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# 国台学术报告 NAOC COLLOQUIUM

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**Time: Friday 2:30PM, July 25 Location: A601 NAOC**

## Declining solar magnetic fields:

### Are we really heading towards a Maunder minimum?

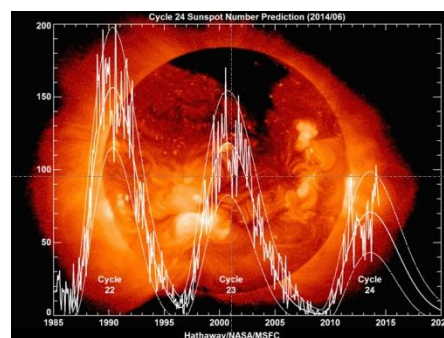


#### Subramaniam Ananthakrishnan ( University of Pune)

An internationally known radio astronomer and radio scientist, Subramaniam Ananthakrishnan had a brilliant academic career and got his BSc(Hons), MTech degrees from Calcutta University and later his PhD degree from the Tata Institute of Fundamental Research (TIFR) and University of Bombay (Mumbai), India in 1976. He was an academic member of TIFR, Mumbai, since 1966 and was deeply involved in the construction, commissioning and operation of two major radio astronomy facilities, known as the Ooty Radio Telescope in 1970 and the Giant Metrewave Radio Telescope (GMRT) in 1999. He was the Observatory Director of the GMRT till 2004 and retired from TIFR as a Senior Professor in 2007 and is an Adjunct Professor of the Pune University since then. He was a DAE-BRNS Raja Ramanna Fellow during 2007-2012 and now holds an INSA Senior Scientist fellowship. He is involved as a reviewer of many major astronomy projects ranging from Radio to Gamma Ray observatories in India. An elected Fellow of all the major national science academies of India, Prof. Ananthakrishnan was given the prestigious INSA International Vainu Bappu Memorial Award 2010 for his "Outstanding contributions in setting up the large Ooty Radio Telescope and the Giant Metrewave Radio Telescope and in making extensive observations of radio sources using the telescopes". Prof. Ananthakrishnan is currently the Vice-President of the International Radio Science Union (URSI) during 2011-2014, after having been the Chairman of one its commissions (J) during 2008-2011. He is the Chair of the Board of Atmospheric Sciences, Pune University and a member of its Academic Council and a member of the First court of Kashmir Central University. He is credited with the authorship of ~ 100+ papers in national and international publications with good citations.

#### Abstract

One of the primary indicators of solar activity is the Sunspot number and the associated 11 year solar cycle. This activity is controlled by the solar magnetic field. There are clear indications based on a variety of studies that the magnetic field on the Sun has been steadily decreasing in the past ~ 20 years resulting in lower activity on the Sun. The Sunspot formation has decreased by ~ 30% since the early 90's. It has been speculated that if this continues, there will be no sunspots by the latter part of this decade, leading to a Maunder-like minimum in the next cycle. Using Interplanetary scintillation data from radio telescopes, surface photospheric fields measured by National Solar Observatory and He abundances measured by ACE, SDO spacecraft and ionospheric foF2 data, my collaborators from PRL, Ahmedabad & Harvard Smithsonian Observatory and I have been studying this monotonic decrease. Interplanetary Scintillation observations between 1983 and 2012 clearly show a steady drop in the turbulence levels in the entire inner heliosphere starting from around 1995. Our recent analysis of the solar magnetic fields have shown that a steady decline of the fields have taken place since around 1996 and meridional flows also appear to have changed. Similarly, Helium abundance dropped dramatically after 2008. We are also seeing a very tight correlation between the measured (foF2)<sup>2</sup> in the ionosphere and sunspot number, which implies that the low-frequency radio window may be open for many years after 2020 and be a boon to radio astronomy for ground based studies of the high red-shift radio universe well below 10 MHz. All these lead us to state that the build-up to the deepest solar minimum in 100 years actually began more than a decade earlier. We will examine the evidence in detail in this talk.



*All are welcome! Tea, coffee, biscuits will be served at 2:15 P.M.*