

# Stars Over Surrey

## Astronomy & Space News Roundup

28<sup>th</sup> December 2018

**BROOKLANDS**RADIO

ONLINE

The Sound of Surrey



# Apollo 8 : 50<sup>th</sup> Anniversary

- Christmas Eve 1968, Apollo 8 goes into orbit around Moon
- First manned mission to another Solar System body
  - also first crew on Saturn V
  - first to launch from KSC
  - launched 21st Dec
  - 10 Lunar orbits
  - splashed down 27th Dec
- NB Not first Earth creatures to the Moon
  - Sept '68, Zond 5, cis-lunar orbit
  - 2 tortoises, earthworms, fruitflies!



# Soyuz Successful Launch to ISS

- Dec 3<sup>rd</sup> - 1<sup>st</sup> crewed Soyuz launch since recent aborted mission
- Fast trajectory, docks with ISS only 6 hours later
- 6 month mission for
  - David Saint-Jacques (Canada)
  - Anne McClain (USA)
  - Oleg Kononenko (Russia)

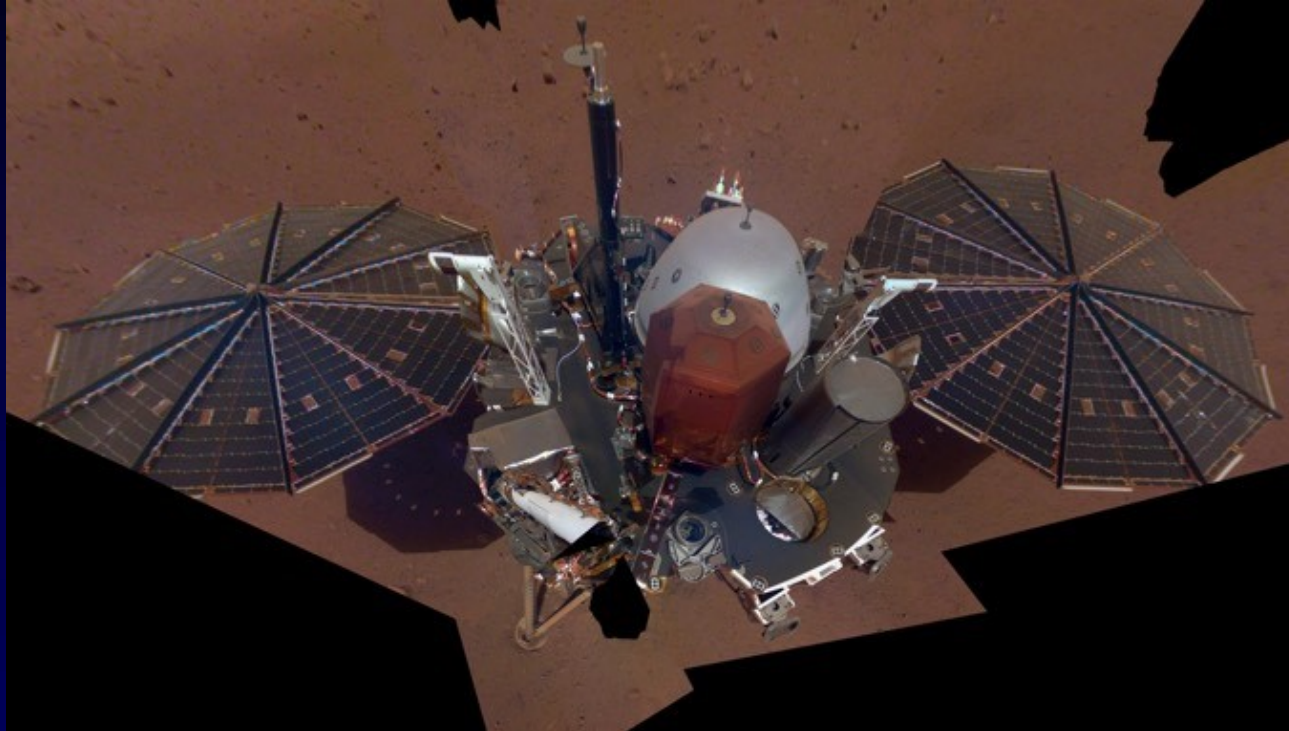


# Previous ISS Crew Return

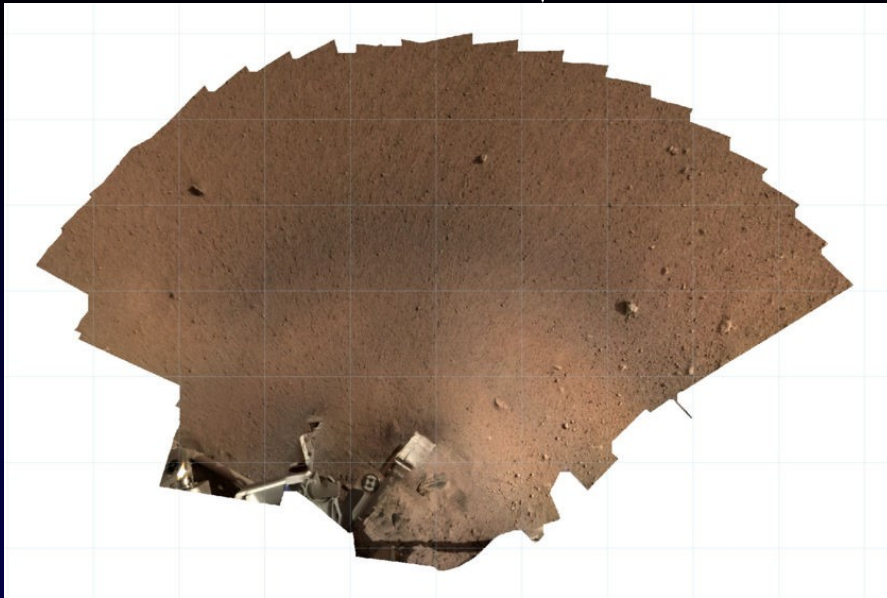
- Russian EVA to study damage
  - The two Russian cosmonauts inspected the hole “drilled” in Soyuz
  - removed outer insulation material on habitation module then took samples of epoxy used to plug air-leak in skin
- Dec 20<sup>th</sup> - Previous ISS crew safely returned in the 'damaged' Soyuz MS-09 after 197 day mission
  - Alexander Gerst (Germany)
  - Serena Auñón-Chancellor (USA)
  - Sergei Prokopyev (Russia)
- Next mission changed
  - at end Feb Ovchinin (Russia) & Hague (USA) will join ISS
    - pair who had to abort in October



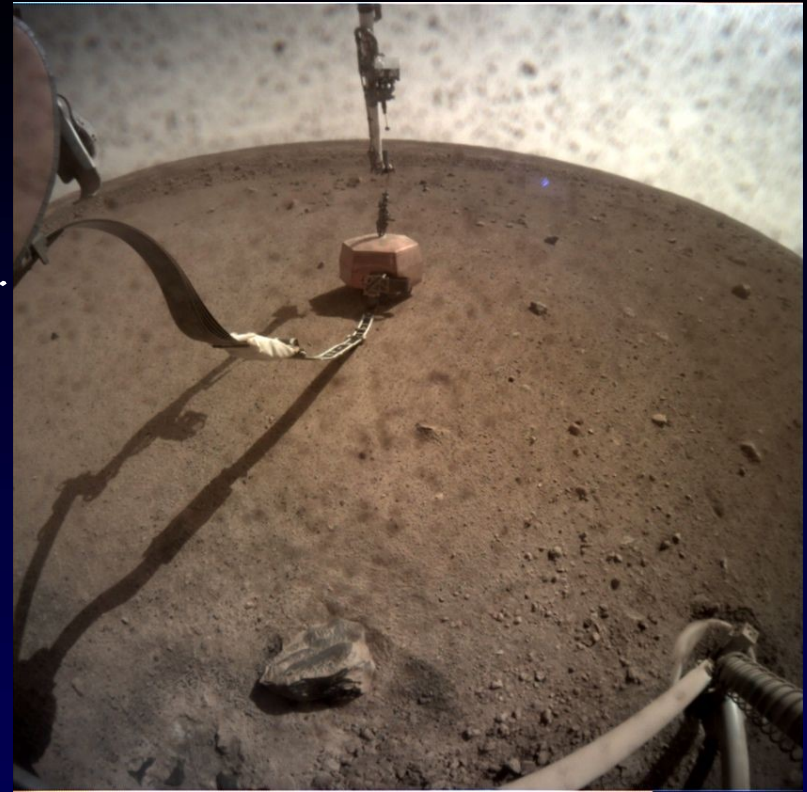
# NASA's Insight Mission To Mars



- 'Selfie' assembled from 11 pictures shows InSight on smooth surface



- 50+ pictures show very smooth area in front of lander
  - enables scientists to determine best places to deploy the two main instruments



- Seismometer now deployed
- Heat Flow probe to follow

# NASA's Insight Mission To Mars

Spotted from orbit by Mars Reconnaissance Orbiter



Heat Shield

Insight lander

Back-shell & parachute

(Note circular marks from landing rockets)

# Space X launches 2 Falcon 9s in week!

- Vandenburg AFB, 3<sup>rd</sup> Dec
  - booster flew for 3<sup>rd</sup> time (a first), launched 64 cube sats
  - landed on barge off California
- Cape Canaveral, 6<sup>th</sup> Dec
  - launches Dragon to ISS but fails to land on barge
  - Hydraulic pump problem, landed off-shore & was rescued
  - default target is off-shore
    - only moved to landing site if all tests show everything OK
- Track record is 32 recoveries
  - 20 landing vertically at Cape Canaveral
  - 1 landing vertically at Vandenberg
  - 11 on off-shore drone ships





# Virgin Galactic reaches edge of Space ✨



# Virgin Galactic reaches edge of Space

- Spaceship Two (VSS Unity) has now reached the edge of Space for the first time on a test flight
  - above Mohave Desert
  - attained 50+ miles altitude
  - NASA defines this as space
    - International edge is “Karman Line”
    - 62 m (100K)
  - Carried by mothership (VMS Eve) to 43,000', released then reached 128,000'
    - rocket burn just 1 minute
    - reached Mach 2.9
- Once operational will switch to Spaceport America, New Mexico
  - \$250,000 for 90 min flight
  - 600 passengers booked!



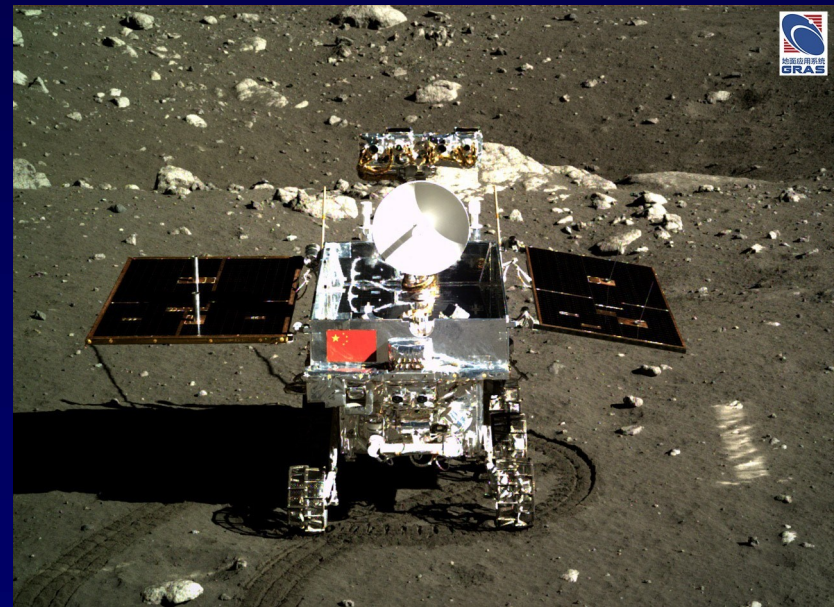
# Commercial Launch from New Zealand

- Rocket Lab Electron launcher
  - Mahia Peninsular, Auckland
  - kerosene fuelled Rutherford rocket engine, 3D printed fuel pumps
- First launch under NASA contract
  - launch 13 cubesats, 16<sup>th</sup> Dec
- Plan to launch 1 / month in 2019
  - mostly from NZ
  - also from Wallops Island, Virginia
- Possible launches from Scotland
  - Sutherland Spaceport
    - A'Mhòine Peninsular
    - UK Space Agency Proposal
    - polar orbit



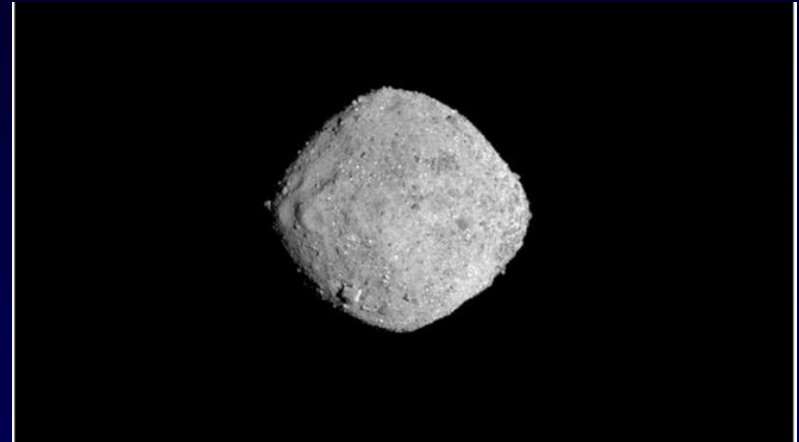
# China Launches to Moon's Far Side

- First ever lander for the Moon's far-side has been launched by China
  - launch 7<sup>th</sup> Dec
  - now in lunar orbit
  - landing in early Jan
- Chang'e 4 consists of a lander with rover
  - based on Chang'e 3 lander/rover combination
- Communication will be via 'Queqiao' (magpie bridge)
  - relay satellite already launched into 'halo' orbit 40,000 miles beyond Moon.



# Osiris Rex arrives at Bennu

- NASA's Osiris-Rex mission has arrived at asteroid Bennu
  - 500 metres across
  - 2 year, 2B mile journey
  - keeping station just 7 Km away
  - hydrated surface material detected by spectrometer
    - at some point there must have been liquid water
- Spacecraft will stay for two years
  - mid-2020 will descend
  - grab 60 grams of regolith
  - return to Earth in 2023



- Voyager 2 reaches interstellar space

- NASA has just announced that this happened on Nov 5<sup>th</sup>
- after 41 years, 11 billion miles
- Voyager 1 reached this in 2012
- 300 years to reach inner edge of Oort Cloud
- 15,000 - 30,000 years to reach edge of Solar System



# Voyager 2: Interstellar BY THE NUMBERS

**1** of two  
interstellar  
spacecraft

**41**  
YEARS  
in space

**1** GOLDEN  
record

**34,191**  
MPH (APPROXIMATE  
TO THE SUN)

**16** HOURS  
36 MINUTES  
ONE-WAY LIGHT TIME FROM  
EARTH TO THE SPACECRAFT

**11** BILLION  
MILES FROM  
THE SUN  
(18 BILLION KM)

**290**  
MILLION MILES  
every year

**18.5+**  
BILLION TOTAL  
MILES TRAVELED  
(30 BILLION KM)

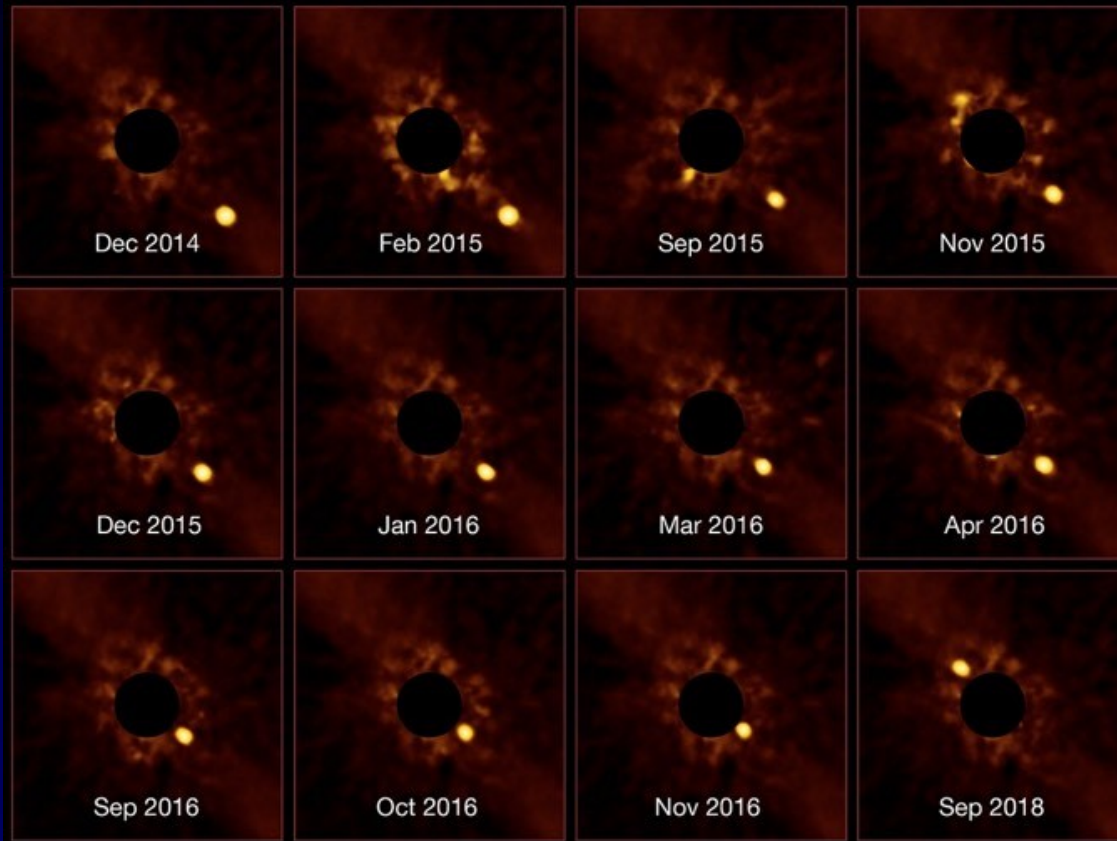
**4**  
PLANETS  
visited  
JUPITER  
SATURN  
URANUS  
& NEPTUNE

As of Nov. 28, 2018



[voyager.jpl.nasa.gov](http://voyager.jpl.nasa.gov)

# Time lapse shows Exoplanet in orbit



- ESO's VLT images Beta Pictoris b
- Orbits parent star at same distance as Saturn from the Sun
- Star blacked out to make exoplanet more visible
- Star is young, only 12 M years old
- 63 LY distant



# Hubble Back In Action



- Hubble provides data on galaxy formation 11B years ago
- Image contains 12,000 galaxies
- Hubble's Ultra Violet imager combined with infra red and visible light images

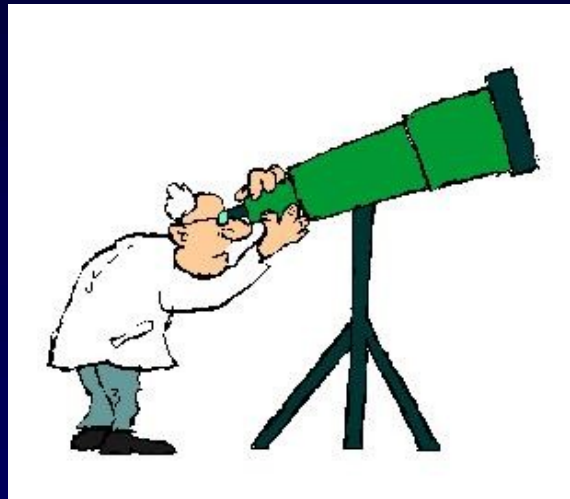
# New Horizons approaches Ultima Thule

- Ultima Thule is a Kuiper Belt Object
  - 4B miles away
  - left over from Solar System formation, 4.6B years ago
- 2<sup>nd</sup> target for NASA spacecraft which flew past Pluto in July 2015
  - now 1B miles further out
- On-board instruments have been checking for nearby objects posing risk
- None found so probe stays on course to pass 2,200 miles away on 1<sup>st</sup> Jan at 31,500 mph
- Mystery - why doesn't it apparently rotate?
  - no change in observed light curve



# What's Up!

For January 2019



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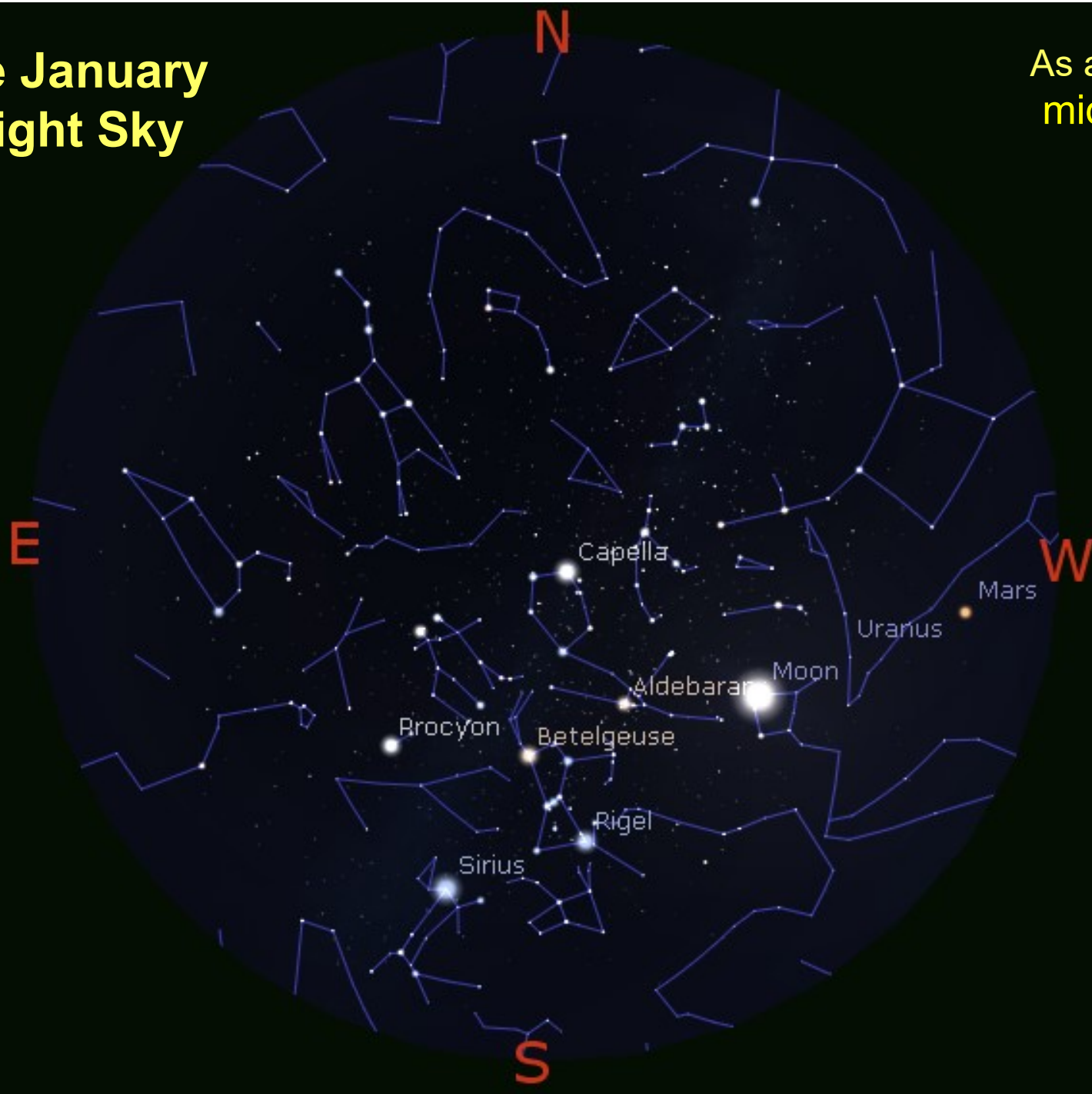
ONLINE

The Sound of Surrey



# The January Night Sky

As at 10 p.m.  
mid-month



# The Moon in January



# What's Up - Planets

- Mercury

- A morning object in SE at mag -0.4, but not easy to find as it rises just 1 hr before sunrise.

- Venus

- A brilliant morning object at mag -4.0 all month in SE, visible even in dawn twilight.

- Mars

- Still a good evening object in the Southern skies throughout the month. Decreasing in brightness from as the month draws on and the planet recedes from us, finishing the month at mag +0.9, in Pisces.

# What's Up - Planets

- Jupiter

- A bright morning object, low in the South East, rising about two hours before the Sun. Shining at Mag -1.6 so easy to find.

- Saturn

- Becoming visible late in the month in SE 1 hr before sunrise.




- Uranus

- Visible all night at Mag +5.8, well placed in Pisces in South

- Neptune

- Telescopic object at Mag +7.9 in Aquarius, low in SW

# Events of Interest in January

- **1<sup>st</sup>** Venus close to the waning crescent Moon, 05.00 hrs
- **2<sup>nd</sup>** Nice line up of Venus, Moon, Jupiter, Mercury
  - from 5 a.m. to 7.30 a.m. 
- **3<sup>rd</sup>/4<sup>th</sup>** Peak of Quatruid meteors, favourable Moon
  - peak at 02.00 hrs 
- **12<sup>th</sup>** Mars just  $6^\circ$  north of crescent Moon 
- **13<sup>th</sup>** Saturn & Mercury  $1.8^\circ$  apart, 20 mins before sunrise
- **21<sup>st</sup>** Total Eclipse of the Moon, 04.41 hrs to 05.43 hrs
- **22<sup>nd</sup>** Venus & Jupiter just  $2.5^\circ$  apart, 05.45 hrs low in SE
- **31<sup>st</sup>** Venus, crescent Moon & Jupiter close together in dawn sky, low in SE from 5.30



# Meetings at Local Societies

- **Guildford AS** *Lecture Theatre L, Uni of Surrey*
  - Thursday 3<sup>rd</sup> January, 7.30 p.m.
  - **Cosmology: Part 2**
    - » Dr Colin McGill
      - » Guildford AS member
      - » BP
      - » Formerly
        - » Oxford Uni
        - » Canadian Institute for Theoretical Astrophysics

# Meetings at Local Societies

- **Farnham AS Aldershot Cricket Club**
  - Tuesday 12<sup>th</sup> January, 7.45 p.m.
    - **The Origin Of The Moon**
      - Dr David Lewis
        - » Farnham AS

# Meetings at Local Societies

- **Croydon AS** *Royal Russell School, Coombe Lane, Croydon*
  - Friday 11<sup>th</sup> January, 19.45 hrs
    - to be announced
  - Friday 25<sup>th</sup> January, 19.45 hrs
    - to be announced

# Meetings at Local Societies

- **Ewell AS** *Nonsuch High School for Girls, Cheam*
  - Friday 11<sup>th</sup> January, 19.45 hrs
  - **Planetary Imaging**
    - Dr David Arditti.
      - » West of London AS

# University of Surrey Astronomy Evenings

- Department of Physics
  - Wednesday 17<sup>th</sup> January
  - Lecture Theatre D
    - Talk
      - Dark Matter
        - » Dr Denis Erkal
      - Stargazing (if clear)
        - or
      - Night Sky Talk
        - (back in Lecture Theatre D)
- Free event, but booking required via web site



# Astronomy on TV

- **The Sky at Night**

- *“Beyond Pluto”*

- The New Horizons mission has given us incredible images and data on Pluto. As part of the mission extension, on 1<sup>st</sup> January the spacecraft will perform the first ever fly-by of a Kuiper Belt object on the edge of the Solar System. The Sky At Night team reveals the latest news and images from this historic mission.

Sunday            13<sup>th</sup> January            BBC 4, 10.00 pm

Thursday        17<sup>th</sup> January            BBC 4, 7.30 pm

*for exact times please check [www.radiotimes.com](http://www.radiotimes.com)  
or [www.bbc.co.uk/skyatnight](http://www.bbc.co.uk/skyatnight)*



*"That's all Folks!"*