

IPS RADIO AND SPACE SERVICES

FACTS ON THE SUN AND SOLAR ACTIVITY



Australian Government
Department of Industry
Tourism and Resources

The Sun is the largest body in the solar system. Situated at the centre, its gravitation causes the nine planets to orbit around it. It is basically a large ball of mainly hydrogen and helium gas, although all the other elements may be found in small amounts. The surface and interior temperatures are too hot to have any liquid or solid material. One of the most interesting features of the sun is the fact that it rotates more slowly at the poles than at the equator - this is called differential rotation. A summary of solar facts is given in the table below.

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| Solar mass = 330,000 x Earth mass |
| Surface gravity = 27 x Earth gravity |
| Surface temperature = 6000 C |
| Surface pressure = 1/100 Earth atmos |
| Solar diameter = 1.5 million km |
| Solar Core temperature = 15 million C |
| Distance from Earth = 150 million km |
| Fuel consumption = 5 million tons/sec |
| Apparent diameter from Earth=1/2deg |
| Solar Energy at Earth = 1370 W / sq m |
| Solar wind speed=400 km/s (average) |
| Solar apparent rotation (av) = 27 days |

The sun has several different regions. At the centre is the core, which is where solar energy is produced via thermo-nuclear fusion. Above this is the radiative zone, where energy travels very slowly upwards. Then we reach the convective zone where heat is transported much faster to the surface, or photosphere. The inner atmosphere is termed the chromosphere, while the outer atmosphere is the corona. Material is continually boiling off from the sun, and is carried outward by the solar wind. This varies in intensity with time. Fortunately for us, the solar output of heat and light is very constant (within 0.1%) over long periods of time. However, the sun is not totally quiescent, but undergoes roughly cyclic outbursts of solar activity.

The most visible manifestation of solar activity is the appearance of dark sunspots on the photosphere. These, and all solar activity are believed due to large and changing magnetic fields threading the outer regions of the sun, from the convective zone to the corona. Sometimes, magnetic fields change rapidly, releasing huge amounts of energy in solar flares and ejection of material from and through the corona (CMEs). These are only visible with special telescopes from the ground and from space. Solar activity tends to vary from a minimum to a maximum and back again in a solar cycle of about 11 years (although this may vary from 7 to 17 years in any particular cycle).

THE AUSTRALIAN SPACE WEATHER AGENCY

