



Prime Meridian

(135) January 5, 2021

Welcome to the third decade of the 21st Century!

Some thoughts about challenging the Earth Crisis during the new decade and beyond.

Above: Our Sun was viewed a few minutes after the New Year and the New Decade from NASA's Solar Dynamics Observatory satellite. The picture sees our star at 304 Å and reveals the upper part of the Sun's chromosphere and the transition region to the extremely tenuous corona. SDO/AIA 304 2021:01:01 00:09:18 UT



On January 2, 2021 the Earth achieved what astronomers call “perihelion.” This is the closest point of Earth’s orbit to the Sun. This took place at 13:51 UT, when the Earth was 0.9832571 of its average distance (Astronomical Unit) from the Sun. View above from Ash, Kent.

Data from “Earth perihelion and aphelion Table Courtesy of Fred Espenak, [www. Astropixel.com](http://www.Astropixel.com)”.

One way or the other, this will be a significant decade in human history.

We are far from helpless and what happens during this critical decade will depend on each and everyone. Stay positive and determined. Don't be a passenger on Space Ship Earth, but make your voice heard in the corridors of power. Make that our New Year resolution.

In this decade, we must challenge not just a Climate, but an Earth Crisis.

Climate has brought mass demonstrations on the streets around the world. We introduced the phases “Earth Crisis,” however, to remind us all that climate is just one factor in this complex threat of human origin. There is a huge and expanding human impact on this planet from the poles to the tropical rainforests. If our species is going to survive, we need to see the whole picture and how everything interacts with everything else. Scientific research will play an essential role in the continuing and developing understanding of how our Earth works as a living planet, how we are changing it and how we can safeguard it and our civilisation. Without science, so-called “planetary stewardship” will be a meaningless slogan.

Climate: by the end of the decade we will know the difference between politicians' rhetoric and reality.

Numerous governments around the world have declared their intention to make major changes on our climate impact by 2030, and becoming climate-neutral by 2050. According to the Paris Agreement, there is a necessity to keep temperature rises below 2°C, hopefully not as high as 1.5°C.

A new decade? Some may consider this pedantic, but the actual beginning of a new decade, new century, or new millennium, does not begin with “0,” like 2000, but with “1,” like 2001. The 21st Century and its first decade, began in 2001, and subsequent decades were 2011 and 2021.

There is a case for bringing together researchers from a range of academic disciplines to address an integrated exploration of the self-inflicted and natural threats to our civilisation or even human survival.

2020 ended with hope that the coming months will see widespread vaccination greatly reduce the danger from COVID-19. The global pandemic has brought health services, economies, education and culture reeling. According to the COVID-19 Dashboard (Center for Systems Science and Engineering (CSSE), Johns Hopkins University, Baltimore, Maryland). The virus has infected 84,761,360 and killed 1,838,440 people world wide (down loaded Jan. 3, 2021). <https://coronavirus.jhu.edu/map.html>

COVID-19 will encourage questions about how nations have responded to this global problem and their capacity for working together on a global scale. What will this suggest about how the world will respond to say, climate and other issues? There is no guarantee that dangerous events will only come along one at a time, and there is a case for exploring how they might impact on human communities in complication.

We now take technological advances as commonplace, but the environmental and ethical considerations are often profound. Environmentalists must recognise that today's science fiction is tomorrow's challenging reality. Those responding to the Earth Crisis, must explore potential future scenarios.

Work continues on transport systems to avoid CO₂ emissions. In robotics, self-driving cars, are underway. As 2020 ended, Boston Dynamics put out a video of its dancing robots. They took us closer to the dreams and moral challenges around robots and AI, as familiar from science fiction (and whatever reality throws our way). Further into the future, but perhaps during this century, the first "aliens" that we meet could be robotic, manufactured biology, or hybrid life - but developed by us, down here on Earth.

As this decade develops, human impact on other worlds is likely to expand.

Homo sapiens may return to the Moon in this decade, rather than exploring it with robot vehicles. This may be as early as 2024, but time will tell. The search for life within our Solar System continues and we urge extreme care in this exciting quest. Our species should avoid the threat of human-caused extinction reaching to other worlds.

The search for other Earth-like (or other kinds of life-bearing) planets, will help us to develop a deeper understanding of how our Earth, orbiting around a yellow dwarf Sun, fits into the bigger picture.

The search for habitable planets around other stars (or maybe some free floating in space) continues. As of the December 29, 2020 update, *The Extrasolar Planets Encyclopaedia*, a data base for professional astronomers, stated that we now know of 4,395 planets beyond the Solar System. The editors at PM have been involved closely in that field (as well as their fight to save the environment on Earth). We hope to continue our research in the coming years.

Attempts to predict the future have ranged from prophetic to laughable. It is possible that by the year 2031, the world, for better or worse, may have been sent down unexpected paths by unforeseen events. Tackling the Earth Crisis will require flexibility and fast response.



Winter Solstice

December 21, 2020

The darkest day in the year, is now behind us, but we remain in the short days of winter.

The 2020 Winter Solstice can symbolise for us the hope for the end of one of the darkest years in recent human history.

As this unusually challenging year draws to its end, the prospect of 2021 brings hope that we shall see not only the cycle of the seasons carrying us towards spring and summer, but also, an eventual return to life as we know it.

At our locality, dawn arrived with a sky already covered by an overcast. There was no visible sunrise to enjoy. There was merely the knowledge that our star was there above the clouds.

The precise moment of the Solstice was at 10:02 GMT. The photograph taken from New Ash Green, Kent at around 10:20 GMT could show nothing to see apart from bare trees below a grey sky.

There had been hopes also of seeing the closest approach of Jupiter and Saturn since 1623, but that was always going to depend on weather. Some media had dubbed it "The Star of Bethlehem." Here, the evening was gloomy as feared.

Those of us who had approached the historic line; up between the Solar System's largest planets, reminding ourselves about the realities of the English climate, We awaited philosophically and with Wise Men (or women) watching the event on the internet.



Above; A chart of the Sun and the sky close to noon on the day of the Solstice, with the atmosphere removed. The dark orange line is the position of the ecliptic, the path of the Earth around the Sun, or, as seen from our planet, the path of the Sun circling our sky. Modified from *Stellarium*.

Right: Our Sun as taken from the Solar Dynamics Orbiter (NASA). This image covers the spectral continuum. The view at the Sun's centre looks directly into deeper, hotter material, while moving towards the edges, we see higher, less hot material, so there is darkening of sunlight towards the end (limb) of the Sun. A sunspot, AR2794, has emerged around the visible side of the Sun. 18:15:50 UTC - essentially GMT.

Below: There was cloud cover at the South Pole, where it was its Summer Solstice. This image came from the Amundsen-Scott South Pole Station. Taken from the roof of the National Science Foundation's Atmospheric Research Observatory (ARO) which houses NOAA/ESRL's Clean Air Facility. 15:50:11 UTC.

SDO/HMI Quick-Look Snapshot: 20201221_161500





Above: The cold and gloomy day on the first day of 2021. Hill above Hartley, Kent.

Prime Meridian.

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We follow the cycle of the seasons in South East England alongside global environmental issues. At the same time, we step back to look at the Earth in its astronomical perspective and the search for other habitable worlds, which help us to understand the Earth in its larger context.

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Our thanks to everyone who has assisted our production of Prime Meridian and our other projects during 2020.

Please note: Looking at the Sun, particularly through cameras, binoculars or telescopes can cause eye damage.