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Art and the Cosmos: Eclipses and Aurora

Sandra Paikowsky (Concordia
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LOOKING AT ECLIPSES



Taddeo Gaddi
Annunciation to the Shepherds
after 1328, fresco
Santa Croce
Florence

There was an eclipse over
Florence on 16 July 1330



Orcagna, *Triumph of Death* (detail), mid 1340s?, fresco fragment, Sta Croce, Florence

There was an eclipse in Florence on 7 July 1339



Raphael, *Isaac and Rebecca seen by Abimelech*, 1518-19, fresco, Loggia of Leo X, Vatican

There was an eclipse in Rome on 8 June 1518

Limbou Brothers,
"Death of Christ
Très Riches Heures
du Duc de Berry,
1412-16,
gouache on vellum
12" x 8"

There was an eclipse
in Paris on
16 June 1406





Tintoretto, *Crucifixion*, 1568, oil on canvas, 136"x 148", San Cassiano, Venice

Grunewald
Small Crucifixion, c.1510
oil on panel, 24"x 18"
National Gallery
Washington, DC



There was a solar eclipse
over Germany on
1 October 1502



Rubens, *Raising of the Cross*, 1610, oil on panel, 184"x 256", Antwerp Cathedral



Rubens, Left Wing (detail); were solar eclipses in Germany on 12 Oct. 1605 and 20 July 1606



Cosmas Damian Asam
Vision of St. Benedict, 1726
fresco, Abbey Church, Einsiedeln (Switz.)

Were eclipses in Bavaria in 1724 and 1733

Cosmas Damian Asam
Vision of St. Benedict, 1735
oil on canvas, Weltenburg, Bavaria

Egon Schiele
*Crucifixion
with Darkened Sun*
1907
oil on canvas, 16"x16"
private coll.





Ippolito Caffi, *View of Venice with the Eclipse of 8 July 1842*, oil on canvas, 34" x 60", c.1842, private collection



Diego Rivera
Portrait of Ramon Gomez de la Serna, 1915
oil on canvas, 43" x 35"
private collection



Howard Russell Butler, *Proposal for a painting of 3 eclipses*, 1926

Oregon, 8 June 1918; California, 10 September 1923; Connecticut-New York, 24 January 1925.

Wassily Kandinsky
Several Circles, 1926
oil on canvas, 55" x 55"
Guggenheim, NY



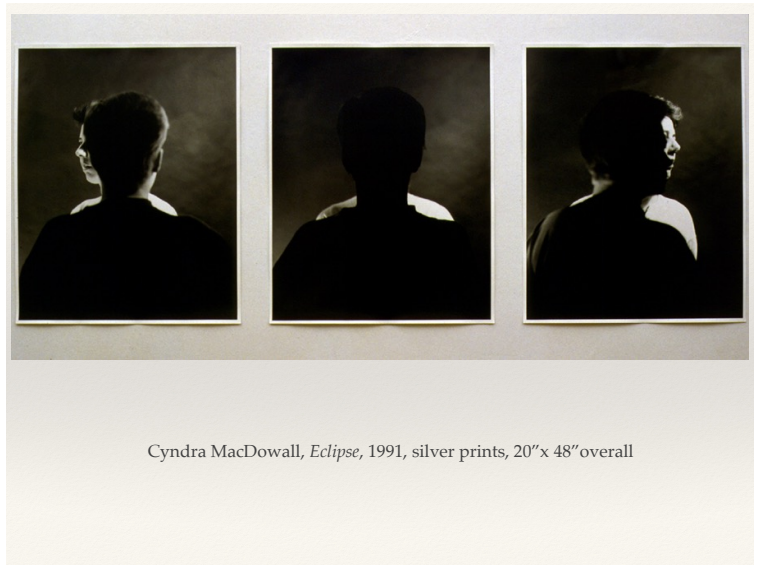
Paul Nash, *Eclipse*, 1945, oil on canvas, 28" x 36", British Council Collection



Roy Lichtenstein, *Eclipse of the Sun II*, 1975, oil and magna, 40" x 54", private collection



Paterson Ewen, *Eclipse of the Moon*, 1990, acrylic on plywood, 106" x 120", A G of Ontario



Cyndra MacDowall, *Eclipse*, 1991, silver prints, 20" x 48" overall




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Eclipses

Tablet with a list of eclipses between 518 BC and 465 BC, mentioning the death of king Xerxes.

British Museum, London



Why do these matter?

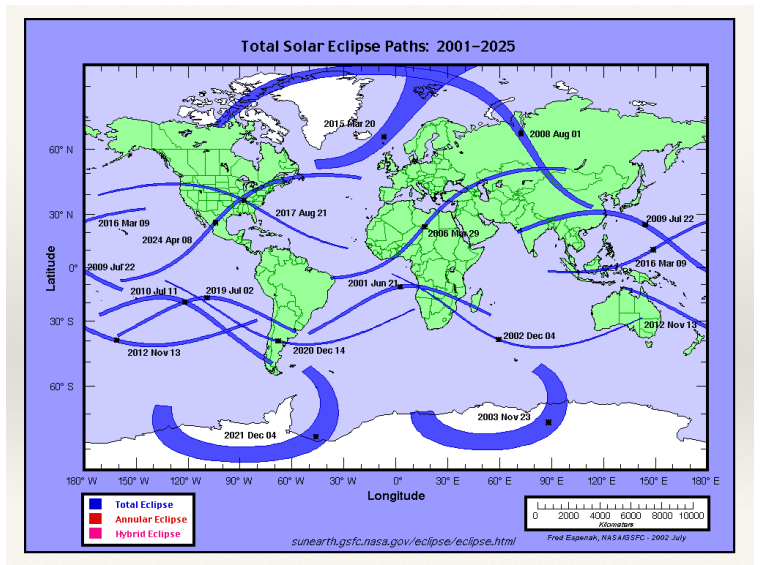
GLOUCESTER These late eclipses in the sun and moon portend no good to us:.....

EDMUND I am thinking, brother, of a prediction I read this other day, what should follow these eclipses....

I promise you, the effects he writes of succeed unhappily; as of unnaturalness between the child and the parent; death, dearth, dissolutions of ancient amities; divisions in state, menaces and maledictions against king and nobles; needless diffidences, banishment of friends, dissipation of cohorts, nuptial breaches, and I know not what.

EDGAR How long have you been a sectary astronomical?

Chinese astronomers Hi and Ho executed for failing to predict eclipse.



Saros cycle

- Eclipses repeat after 18 years and 11.3 days.
- The .3 days shifts the eclipse about 110° degrees west.
- Also some saros sequences start at the south and drift North, others at the North and drift South.
- Cycle is very complex: can only see it after many years.
- Why is it so complicated? Need to combine

I. Earth's rotation

II. Moon's orbit (not quite circular)

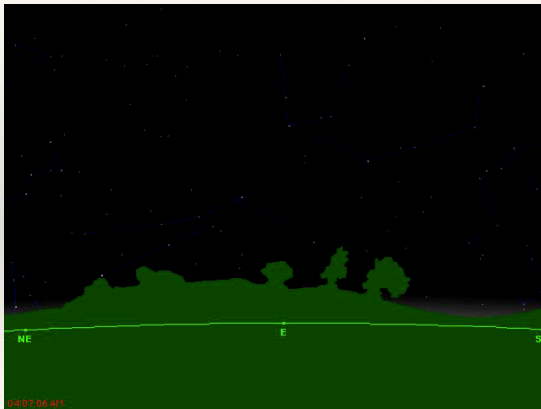
III. Earth's orbit (ditto)

IV. and the plane of the moon's orbit precesses

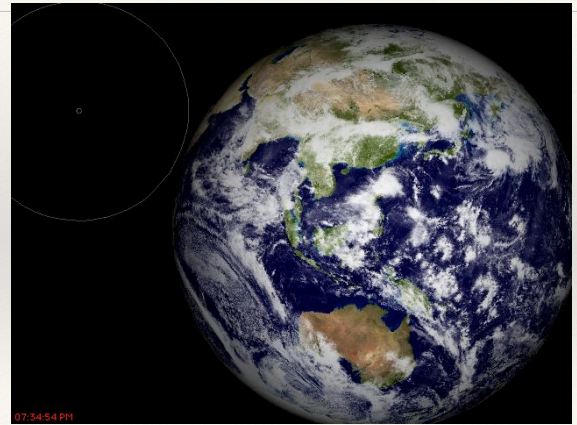
Eclipse of 1999 seen from Mir



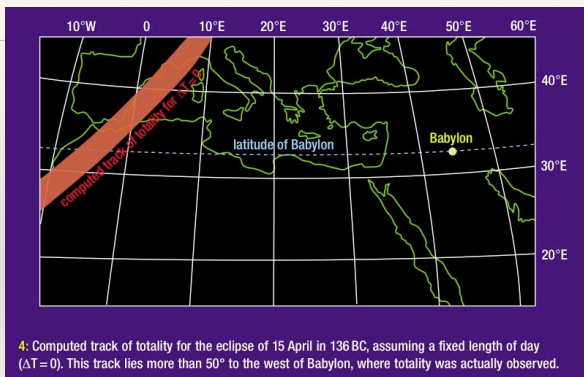
Babylonians observed total eclipse 15 April 136 BC.



and they would even have seen it from the moon !

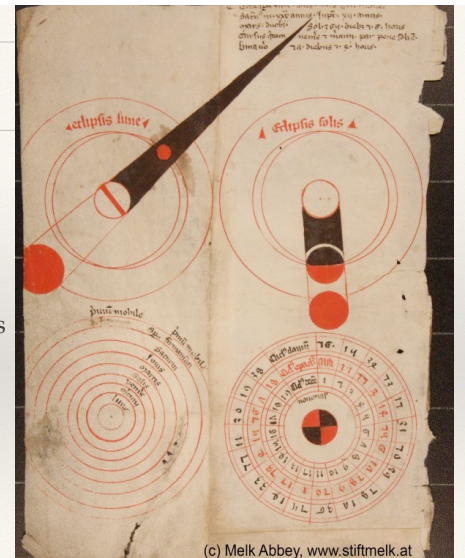


But they shouldn't have!



- Earth's rotation has slowed down, by 1/100 sec/century, because of tidal effects! i.e. earth isn't a very good time-keeper

- ❖ A medieval fragment (1490)
- ❖ Note explanation is right, even though solar system is wrong!!!!



❖ Moon is about $1/2^\circ$ in the sky: use it as a "screen" for the shadow of the earth.

❖ The shadow of the Earth $\sim 2^\circ$ wide.

Photo by Anthony
Ayiomitas



Gives $d \sim 375,000$ km (384,400 km)

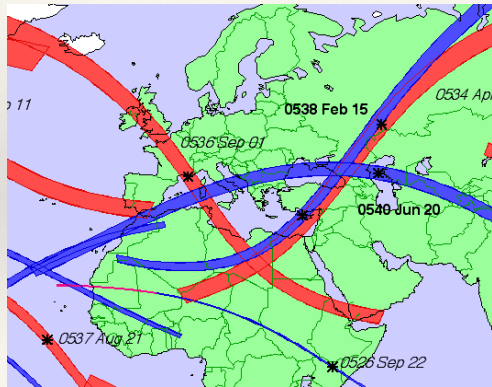


St Benedict, by Cosmas Damian Asam 1735

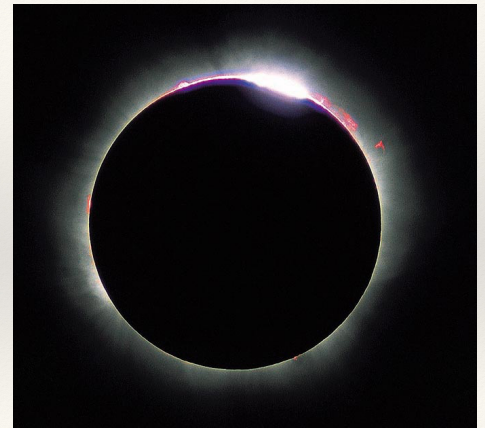
[Wikipedia](#)

❖ Founded Monte Cassino ~ 530 CE

❖ Eclipse 540 CE

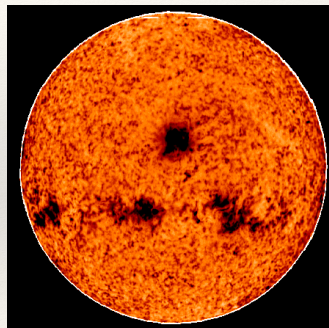


❖ Bailey's Beads and Diamond ring: sun shines through mountains on Moon's edge



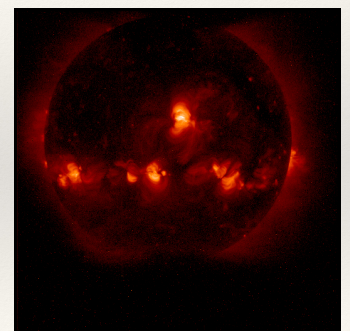
Look at the sun in different ways

❖ Sunspots, are cooler ($\sim 4500^\circ$)

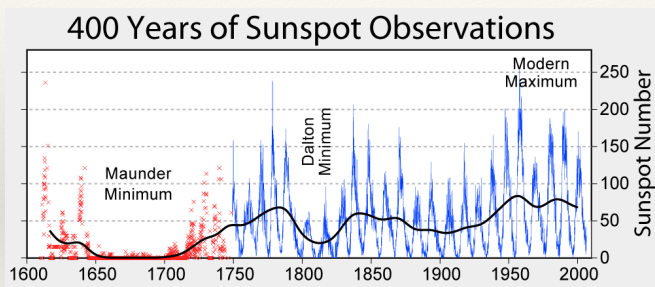


And this shows the magnetic field

- So the hot X-rays come from the cold sunspots
- And they are tied to the magnetic fields
- Note how they all line up



Maunder minimum (long period of very few spots)

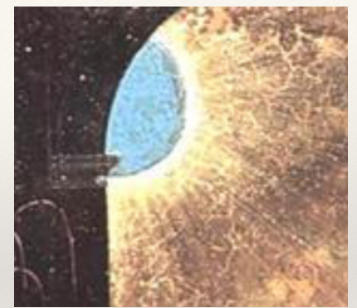


Maybe... related to little Ice Age in Europe



Giovanni Bella *Frozen Lagoon in Venice 1708*

Well, they don't look Canadian!



Raphael, *Isaac and Rebecca seen by Abimelech*, 1518-19, fresco, Loggia of Leo X, Vatican



Corona is faint, so can only be seen directly during a solar eclipse.

But its appearance changes dramatically according during the solar cycle

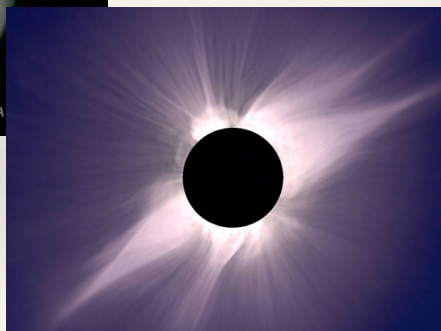
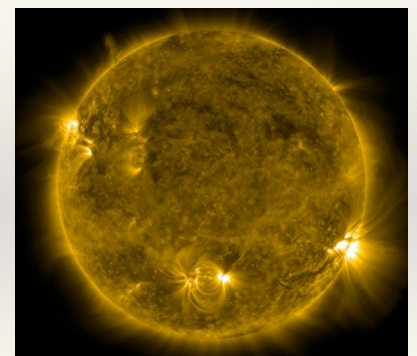


Image Credit: High Altitude Observatory, NCAR

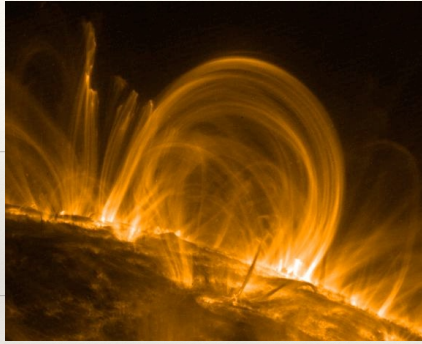
From the side we can see clearly what the sunspots are

- ❖ Sunspots are magnetic storms on the sun
- ❖ Occur in pairs linked to N & S poles of mag field



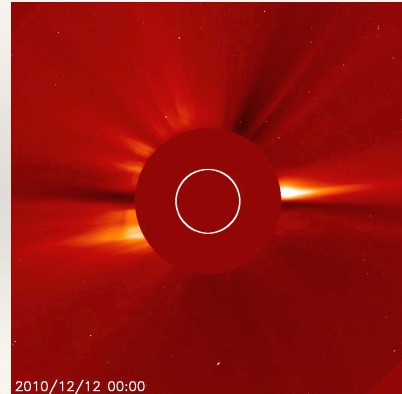
NASA

Close up view:

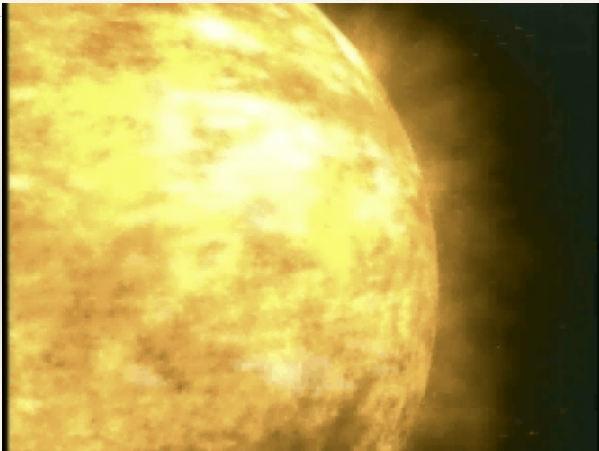


NASA

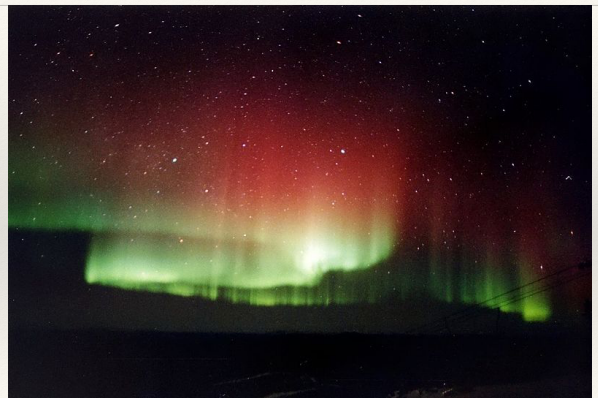
- ❖ They can expand and squirt out gases
- ❖ or collapse and spray out high energy particles
- ❖ Solar & Heliospheric Observatory ([SOHO](#))



Which travel towards the earth



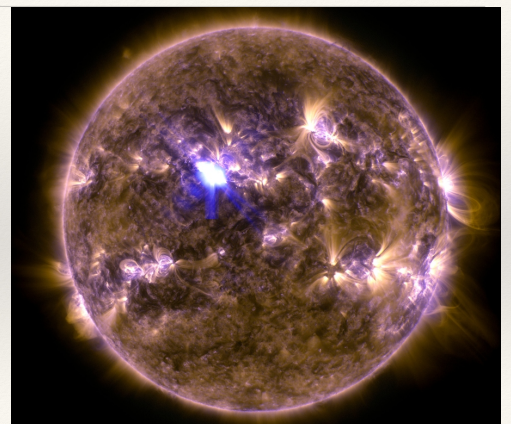
And become aurora



Brocken Inaglory. Wikimedia

Flare on April 11th 2012

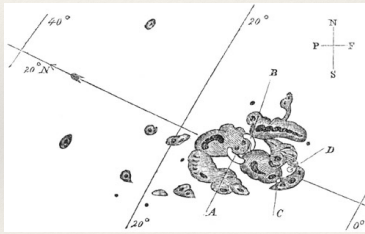
Strong flare, caused
mass ejection and
aurora



Arctic light - Frank Olsen

Carrington Event

- ❖ Biggest solar storm in (recorded) history
- ❖ 28th August-2nd Sept 1859
- ❖ Blew out telegraph linkages all over Europe & US



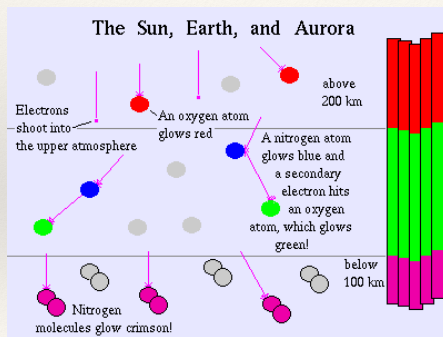
Frederic Church

based on Isaac Hayes Arctic expeditions (Ellesmere Island)

Church saw Carrington Event: never went to the Arctic but saw it from Maine

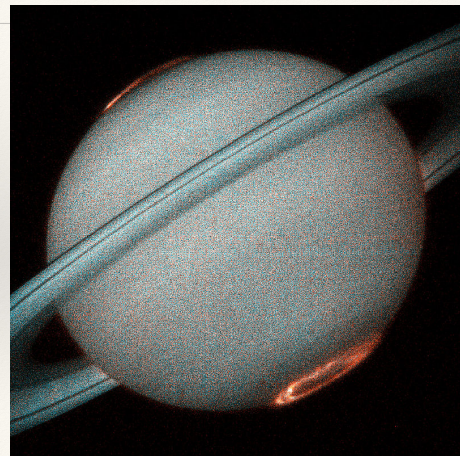


The colours are unearthly....

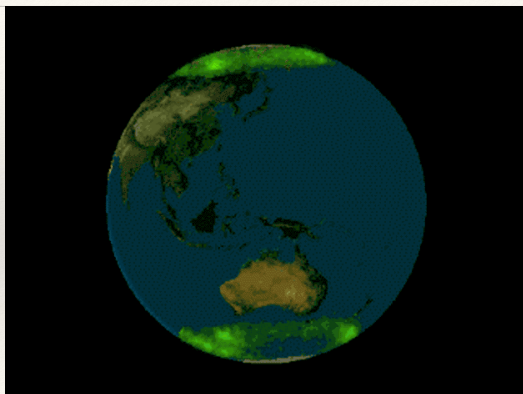


University of Alaska
Geophysical Institute

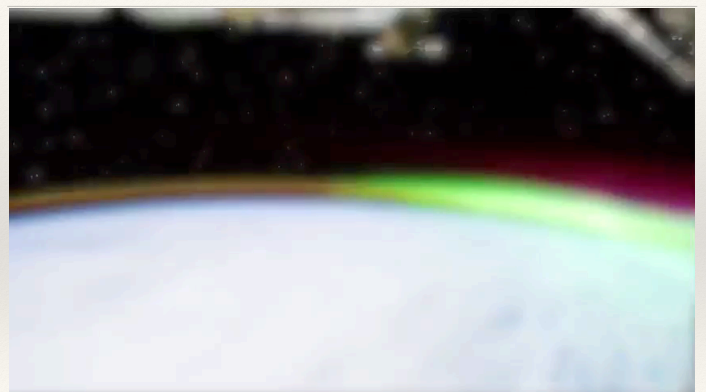
And even show up on un-earths!



Note we always get simultaneous aurora at N & S poles



You can even fly through them



International Space Station movie

Matters Arising

*And the Northern Lights in the crystal nights came forth with a mystic gleam.
They danced and they danced the devil-dance over the naked snow;
And soft they rolled like a tide upshoaled with a ceaseless ebb and flow.
They rippled green with a wondrous sheen, they fluttered out like a fan;
They spread with a blaze of rose-pink rays never yet seen of man.
They writhed like a brood of angry snakes, hissing and sulphur pale...*

—Robert W. Service

Is this the sound?



or this?



NELVANA OF THE NORTHERN LIGHTS

SHE TRAVELS AT THE SPEED
OF LIGHT ALONG A RAY
OF THE NORTHERN LIGHTS

THE FIRST CANADIAN
SUPERHERO, 1941



Tom Thomson, *Northern Lights*, 1915, private collection



Tom Thomson, *Northern Lights*, 1916, Montreal Museum of Fine Arts



Tom Thomson, *Northern Lights*, 1917, National Gallery of Canada



Tom Thomson, *Northern Lights*, 1917, Art Gallery of Ontario



David Milne, *The Big Dipper*, 1936, oil on canvas, 12"x 13", National Gallery of Canada



Sudbury Neutrino Observatory

Aurora Borealis with Big Dipper



Joyce Wieland
Northern Lights, 1960
oil on canvas, 32"x 32"
private collection



Paterson Ewen, *Northern Lights*, 1973, acrylic, oil, steel etc. on wood, 66"x 98", AGO



Doris McCarthy, *Northern Lights Over Yellowknife*, 1974, acrylic on panel, 12"x 16", priv. coll.

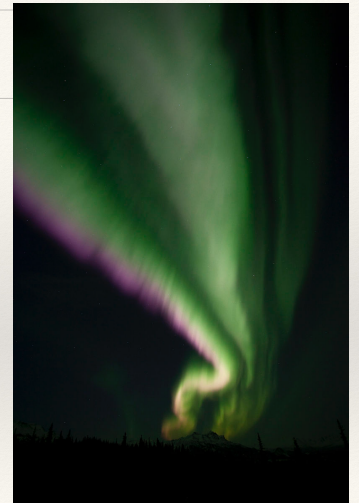


Napachie Pootoogook, *Aurora borealis in Autumn*, 1979, mixed media on paper, 22" x 30"
McMichael Collection of Canadian Art



K.M. Graham, *Arctic Night with Whiplash, Northern Lights*, 1987, acrylic on canvas, 50" x 60", Art Gallery of Hamilton

A whiplash aurora:
note pink at bottom

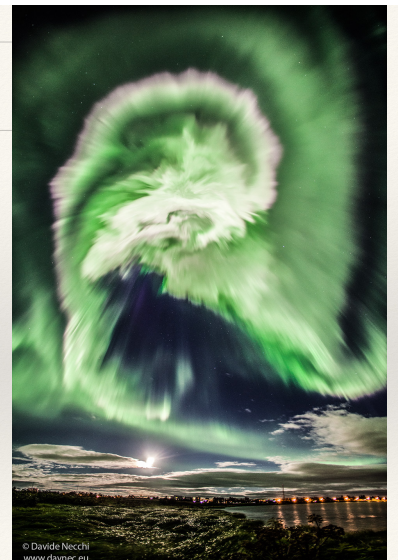


[Aurora Borealis Over Mount Fellows](#) Uploaded by [AlbertHerring](#)



Rae Johnson, *Funnel Aurora*, 2009, oil on wood, 72" x 96"

A funnel aurora over
iceland



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www.davinee.eu



Diana Thorneycroft, *Group of Seven Awkward Moments (Northern Lights)*, 2007,
digital photograph