

1. Record Nr.	UNINA9910328157203321
Autore	Matthes Katja
Titolo	Earth's climate response to a changing Sun / / Jean Lilensten
Pubbl/distr/stampa	Les Ulis : , : EDP sciences, , 2015 ©2015
ISBN	9782759818495 2759818497
Edizione	[1st ed.]
Descrizione fisica	1 online resource
Altri autori (Persone)	LilenstenJean
Disciplina	551.6
Soggetti	Climatic changes - Effect of solar activity on Global temperature changes
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Frontmatter -- Contents -- Foreword -- Preface -- PART I. INTRODUCTION TO THE SUN-CLIMATE CONNECTIONS -- 1.1 The Earth's atmosphere: an introduction -- 1.2 The impact of solar variability on climate -- 1.3 The Sun-Earth connection, on scales from minutes to millennia -- 1.4 The role of the Sun in climate change: a brief history -- 1.5 The role of the Sun in climate change: a societal viewpoint -- 1.6 The debate about solar activity and climate change -- References of Part I -- PART II. SOLAR AND SPACE FORCING -- 2.1 Basics of solar and heliospheric modulation -- 2.2 Solar radiative forcing -- 2.3 Variability of solar and galactic cosmic rays -- 2.4 Variability and effects by solar wind -- 2.5 Variations of solar activity -- 2.6 Understanding solar activity -- INFOBOX 2.1 Orbital forcing of glacial - interglacial cycles -- INFOBOX 2.2 Grand minima and maxima of solar activity -- INFOBOX 2.3 A practical guide to solar forcing data -- References of Part II -- PART III. DETECTING SOLAR INFLUENCE ON CLIMATE -- 3.1 Observations on paleoclimatic time scales -- 3.2 Ground-based observations -- 3.3 Satellite observations -- 3.4 Reanalysis data -- 3.5 Uncertainties and unknowns in atmospheric observations: How do they affect the solar signal identification? -- 3.6 Numerical models of atmosphere and ocean -- 3.7 From climate to Earth system models -- 3.8 Uncertainties in the modeling of the solar

influence on climate -- 3.9 Detection and attribution: How is the solar signal identified and distinguished from the response to other forcings? -- INFOBOX 3.1 Why are models needed in the first place, and can they be trusted? -- INFOBOX 3.2 Model Equations and how they are solved -- References of Part III -- PART IV. IMPACTS ON THE EARTH SYSTEM -- 4.1 Direct impact of solar irradiance variability -- 4.2 'Top-down' versus 'bottom-up' mechanisms for solar-climate coupling -- 4.3 Interactions of different sources of variability -- 4.4 Impact of solar variability on the magnetosphere -- 4.5 Atmospheric ionisation by solar energetic particle precipitation -- 4.6 Impact of energetic particle precipitation on atmospheric chemistry and climate -- 4.7 The impact of cosmic rays on clouds -- 4.8 Impact of solar variability on the global electric circuit -- INFOBOX 4.1 Modeled impact of total solar irradiance (TSI) forcing -- INFOBOX 4.2 Lightning, cosmic rays and energetic particles -- INFOBOX 4.3 The influence of solar variability on extreme weather -- References of Part IV -- PART V. CONCLUSION -- Conclusions -- References of Part V -- Glossary -- The authors

Sommario/riassunto

For centuries, scientists have been fascinated by the role of the Sun in the Earth's climate system. Recent discoveries, outlined in this book, have gradually unveiled a complex picture, in which our variable Sun affects the climate variability via a number of subtle pathways, the implications of which are only now becoming clear. This handbook provides the scientifically curious, from undergraduate students to policy makers with a complete and accessible panorama of our present understanding of the Sun-climate connection. 61 experts from different communities have contributed to it, which reflects the highly multidisciplinary nature of this topic. The handbook is organised as a mosaic of short chapters, each of which addresses a specific aspect, and can be read independently. The reader will learn about the assumptions, the data, the models, and the unknowns behind each mechanism by which solar variability may impact climate variability. None of these mechanisms can adequately explain global warming observed since the 1950s. However, several of them do impact climate variability, in particular on a regional level. This handbook aims at addressing these issues in a factual way, and thereby challenge the reader to sharpen his/her critical thinking in a debate that is frequently distorted by unfounded claims.
