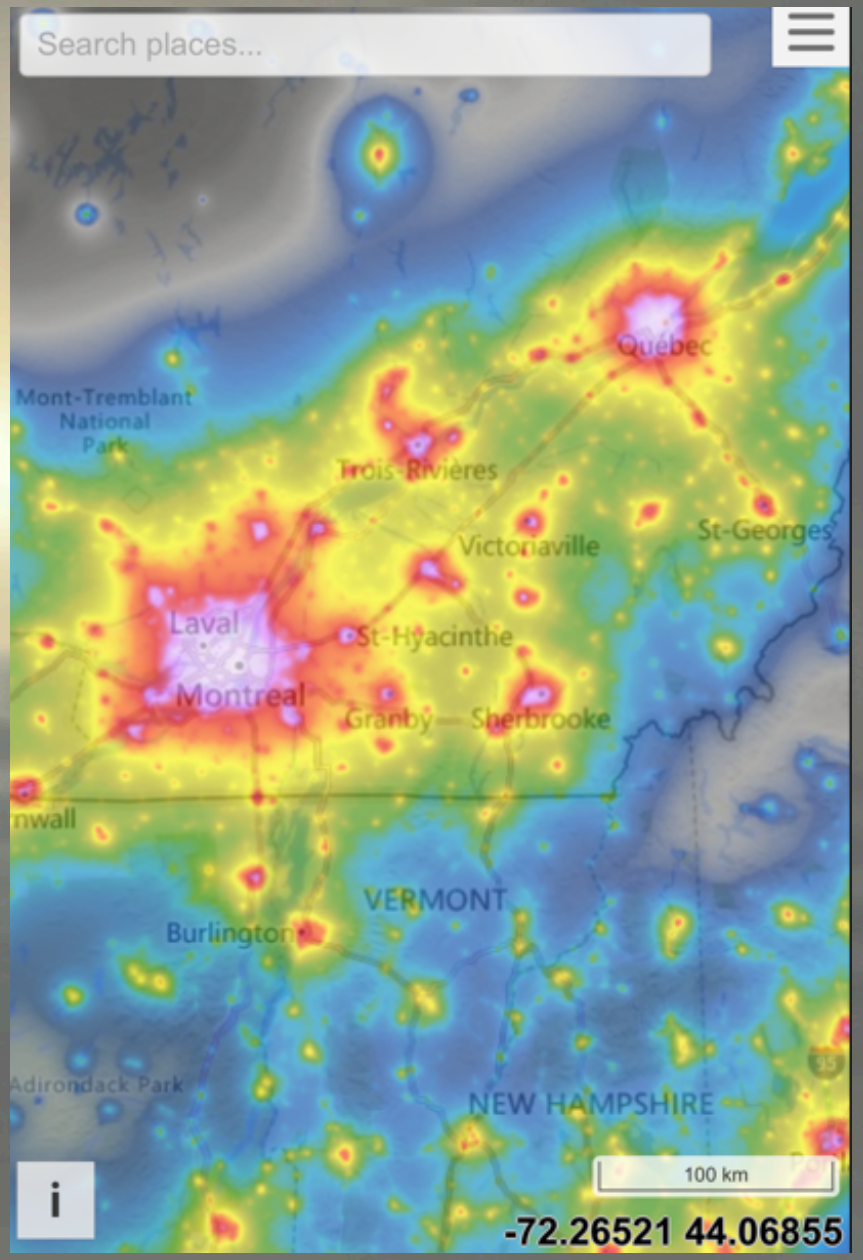
Collaboration du club

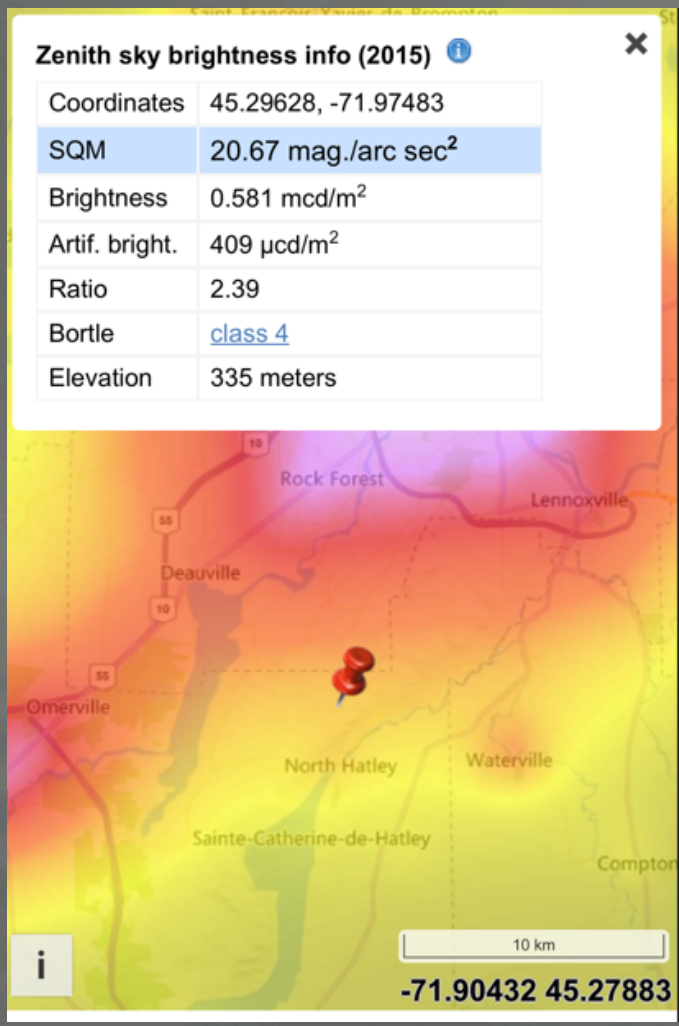
- Début de mesures par SQM
  - Roger avec un appareil maison
  - André avec une version SQM large ouverture
  - Jean-Bruno-Desrosiers

- Rencontres avec les responsables du projet CEGEP
  - Confection de chapeau restrictif
  - Prises de mesures
  - Confection de feuille d'enregistrement des données
  - Validation des données recueillies, nombre et qualité

Pollution lumineuse.

Light pollution map 2015





Score de Bortle et de Mag/arcsec2

image de CDS

Color	Artificial / Natural Sky Brightness	Brightness mags / sq arcsec V Band	Bortle Scale approx
	< 0.01	22.00 to 21.99	1
	0.01 to 0.06	21.99 to 21.93	2
	0.06 to 0.11	21.93 to 21.89	2
	0.11 to 0.19	21.89 to 21.81	3
	0.19 to 0.33	21.81 to 21.69	3
	0.33 to 0.58	21.69 to 21.51	4
	0.58 to 1.00	21.51 to 21.25	4

Color	Artificial / Natural Sky Brightness	Brightness mags / sq arcsec V Band	Bortle Scale approx	Description (Descriptions are approximate. Your sky may vary.)
	< 0.01	22.00 to 21.99	1	Theoretically darkest sky limited by airglow and starlight
	0.01 to 0.06	21.99 to 21.93	2	Gegenschein visible. Zodiacal light annoyingly bright. Rising milkyway confuses some into thinking it's dawn. Limiting magnitude 7.6 to 8.0 for people with exceptional vision. Users of large dobsonian telescopes are *very* happy. [-ad]
	0.06 to 0.11	21.93 to 21.89	2	Faint shadows cast by milkyway visible on white objects. Clouds are black holes in the sky. No light domes. The milky way has faint extentions making it 50 degrees thick. Limiting magntiude 7.1 to 7.5. [-ad]
	0.11 to 0.19	21.89 to 21.81	3	
	0.19 to 0.33	21.81 to 21.69	3	The sky is crowded with stars, extending to the horizon in all directions. In the absence of haze the M.W. can be seen to the horizon. Clouds appear as black silhouettes against the sky. Stars look large and close. [-Richard Berry] Low light domes (10 to 15 degrees) on horizon. M33 easy with averted vision. M15 is naked eye. Milky way shows bulge into Ophiuchus. Limiting magnitude 6.6 to 7.0. [-ad]
	0.33 to 0.58	21.69 to 21.51	4	21.6: ... a glow in the direction of one or more cities is seen on the horizon. Clouds are bright near the city glow. [-Richard Berry]
	0.58 to 1.00	21.51 to 21.25	4	Zodiacal light seen on best nights. Milkyway shows much dark lane structure with beginnings of faint bulge into Ophiuchus. M33 difficult even when above 50 degrees. Limiting magnitude about 6.2 to 6.5. [-ad]
	1.00 to 1.73	21.25 to 20.91	4.5	21.1: The M.W. is brilliant overhead but cannot be seen near the horizon. Clouds have a greyish glow at the zenith and appear bright in the direction of one or more prominent city glows. [-Richard Berry] Some dark lanes in milkyway but no bulge into Ophiuchus. Washed out milkyway visible near horizon. Zodiacal light very rare. Light domes up to 45 degrees. Limiting magnitude about 5.9 to 6.2. [-ad]
	1.73 to 3.00	20.91 to 20.49	4.5	
	3.00 to 5.20	20.49 to 20.02	5	20.4: To a city dweller the M.W. is magnificent, but contrast is markedly reduced, and delicate detail is lost. Limiting magnitude is noticeably reduced. Clouds are bright against the zenith sky. Stars no longer appear large and near. [-Richard Berry] Milkyway washed out at zenith and invisible at horizon. Many light domes. Clouds are brighter than sky. M31 easily visible. Limiting magnitude about 5.6 to 5.9.[-ad]
	5.20 to 9.00	20.02 to 19.50	5	
	9.00 to 15.59	19.50 to 18.95	6	19.5: M.W. is marginally visible, and only near the zenith. Sky is bright and discoloured near the horizon in the direction of cities. The sky looks dull grey. [-Richard Berry] Milkyway at best very faint at zenith. M31 difficult and indestinct. Sky is grey up to 35 degrees. Limiting magntidue 5.0 to 5.5. [-ad]
	15.59 to 27.00	18.95 to 18.38	7	
	27.0 to 46.77	18.38 to	8	Entire sky is grayish or brighter. Familliar constellations are missing stars. Fainter constellations are absent. Less than 20 stars visible over 30 degrees elevation in brigher areas. Limiting magntude from 3 to 4.CCD

Les appareils de mesure de Unihedron

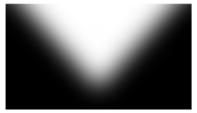
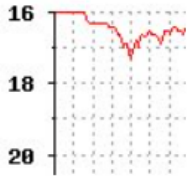
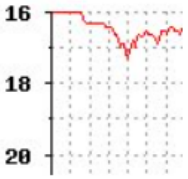
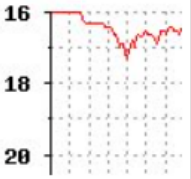
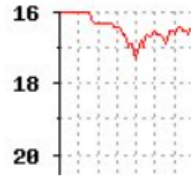
- Sky Quality Meter :
- unihedron.com/projects/darksky/

- Champ d'analyse (FOV):

SQM 40 degrés

SQM-L 20 degrés

Sky Quality Meter comparison

Model	SQM	SQM-L	SQM-LE	SQM-LU	SQM-LU-DL	SQM-LR
Interface	 Handheld / Display	 Handheld / Display	 Ethernet	 USB	 USB	 RS232
FOV	 Wide	 Narrow	 Narrow	 Narrow	 Narrow	 Narrow
Reach	 Handheld	 Handheld	 Global	 5m (15')	 Autonomous	 100m (300')
Readings	 Single reading	 Single reading	 Single / Continuous	 Single /Continuous	 Single /Continuous	 Single /Continuous


Sky Quality Meter
Start
mags
arcsec²
16 17 18 19 20 21
Sky Quality Meter
Start
mags
arcsec²
16 17 18 19 20 21

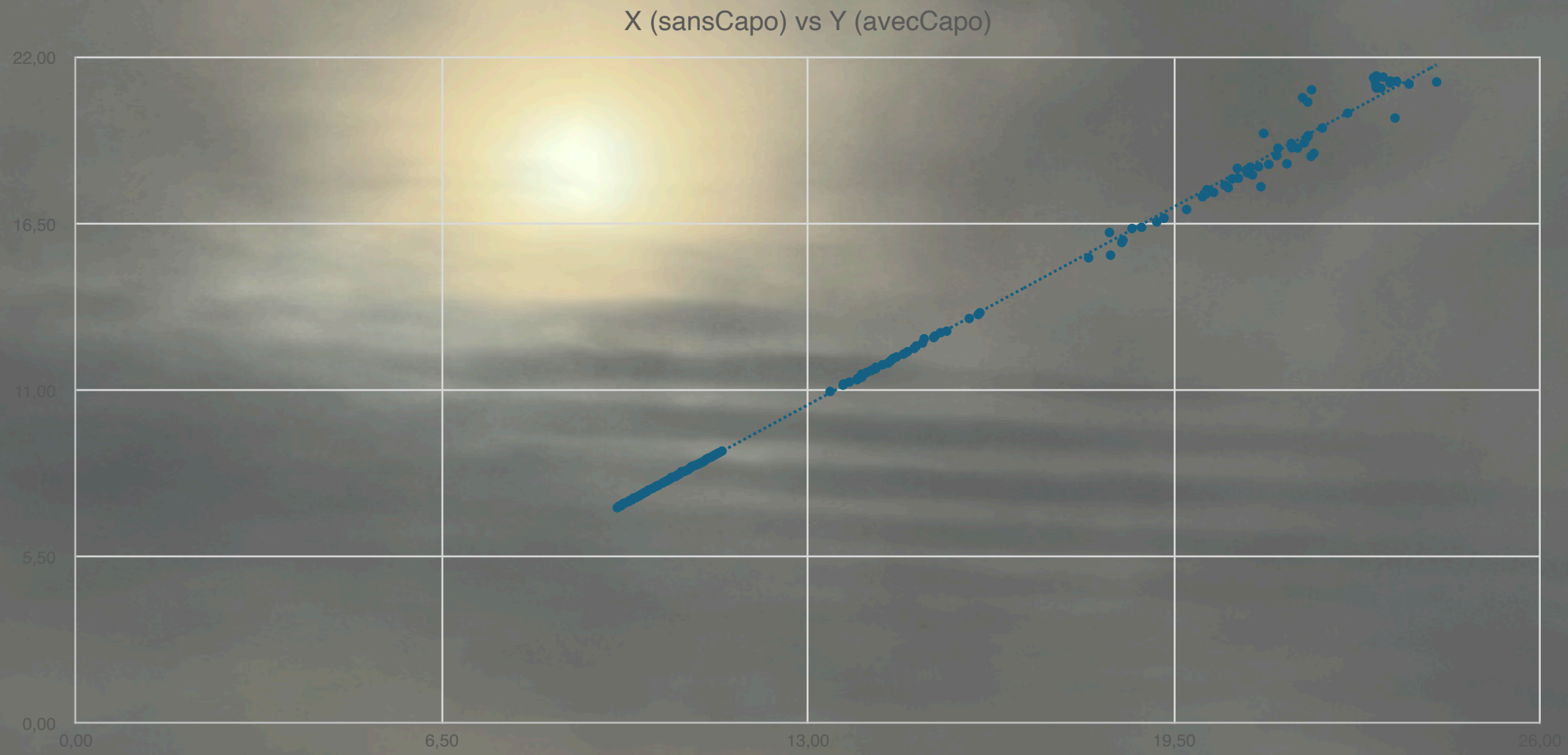
Données préliminaires

- Comparaison de différents appareils
  - Roger DIY par Wi-Fi
  - SQM large fenêtre (40 degrés)
  - SQM-L fenêtre étroite (20 degrés)
  - Confection et ajout de cheminée
- Différents sites
- Différentes conditions
  - Ciel clair
  - Partiellement nuageux
  - Complètement nuageux
  - Soleil et Lune à plusieurs altitudes et phase

Comparaison de différentes options

	SQM-L seul	SQML et cheminée	SQM seul
	20.66	22.81	20.80
	20.67	22.85	20.81
	20.62	22.66	20.79
	20.63	22.76	20.82
	20.63	22.83	20.82
	20.72	22.76	20.78
	20.57	22.82	20.85
	20.67	22.74	20.84
	20.69	22.77	20.88
	20.63	22.83	20.85
Moy	20.65	22.78	20.82
StDev	0.042	0.057	0.031

Coucher de soleil à N-D des Bois … 29 Mars 2025



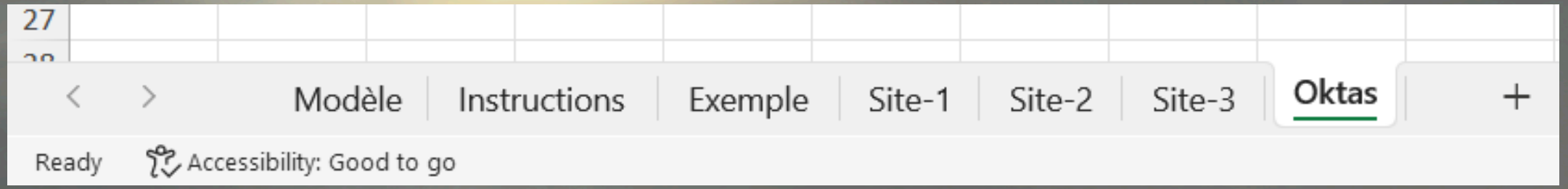
Feuille d’acquisition

Usager	Date (JJ/MM/AAAA)	Fuseau horaire (HNE pour -5, HAE	Nom de Localisation	Latitude Degrés (00.0000)	Longitude Degrés (00.0000)	Temps (sur 24 hre)	SQM Lecture - 1	SQM Lecture - 2	SQM Lecture - 3	SQM Lecture - 4	SQM Lecture - 5	Nuages (Okta)	Moyenne	Médiane	Écart type	Notes	Optionnel:	Fin du Crépuscule Astronomique (24 hres)	Altitude du Soleil (degrés)	Altitude de la Lune (degrés)	Visibilité Lune (%)	Température (en oC)	Point de rosée (en oC)	Pression barométrique (hPa)	Plafond des nuages calculé (m)

Modèle | Instructions | Exemple | Site-1 | Site-2 | Site-3

Structure des pages d’acquisition

Possibilité de 50 évènements à décrire



Entrées nécessaires

Validées avec le groupe de recherche

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	**Usager**	**Date** (JJ/MM/AAAA)	**Fuseau horaire (HNE pour -5, HAE pour -4)**	**Nom de Localisation**	**Latitude Degrés (00.0000)**	**Longitude Degrés (00.0000)**	**Temps** (sur 24 hre)	**SQM Lecture - 1**	**SQM Lecture - 2**	**SQM Lecture - 3**	**SQM Lecture - 4**	**SQM Lecture - 5**	**Nuages (Okta)**	**Moyenne**	**Médiane**	**Écart type**	**Notes**
2																	
3																	
4																	
5																	
6																	

200 Martiens…

Moyenne = 40 cm

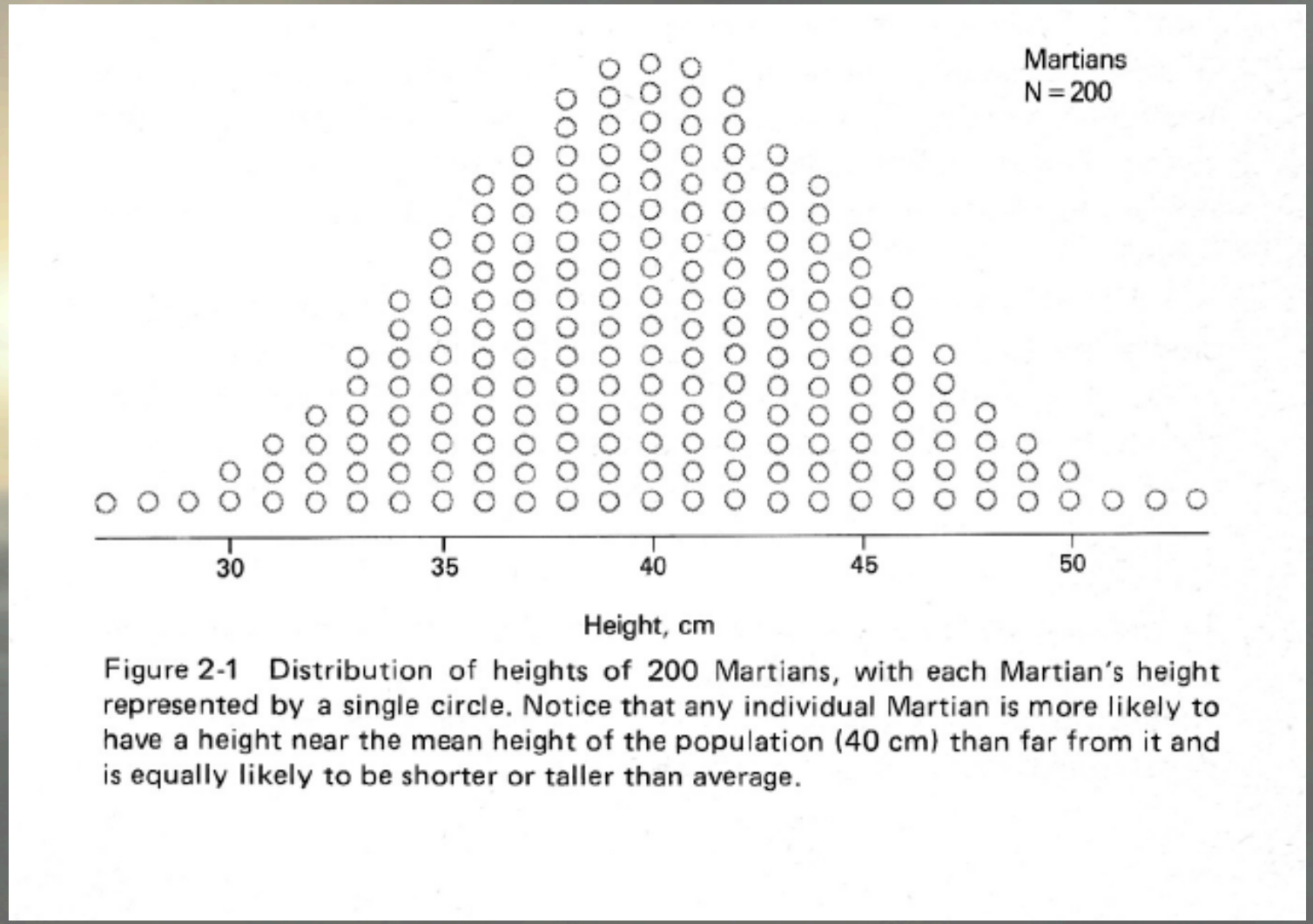


Figure 2-1 Distribution of heights of 200 Martians, with each Martian's height represented by a single circle. Notice that any individual Martian is more likely to have a height near the mean height of the population (40 cm) than far from it and is equally likely to be shorter or taller than average.

150 Vénusiens …

- Moyenne de 15 cm
- Majorité entre 10 et 20

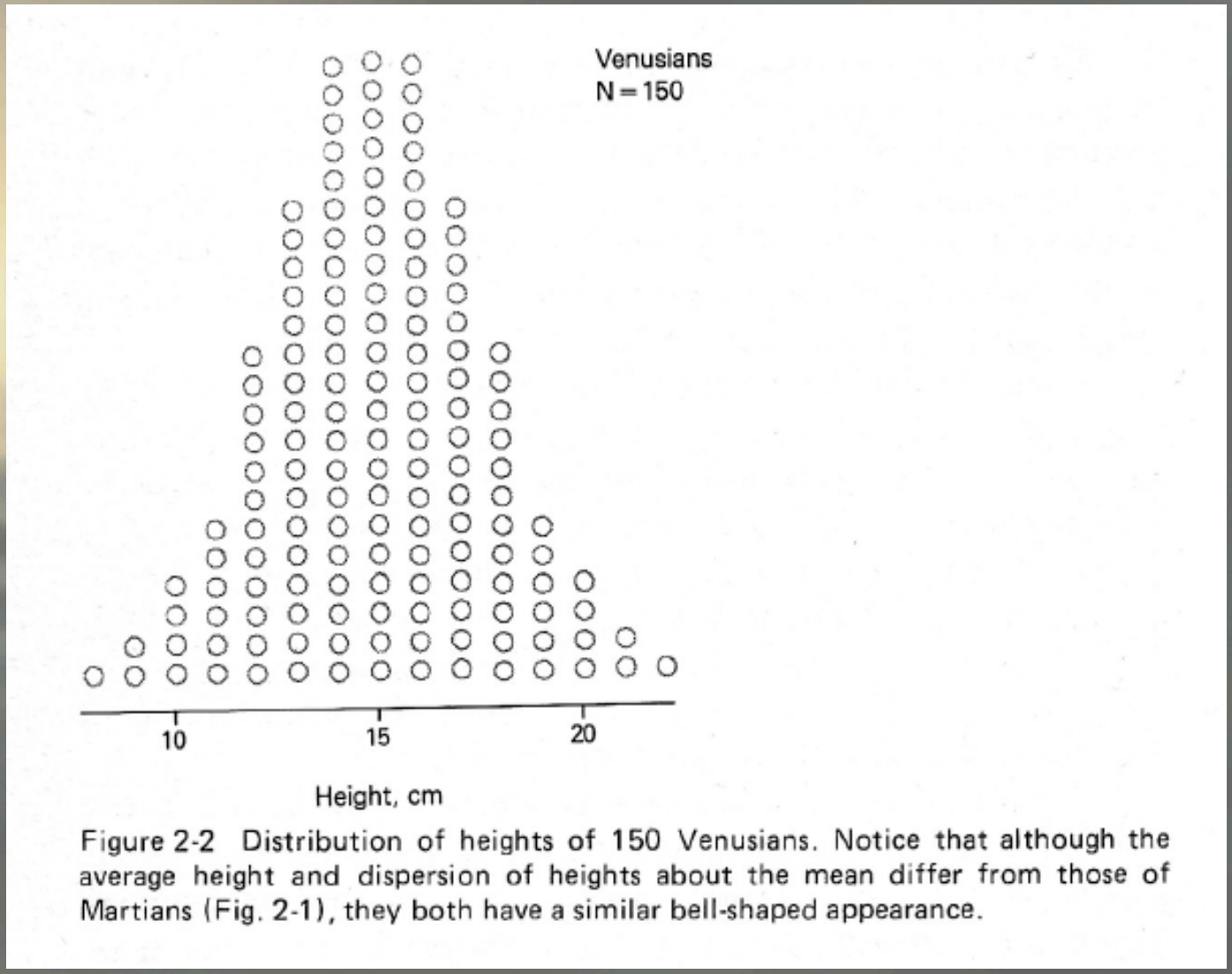


Figure 2-2 Distribution of heights of 150 Venusians. Notice that although the average height and dispersion of heights about the mean differ from those of Martians (Fig. 2-1), they both have a similar bell-shaped appearance.

Population de Jupiter…

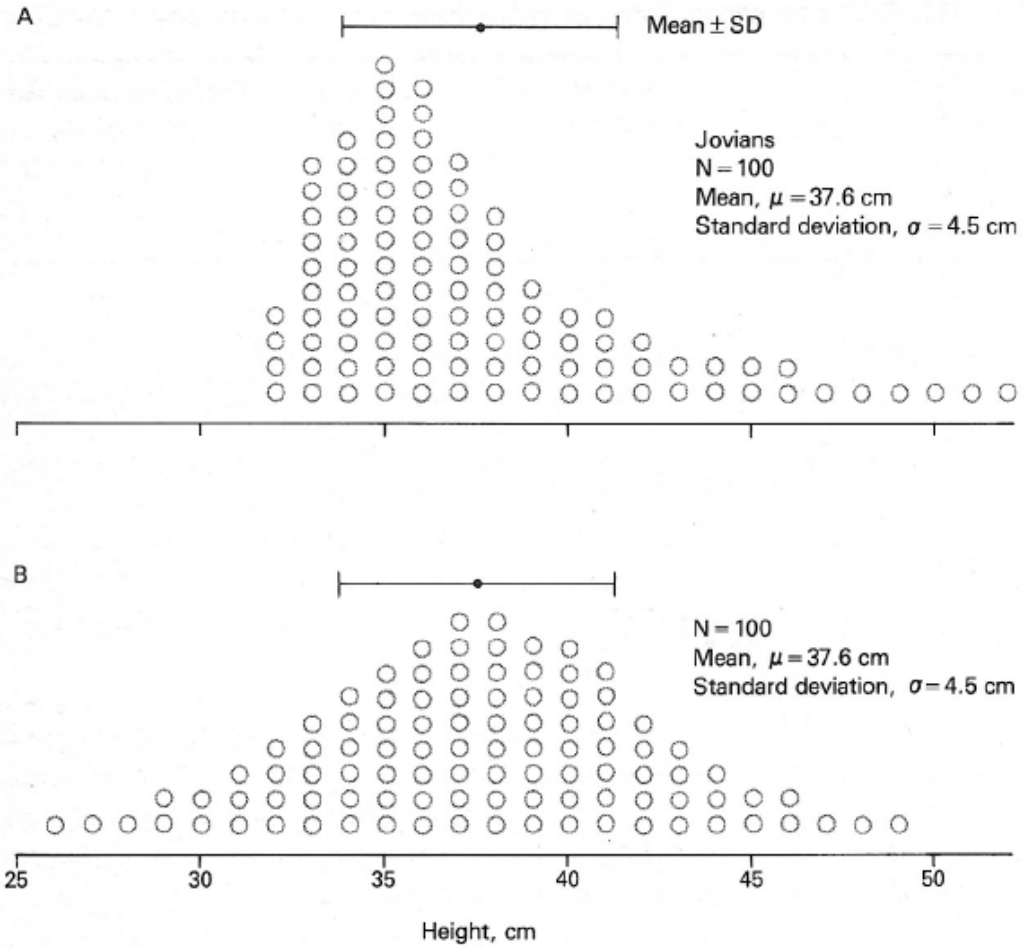


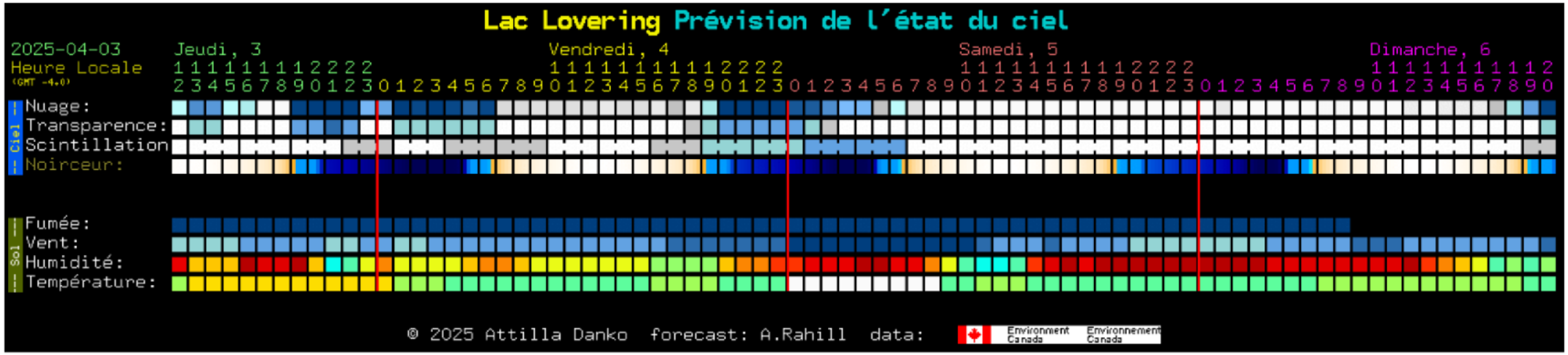
Figure 2-3 When the population values are not distributed symmetrically about the mean, reporting the mean and standard deviation can give the reader an inaccurate impression of the distribution of values in the population. Panel *A* shows the true distribution of the heights of the 100 Jovians (note that it is skewed toward taller heights). Panel *B* shows a normally distributed population with 100 members and the same mean and standard deviation as in panel *A*. Despite this, the distribution of heights in the two populations is quite different.

Entrées optionnelles

S	T	U	V	W	X	Y	Z	AA
Optionnel:	Fin du Crépuscule Astronomique (24 hres)	Altitude du Soleil (degrés)	Altitude de la Lune (degrés)	Visibilité Lune (%)	Température (en oC)	Point de rosée (en oC)	Pression barométrique (hPa)	Plafond des nuages calculé (m)

du site ClearDarkSky.com

Last updated 2025-04-03 12:55:43. No Image below? Read this. Not showing todays data? Clear your cache.



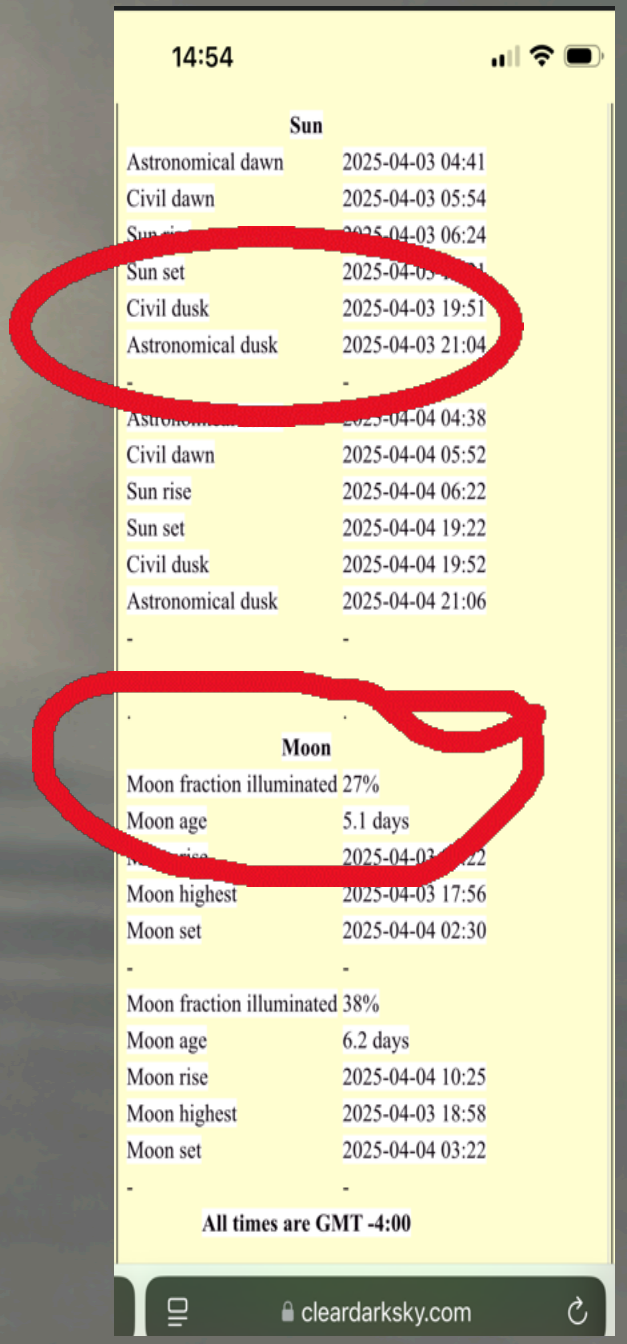
Nifty Links:	Near-Realtim… Satellite Imagry of Clouds	Sun & Moon Data	Ro… Map	Topo Map	Civil Weather	Aurora Map
		…tellites: Predictions Live Map	Star Maps: heavens-above fourmilab	Light Pollution map	Forecast History / Climate	

What is it?

Created by Attilla Danko and maintained by CSCCharts, it's the astronomer's forecast. At a glance, it shows when it will be cloudy or

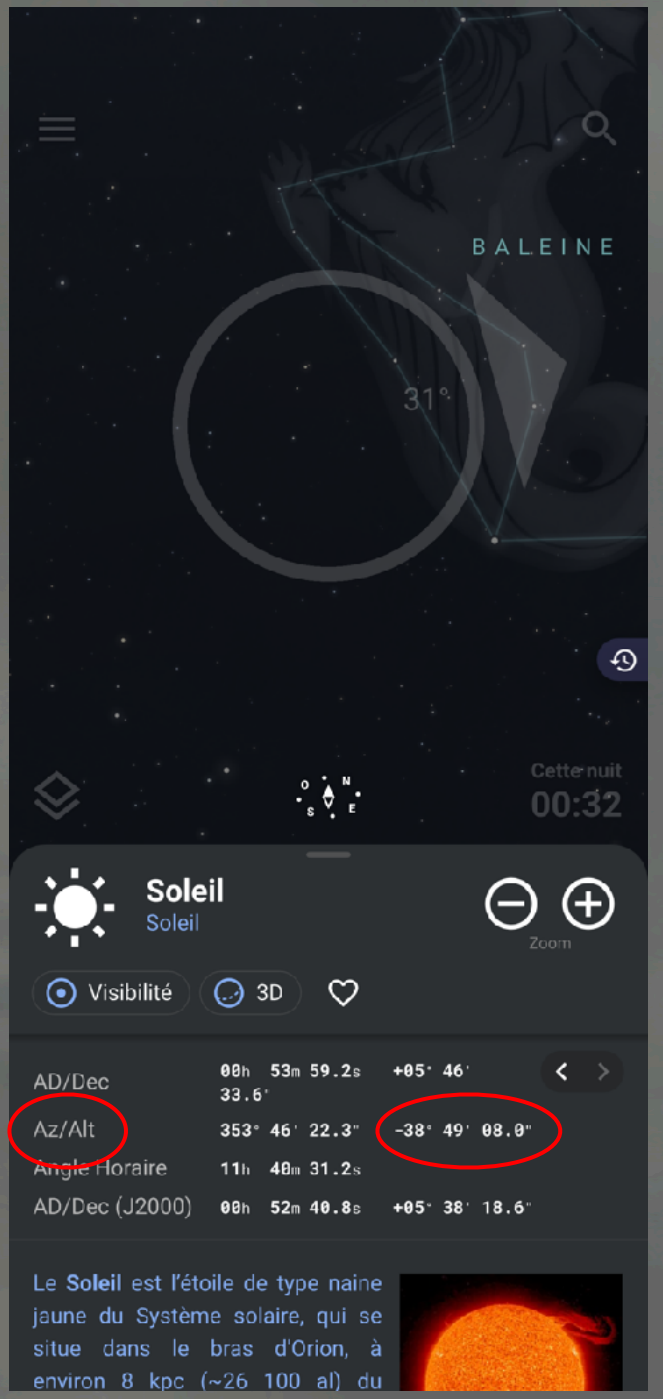
Clear Dark Sky

- Crépuscule astronomique
  - Astronomical dusk
- Phase de la Lune
  - Moon fraction illuminated

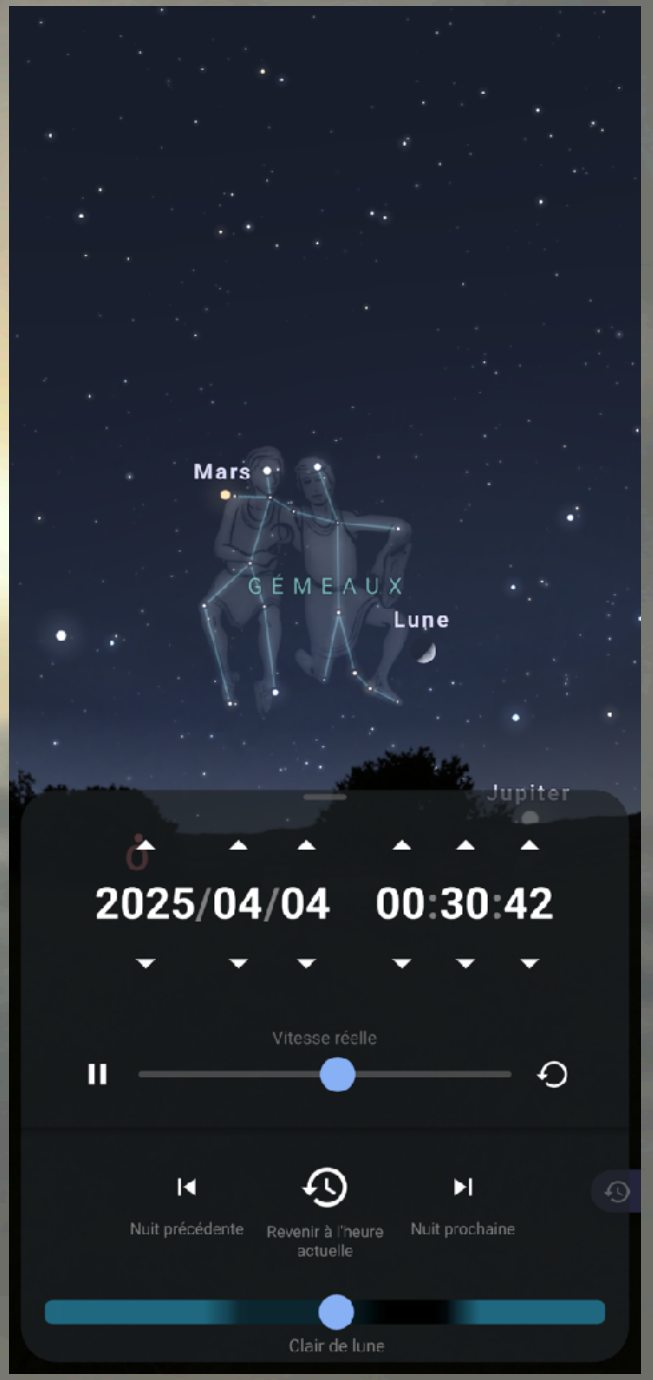


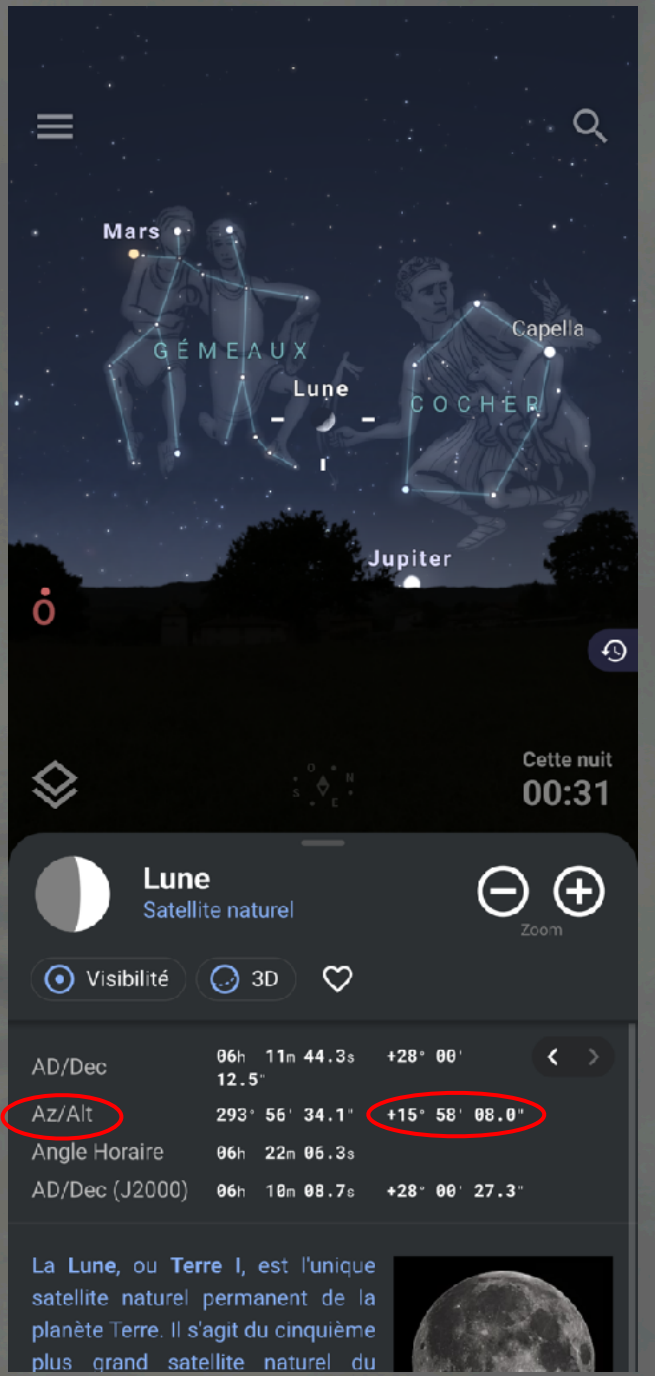
Stellarium
Soleil





Stellarium
Lune

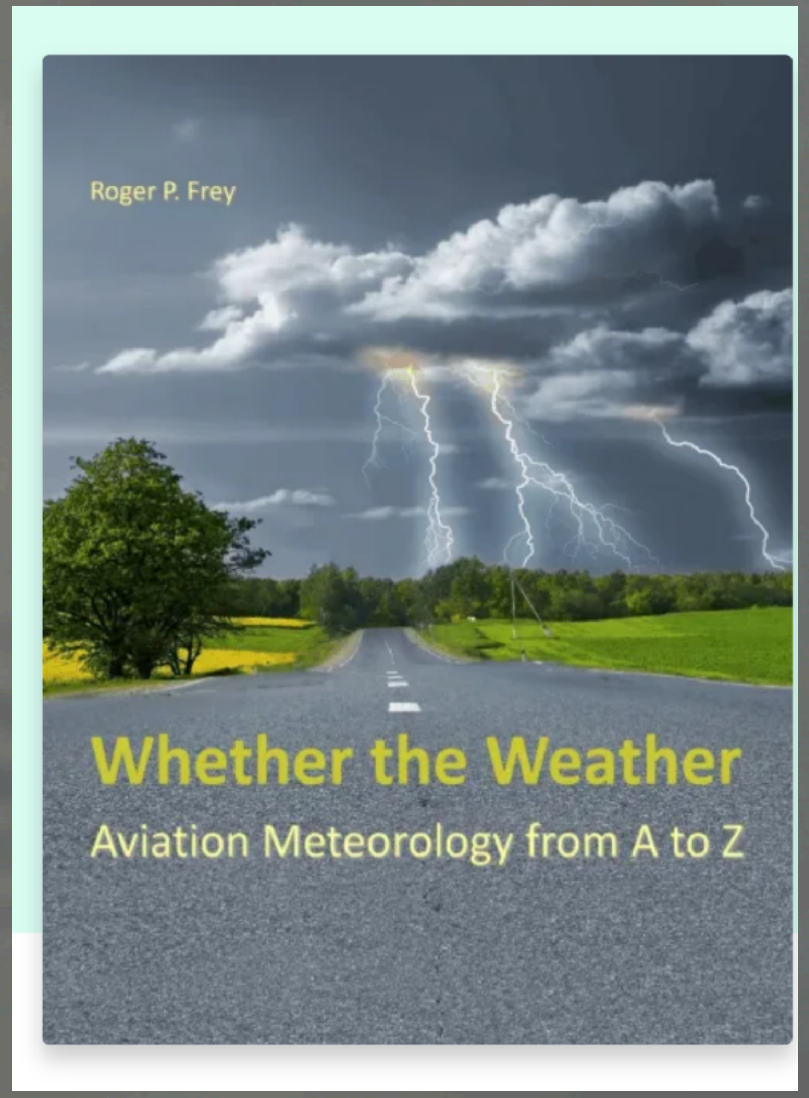




Plafond nuageux en mètres

temp (oC)
-
temp rosée (oC)

X 150



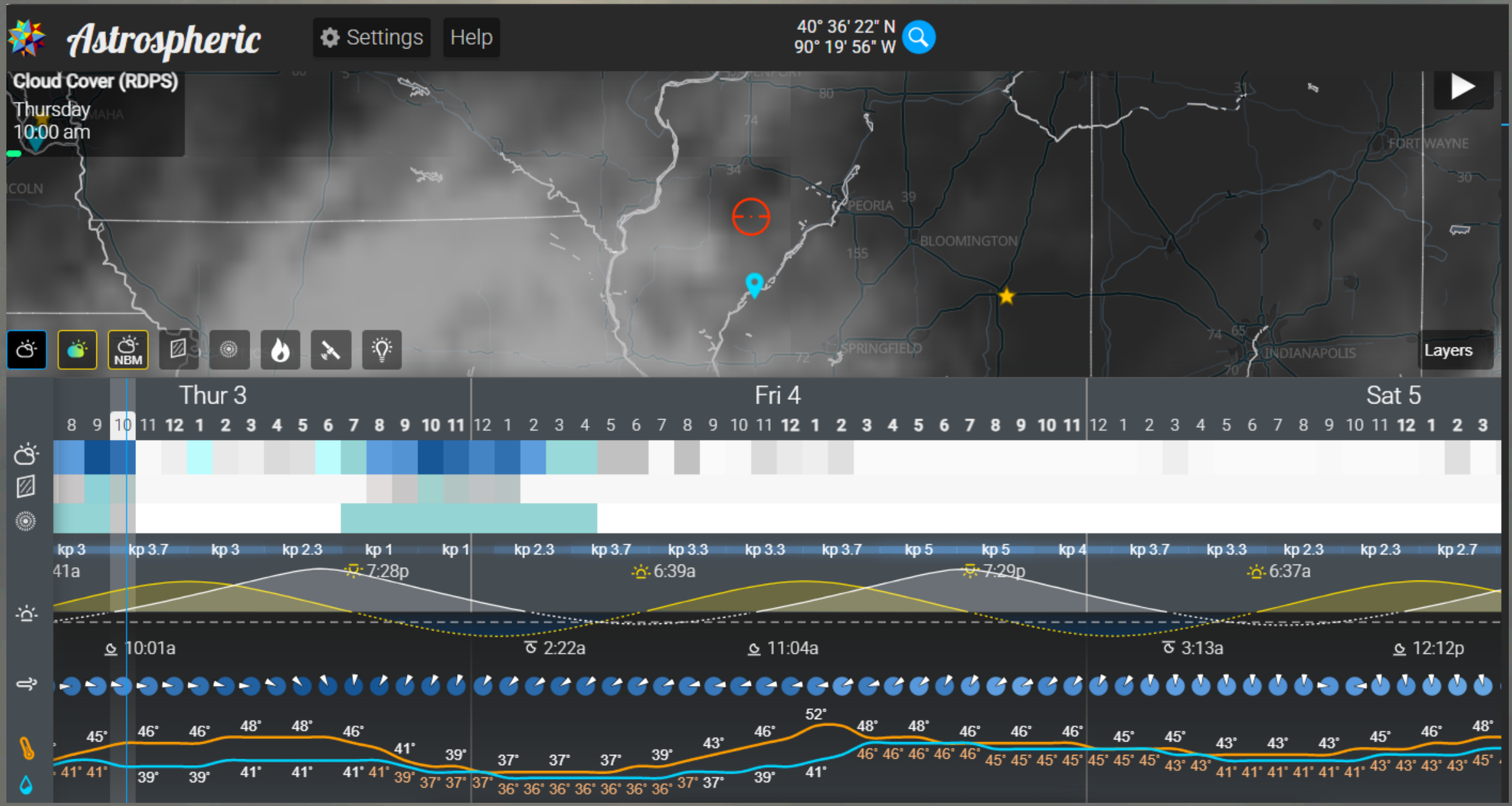
Éclipse de Lune

Nuages basse altitude 14%

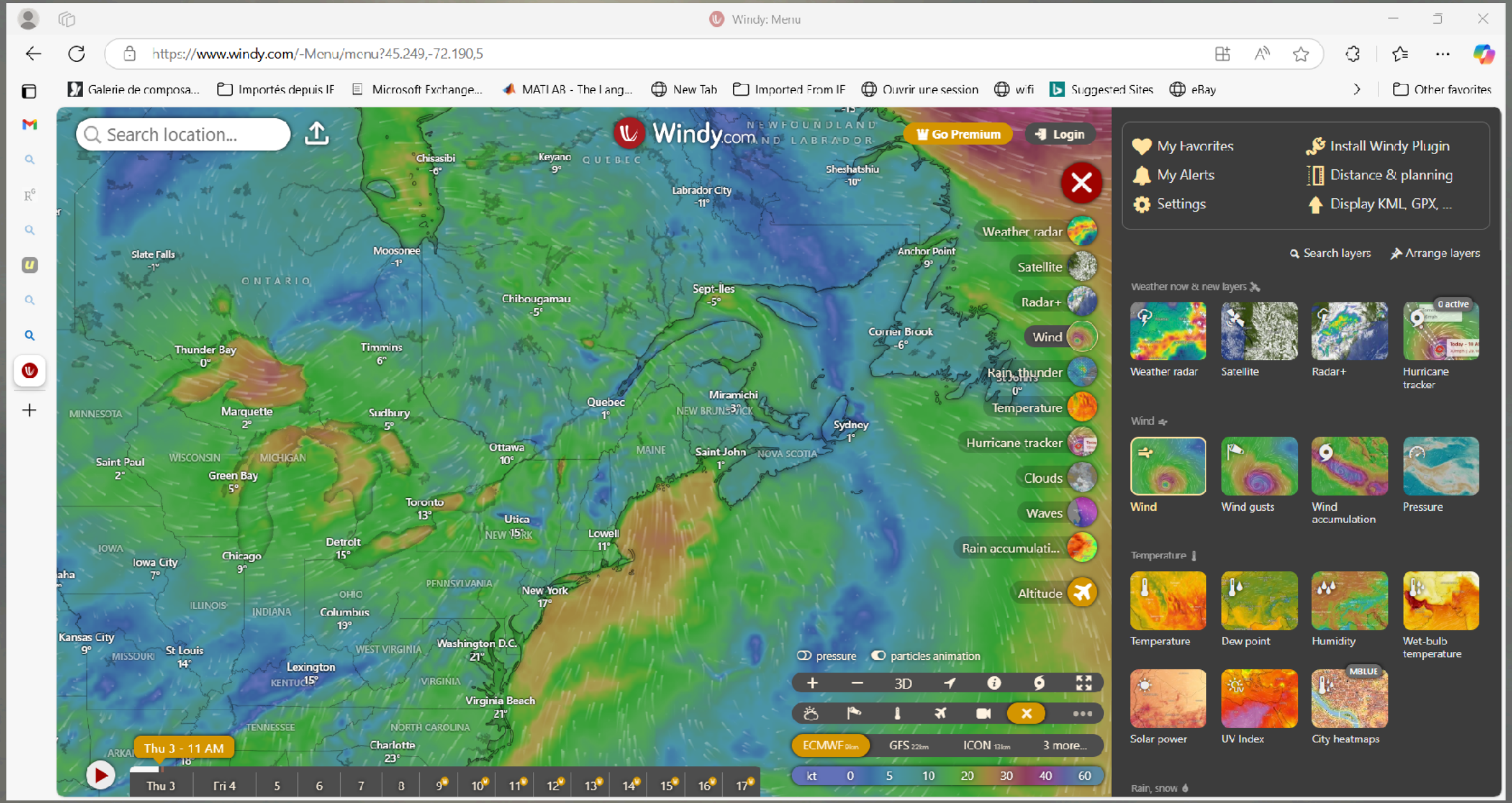
avant: 13.25 (SD 0.37)



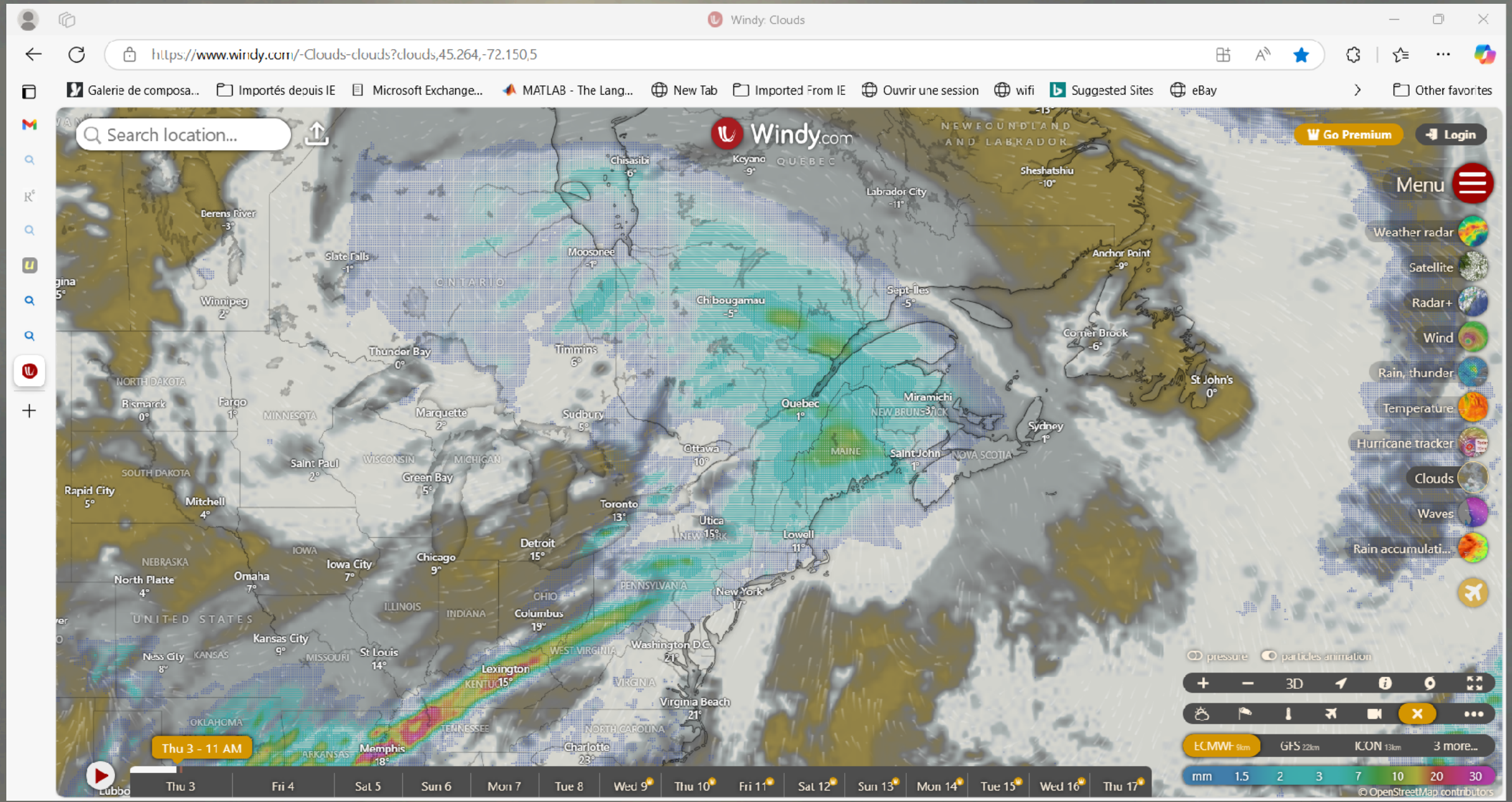
Astrospheric



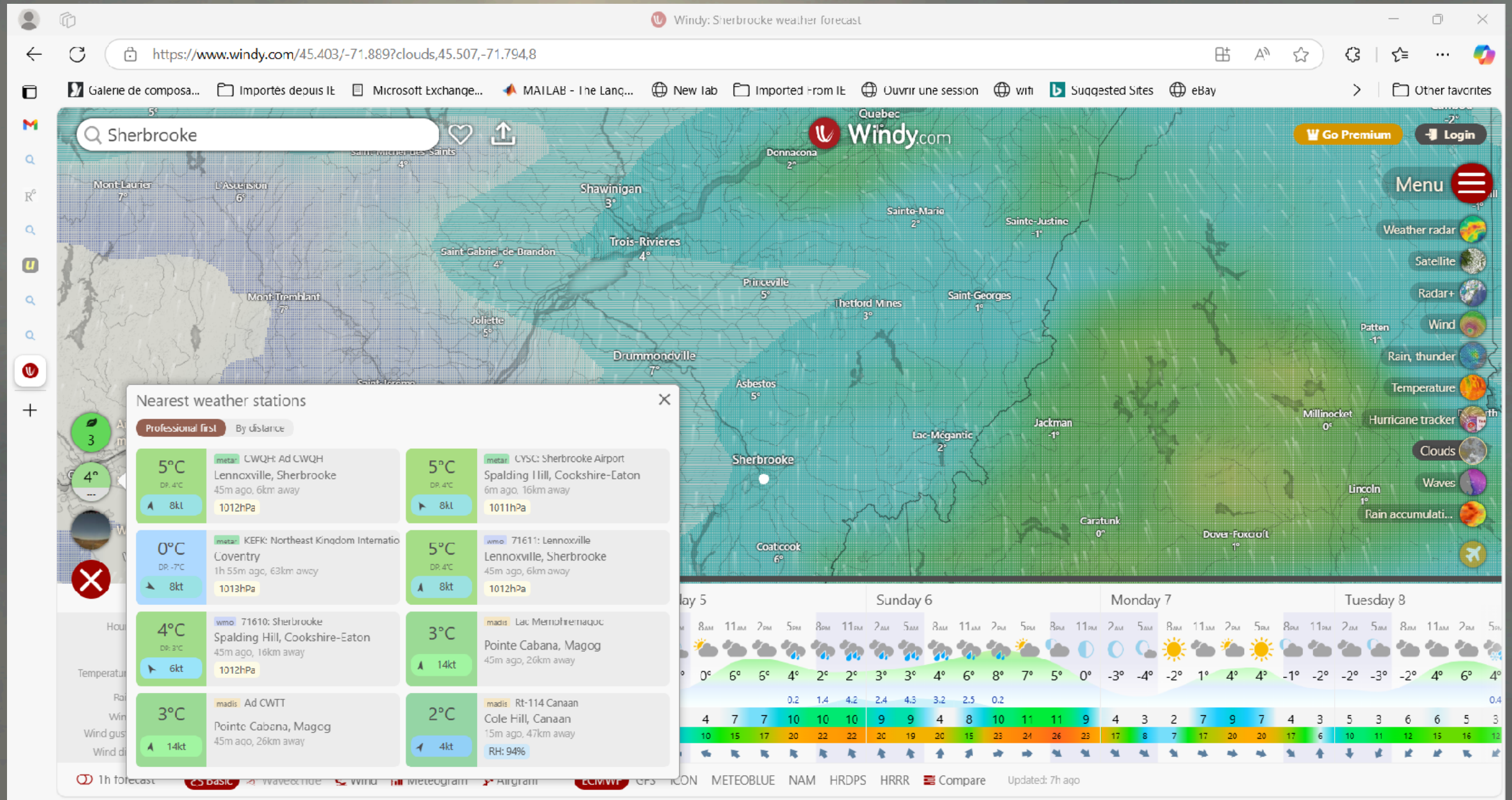
Windy


Windy: Menu
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Settings
Install Windy Plugin
Distance & planning
Display KML, GPX, ...
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Arrange layers
Weather radar
Satellite
Radar+
Wind
Rain, thunder
Temperature
Hurricane tracker
Clouds
Waves
Rain accumulati...
Altitude
Weather now & new layers
Hurricane tracker
Wind
Wind gusts
Wind accumulation
Pressure
Temperature
Dew point
Humidity
Wet-bulb temperature
Solar power
UV Index
City heatmaps
Rain, snow
pressure
particles animation
3D
ECMWF
GFS
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Fri 4
Labrador City
Sheshatshiu
Anchor Point
Corner Brook
Moosonee
Chibougamau
Sept-Îles
Timmins
Thunder Bay
Quebec
Miramichi
Sydney
Saint John
Ottawa
Toronto
Utica
Lowell
Detroit
Chicago
New York
Columbus
Washington D.C.
Lexington
Virginia Beach
Charlotte
Kansas City
St Louis
Iowa City
Green Bay
Saint Paul
Marquette
Sudbury

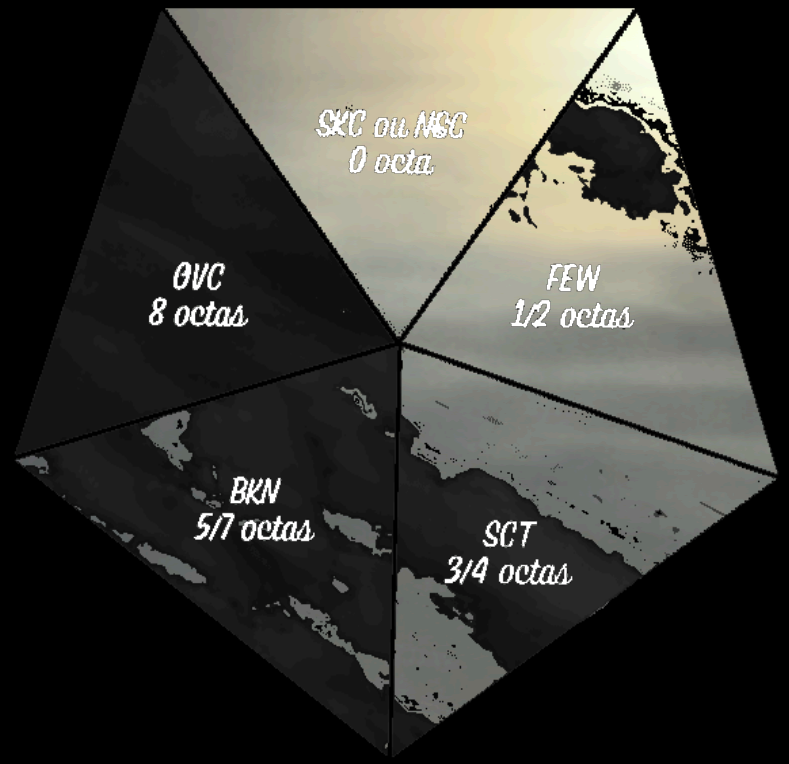
Windy

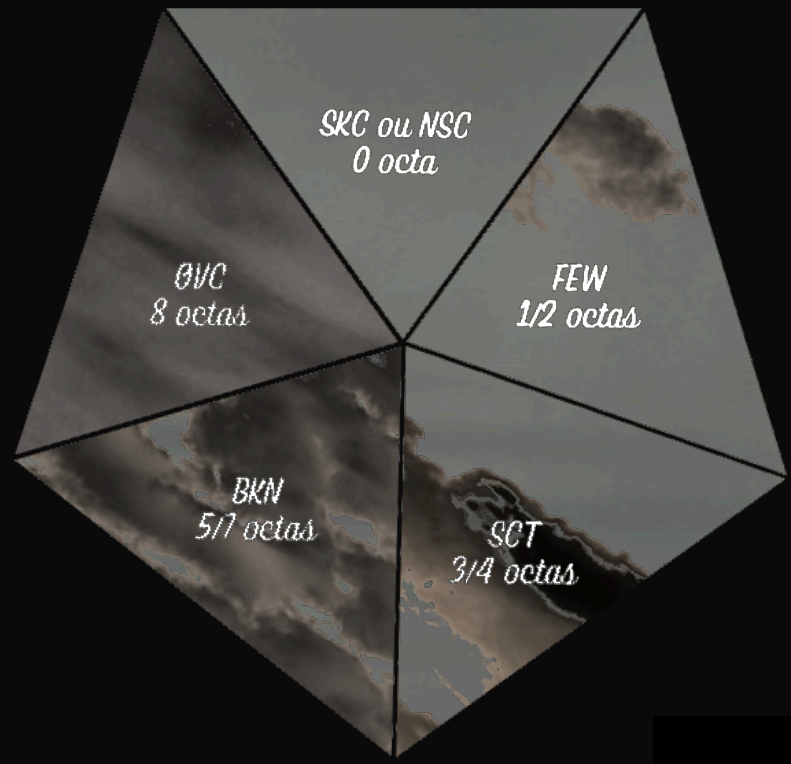

Windy: Clouds
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Windy.com
Go Premium
Login
Menu
Weather radar
Satellite
Radar+
Wind
Rain, thunder
Temperature
Hurricane tracker
Clouds
Waves
Rain accumulati...
Thu 3 - 11 AM
Thu 3
Fri 4
Sat 5
Sun 6
Mon 7
Tue 8
Wed 9
Thu 10
Fri 11
Sat 12
Sun 13
Mon 14
Tue 15
Wed 16
Thu 17
ECMWF 9km
GFS 22km
ICON 13km
3 more...
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Windy


Windy: Sherbrooke weather forecast
https://www.windy.com/45.403/-71.889?clouds,45.507,-71.794,8
Sherbrooke
Windy.com
Go Premium
Login
Menu
Weather radar
Satellite
Radar+
Wind
Rain, thunder
Temperature
Hurricane tracker
Clouds
Waves
Rain accumulati...
Nearest weather stations
Professional first
By distance
5°C
Lennoxville, Sherbrooke
45m ago, 6km away
1012hPa
5°C
Spalding Hill, Cookshire-Eaton
6m ago, 16km away
1011hPa
0°C
Coventry
1h 55m ago, 63km away
1013hPa
5°C
Lennoxville, Sherbrooke
45m ago, 6km away
1012hPa
4°C
Spalding Hill, Cookshire-Eaton
45m ago, 16km away
1012hPa
3°C
Pointe Cabana, Magog
45m ago, 26km away
3°C
Pointe Cabana, Magog
45m ago, 26km away
2°C
Cole Hill, Canaan
15m ago, 47km away
RH: 94%
Sunday 6
Monday 7
Tuesday 8
ECMWF
GFS
ICON
METEOBLUE
NAM
HRDPS
HRRR
Compare
Updated: 7h ago

Okta de l’ OMM


Couverture nuageuse
SKC ou NSC
0 octa
FEW
1/2 octas
SCT
3/4 octas
BKN
5/7 octas
OVC
8 octas


Couverture nuageuse
SKC ou NSC
0 octa
FEW
1/2 octas
SCT
3/4 octas
BKN
5/7 octas
OVC
8 octas

How to read okta symbols?

An okta is a circle divided into eight parts, each part representing how many eighths of the sky is covered by clouds. Therefore, the okta is also called “eighths”. Abbreviations are also used to refer to the oktas. So, here’s what each okta looks like and exactly what it means according to the World Meteorological Organization:

- 0 oktas (SKC): Sky clear — Fine
- 1 okta (FEW, Few clouds): 1/8 of the sky covered or less, but not zero — Fine
- 2 oktas (FEW): 2/8 of the sky covered — Fine
- 3 oktas (SCT, Scattered clouds): 3/8 of the sky covered — Partly Cloudy
- 4 oktas (SCT): 4/8 of the sky covered — Partly Cloudy
- 5 oktas (BKN, Broken clouds): 5/8 of the sky covered — Partly Cloudy
- 6 oktas (BKN): 6/8 of the sky covered — Cloudy
- 7 oktas (BKN): 7/8 of sky covered or more, but not 8/8 — Cloudy
- 8 oktas (OVC): 8/8 of sky completely covered, no breaks — Overcast

In addition, there are also two more oktas. An okta 9 is used when the sky itself is not visible (obscured sky). This may be for example due to low-lying fog or heavy snowfall and other similar phenomena. An okta 10, or rather no okta, is a special sign — two horizontal lines in a circle. It is used when no measurements were taken at all.

How to read okta symbols

Sky cover (oktas)	Symbol	Name	Abbreviation
0		Sky clear	SKC
1		Few clouds	FEW
2		Few clouds	FEW
3		Scattered clouds	SCT
4		Scattered clouds	SCT
5		Broken clouds	BKN
6		Broken clouds	BKN
7		Broken clouds	BKN
8		Overcast	OVC
(9)		Sky obscured	—
(/)		Not measured	—

Source: World Meteorological Organization

WINDY.APP

Participation

- Utilisation SQM-L
- Votre lieu d’observation préféré
- 2 autres options sur feuille séparée

- Soleil et Lune sous 18 degrés
- Ciel dégagé
- Ciel complètement obstrué par les nuages, sans precipitation

- Transfert par internet de la feuille d’acquisition (Excel)
- Instructions sur le site “étude-ciel-nocturne” dans Discord