Coronal Weather Report

Modeling the Sun's Coronal Magnetic Field

Solar scientists can map the Sun much like Earth scientists map the Earth. Each of these images show a globe view which has then been laid out into a flat map format. A flat map is able to show both sides of the globe at once. As the Sun rotates, features from the backside come into veiw and one can piece together a map of the full solar surface. The second row shows a map of the Sun's corona in extreme ultraviolet light observed by the SOHO spacecraft. The third row shows a computer model of the Sun's coronal magnetic field generated from magnetic information from the surface of the Sun. The activity on the back will explore how scientists obtain this type of image.

For additional information visit:
http://cse.ssl.berkeley.edu/coronalweather/

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image credit: The Living Earth, Inc.

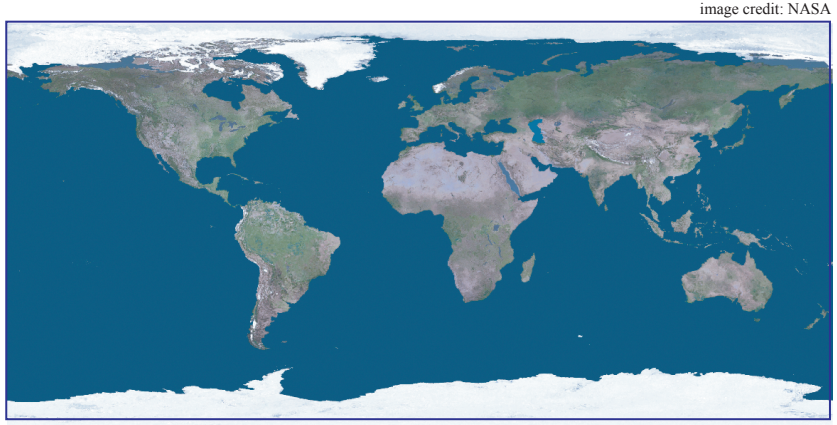


image credit: NASA

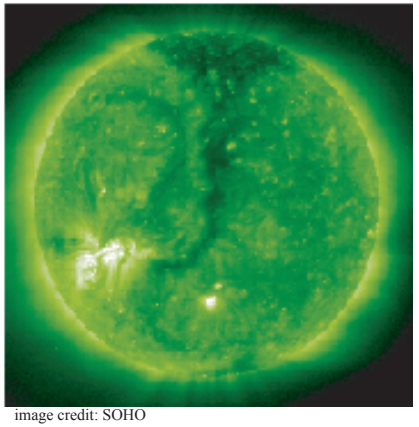
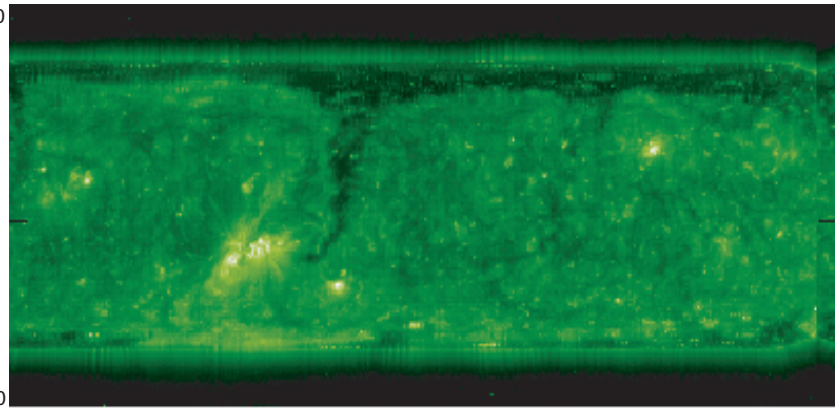
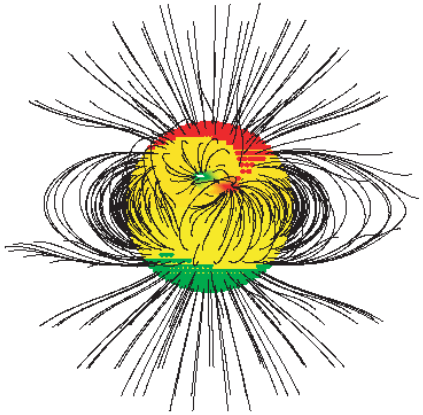
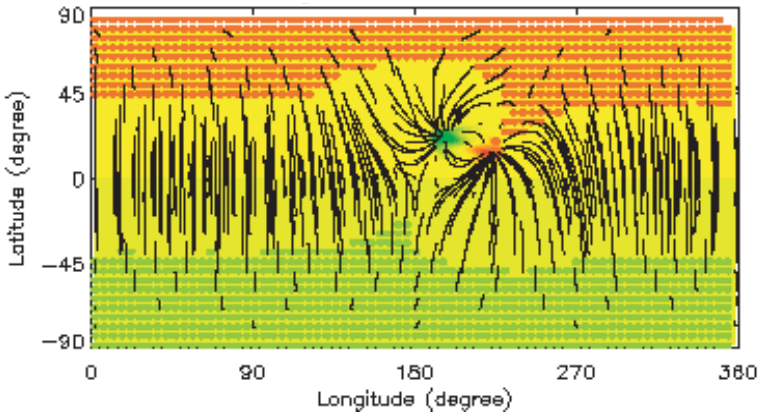


image credit: SOHO







Forecasting the Sun's Changing Coronal Magnetic Field

The Sun's surface (the photosphere) and the outermost layer (the corona) play an important role in forcasting space weather. To better predict solar storms scientists develop models of the Sun's coronal magnetic field and simulate how it changes with time. Understanding and modeling the dynamic behavior of the coronal magnetic field is key to developing a useful space weather report and determining how solar storms might impact the Earth.

Taking Steps Towards A Coronal Weather Report

I. Mapping the Sun's Magnetic Field: A coronal weather report begins with a map of the photospheric magnetic field of the Sun. Photospheric maps based on actual observations are used when predicting real storms. For simplicity, the photospheric maps shown below (1,2,3) are computer generated and look different than the more complicated model image on the front.

II. Modeling the Coronal Magnetic Field: Step two in a coronal weather report is to calculate the coronal magnetic fields (a,b,c) based on the information provided by the photospheric magnetic map.

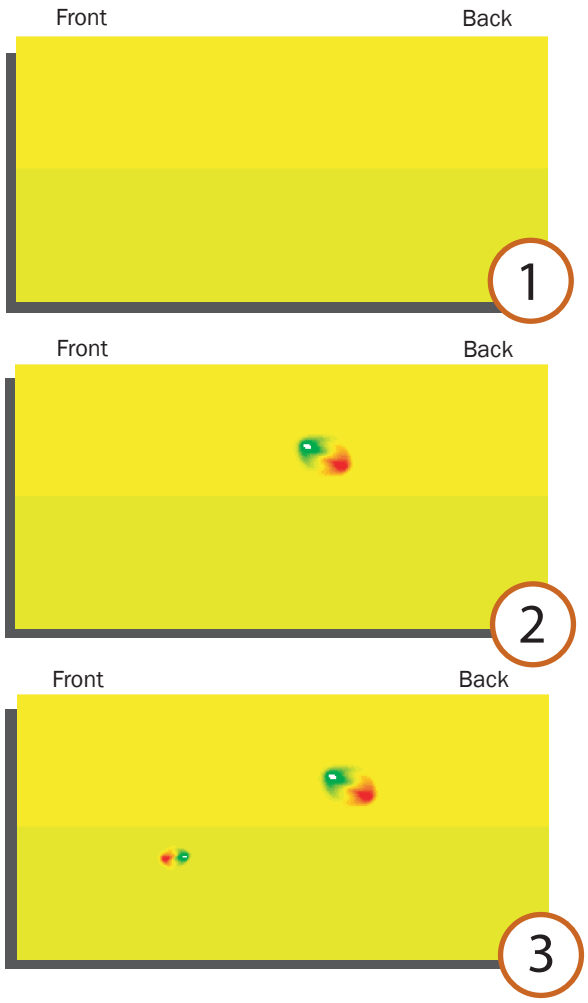
Images 1, 2 and 3 are a series of computer generated photospheric magnetic maps and a, b, and c are the resulting coronal magnetic field lines calculated from them. In the photospheric magnetic field maps, color indicates magnetic field pointing out from or in towards the Sun. The strongest magnetic field is indicated by the red(outward) and green(inward) regions.

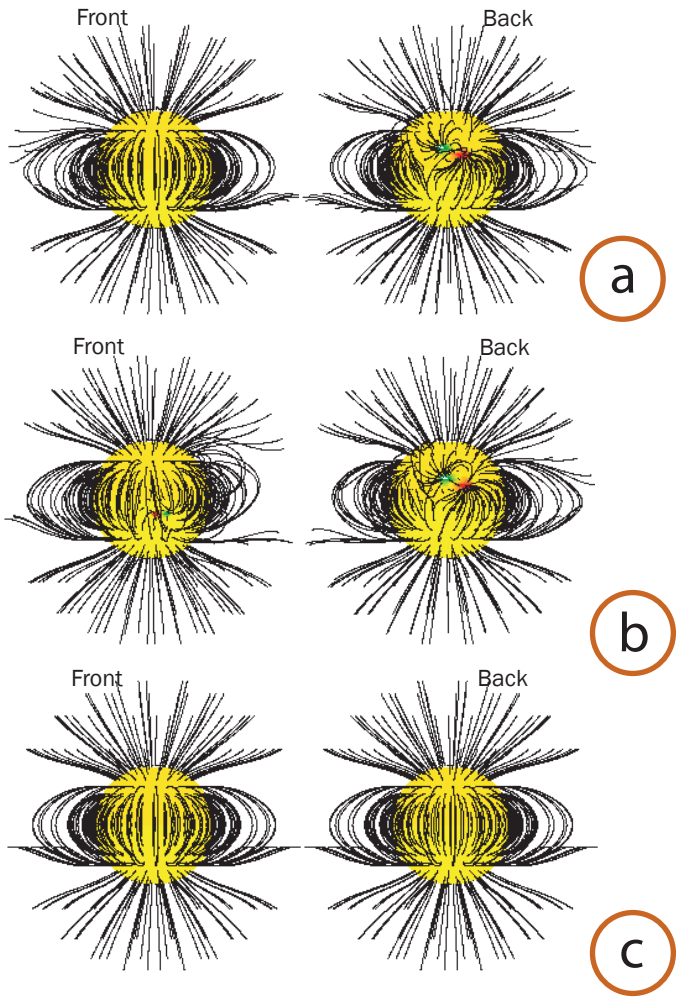
Using models like this scientists can predict the magnetic field configuration of the corona based on observations of the photosphere. They can then evolve the models in time to understand which types of field configurations lead to *solar storms.*

Try your hand at coronal weather forecasting. Match each photospheric magnetic map (1, 2, or 3) with the corresponding coronal field (a, b, or c). Keep in mind that one photospheric map represents both sides of the Sun, flattened out into a single image.

For information about magnetic fields and an on-line version of this activity visit the following Web site:

http://cse.ssl.berkeley.edu/coronalweather/





answers: 1=C, 2=A, 3=B