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One Hundred Years Since "The Maunder Butterfly Diagram and Maunder Minimum": An Introduction

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This introductory talk will highlight E. Walter Maunder and Annie Maunder's scientific accomplishments and their relevance for today's forefront research on Sun-Earth Connection.

At the Royal Observatory in Greenwich, E. Walter Maunder (1851-1928), aided by his second wife Annie (1868-1947), published in June 1904, "Note on the distribution of Sun-spots in heliographic latitude, 1874 to 1902." [1] Their discovery graphically summarizes for modern solar physics hemispheric and global solar patterns of large-scale magnetic field and surface velocity.

E. Walter Maunder also, with two prior publications -- in 1890 [2] and 1894 -- popularized "A prolonged sunspot minimum," ca. 1620-1720, first noted by Gustav Sporer. That remarkable period of rare sunspot appearance is now commonly known as the Maunder Minimum, but its physical basis still remains poorly understood one hundred years later.

Additional enduring contributions to "solar science" by the Maunders' include:

(1) recognition of certain regions on the Sun that are devoid of visible spots but nevertheless could be sources for terrestrial magnetic activity, foretokening the M-regions described by Julius Bartels and coronal holes observed from Skylab;

(2) suggestion of rays or beams that continuously or intermittently emit solar material, and their plausible connection to magnetic storms on Earth, foreshadowing of Parker's solution of the supersonic solar wind, and possibly the 21st century's studies of Coronal Mass Ejections and Space Weather; and

(3) speculation that the Sun is relatively brighter rather than fainter when solar magnetism is strong, pointing to results from space-borne radiometers of the 1980s-present.

References

[1] E. W. Maunder, *Mon. Notices R. Astron. Soc.* **64**, 747 (1904).
[2] E. W. Maunder, *Mon. Notices R. Astron. Soc.* **50**, 251 (1890).