

IPS RADIO AND SPACE SERVICES

FACTS ON SPACE WEATHER

We are all familiar with terrestrial tropospheric weather. It is what we experience all around us, our atmospheric environment. It may be fine, cloudy, stormy or sunny. It may rain or hail. We know about temperature and pressure. This is all about weather in the lowest 10 km of our atmosphere.

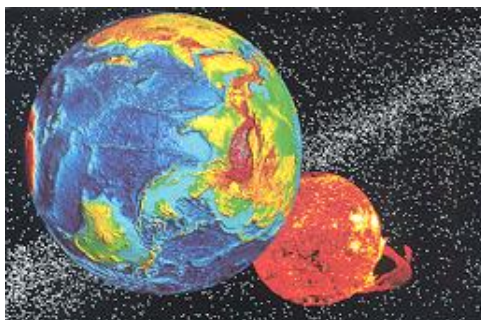
As we go out into space, the atmosphere becomes very thin, until by the time we are in space, it has almost vanished. Almost, but not quite. Even in space there are some atoms, and these move. Different forms of energy also pervade space. And it is the dynamic interaction of energy and matter that in space, as on Earth, produces what we refer to as space weather. In other words, space weather is the changes that occur in the space environment.

The sun is the source of terrestrial weather, and it is the primary, but not the sole source of space weather. The solar wind from the Sun streams past the Earth and is mostly deflected by the Earth's magnetic field. But variations in the solar wind cause changes in the Earth's magnetic field. Sometimes these changes are gradual increases in density or velocity. Sometimes they are huge plasma clouds preceded by a shockwave (a little like an oceanic tsunami). Auroral displays result from the passage of large plasma clouds past the Earth.

Occasionally a huge release of magnetic energy occurs on the Sun. This can produce large quantities of x-rays which affect the Earth's atmosphere. This release can also accelerate atomic particles (mostly protons) to a very high speed (a substantial fraction of the speed of light). These high energy particles then form very penetrating and ionising radiation, which can reach the stratosphere where jetliners fly.

Apart from the Sun, space is filled with Galactic cosmic radiation and pieces of space debris. Small pieces of natural debris are termed meteoroids, and when these hit the Earth they produce meteors - streaks of light in the night sky. Larger pieces of space rock can be damaging to satellites and even, if large enough, to man on the Earth.

Most aspects of space weather affect us to some extent. The more our society becomes dependent on technology and the more we utilise space, the more we are affected by space weather. Some aspects of space weather are benevolent, and allow activities not otherwise possible. Some aspects are benign, and some are malevolent. Like terrestrial weather, it sometimes depends on the situation and the event.



Australian Government
Department of Industry
Tourism and Resources

Level 6, North Wing
477 Pitt St
Sydney NSW 2000
AUSTRALIA

P.O Box 1386
Haymarket NSW 1240
AUSTRALIA

Tel: +61 2 92138000

Fax: +61 2 92138060

office@ips.gov.au

www.ips.gov.au

THE AUSTRALIAN SPACE WEATHER AGENCY