Astronomy
Is Our Sun Normal?

Narration
Astronomers can now combine optical and radio images from Earth with images from space to open up the entire spectrum, including the infra-red, ultraviolet, as well as x-rays and gamma rays. Each wavelength region probes different levels of the Sun's atmosphere. Only by looking through all these 'windows' can we begin to see how it all works. Will all this data be enough? Is our Sun special or can we see similar phenomena on other stars? Here in California at the Center of Extreme Ultraviolet Astrophysics they have detected huge flares on other stars.

Stuart Bowyer
All stars, except for our Sun, look just like points of light, even with the world's largest telescopes. So the only way you can see a stellar flare is by looking for a sudden enhancement or brightening. When we were checking out the instrumentation on the Extreme Ultraviolet Explorer satellite we were fortunate in detecting just such an enhancement. The intensity of the star increased almost a factor of ten in a very short time. We were also fortunate in that we were using the spectrometers at that very same time so we had a record of the spectrum of the flare, while it was taking place, which we can compare with the spectrum obtained before the flare took place. And the results then tell us what are the plasma conditions in this stellar flare. The flare we saw was some hundreds of times more intense than any flare ever seen on the Sun, which is rather a good thing actually since such an energetic event on the surface of the Sun would have a devastating effect to life on Earth. The upper atmosphere would be ionised and all communication would be disrupted. We'd have a daytime aurora which would be quite spectacular but, in the long run, the ultraviolet light would reach the surface of the Earth with devastating consequences to life. The question is why do these flares take place? Another question is – why does the corona, the outer reaches of the Sun, have such a high temperature? It's at a temperature of several million degrees but the surface of the star is only six thousand degrees. How can such a cool surface heat up a high temperature corona? We don't know the answers to this but we hope to find out by studying EUV radiation from other stars and see how they compare with our own Sun.

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So by investigating other nearby stars we will be better able to understand our own star. New detectors and the ability to get above the atmosphere, have given astronomers new eyes to look at the whole Universe. And every window opened, even for our nearby Sun, reveals new things about the Universe and increases our understanding of our place in it.