
Space weather: a glimpse of the physical processes

Karl-Ludwig Klein^{*1}

¹LESIA - Observatoire de Paris CNRS – Observatoire de Paris CNRS – Observatoire de Meudon,
92190 Meudon, France

Résumé

A fundamental feature of the corona, readily visible in eclipse photographs, is its shape, which is clearly not spherical. While the visible Sun is structured by gravity, the solar corona is also shaped by magnetic fields. They are rooted in the solar interior, where they interact with gas motions. This introduces a broad range of variabilities of the magnetic field in the corona. Flares are brightenings, especially in X-rays, EUV and radio waves, resulting from explosive heating and particle acceleration to high energies. In a coronal mass ejection, major parts of the coronal gas are ejected, together with the magnetic field, into the interplanetary medium. While these explosive events reveal the variability of the corona on time scales of seconds to minutes, the overall activity of the Sun has also a long-term evolution, especially the well-known activity cycle of 11-years duration. The space environment of the Earth is affected in different ways by solar activity: the variable X-ray and EUV emission heats and ionises the Earth's atmosphere, leading to perturbations of satellite orbits and of radio communications. High-energy particles have similar effects, especially in the polar regions. Solar wind streams and coronal mass ejections can reconfigure the Earth's magnetic field and trigger energy release there. All these processes may have effects especially on air borne and space borne human activities. The present contribution will give an overview of the physical processes at work, as far as we understand them. The development of services for the assessment and prediction of space weather events will be addressed in the overview by T. Dudok de Wit

Mots-Clés: Solar corona, solar wind, solar activity, solar, terrestrial relations, space weather

*Intervenant