

## Space weather and pandemic warnings?

Medical science is not accustomed to turning to the skies for warnings of pandemics although this is precisely what our distant ancestors throughout history were prone to do. The Sun clearly plays an important role in all aspects of our lives. For instance, there have been many claims that the occurrence of pandemic influenza and other viral outbreaks is correlated with the well-known 11-year sunspot cycle<sup>1-3</sup> although the precise mechanism for such a causative connection had remained unclear. Now, with space exploration and continuous monitoring of 'space weather', it is evident that the Earth's magnetosphere, and the interplanetary magnetic field in its vicinity, are modulated by the solar wind that in turn controls the flow of charged particles onto the Earth<sup>4</sup>. During times of sunspot minima, particularly deep sunspot minima, a general weakening of magnetic field occurs which would be accompanied by an increase in the flux of cosmic rays (GCR's) and also of electrically charged interstellar and interplanetary dust particles. As there is growing evi-

dence to suggest that the latter include biological entities, an increase in their incidence on the Earth is therefore to be expected at such times<sup>5</sup>. Not only CR-induced mutation events, but recombination events involving novel virion strains, would be the expected outcome of which we should be aware.

The next minimum between the current cycle 24 and cycle 25 was predicted to occur between July 2019 and September 2020 (Figure 1). Perhaps, we have now approached the deepest sunspot minimum for a century, with more 'spotless' days per week than in previous minima.

On the basis of this data, there appears to be a prima facie case for expecting new viral strains to emerge over the coming months and so it would be prudent for Public Health Authorities the world over to be vigilant and prepared for any necessary action. We need hardly to be reminded that the spectre of the 1918 devastating influenza pandemic stares us in the face from across a century.

Data on the number of sunspots were provided by the Sunspot Index and Long-

Term Solar Observations-World Data Center, Royal Observatory of Belgium, Brussels (<http://www.sidc.be/silso/home>).

1. Hope-Simpson, R. E., *Nature*, 1978, **275**, 86.
2. Hoyle, F. and Wickramasinghe, N. C., *J. R. Soc. Med.*, 1990, **83**(4), 58.
3. Qu, J., *Rev. Med. Virol.*, 2016, 309-313.
4. Poppe, B. B. and Jorden, K. P., *Sentinels of the Sun: Forecasting Space Weather*, Johnson Books, Boulder, Colorado, 2006; ISBN 978-1-55566-379-7.
5. Steele, E. J. *et al.*, *Prog. Biophys. Mol. Biol.*, 2018, **136**, 3-23.

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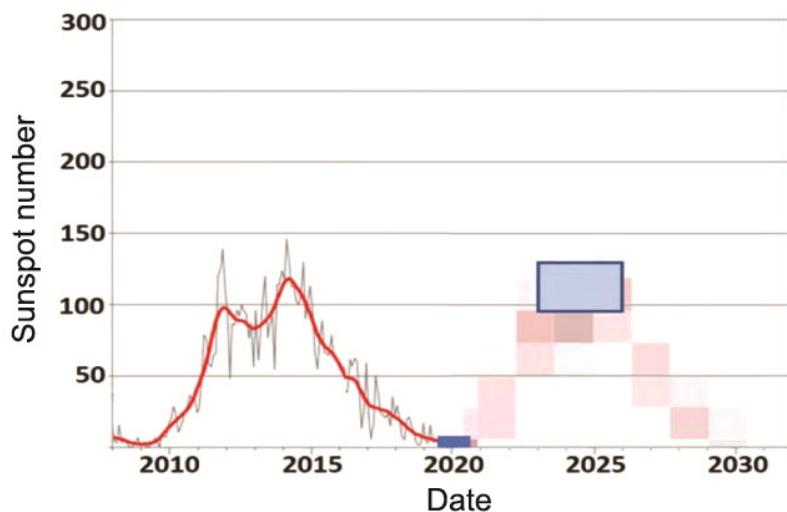


Figure 1. Current cycle 24 and predicted cycle 25.