latitude dependent limb brightness variation. There is a 
measurable "oblateness" shape to this brightness signal. 
Data obtained in two color bands suggest that the signal 
can be interpreted as a temperature variation. Regions near 
+ 50° solar latitude are coolest and the polar and 
equatorial regions are 0.6 ± 0.1 °C hotter. There is some 
evidence that the extreme polar region is slightly cooler 
than the surrounding region.

This research was supported in part by the National Science 
Foundation.

06.10
Solar Dynamo Simulations
G. A. Glatzmaier (LANL)

We present nonlinear, three-dimensional, time-dependent 
solutions of our solar dynamo model. When the dynamo 
operates in the convection zone, the simulated magnetic 
fields propagate away from the equator (in contrast to 
observations) with a period shorter than 23 years because 
our simulated angular velocity decreases with depth and the 
velocity of the convective motions is too large. If, in 
reality, the solar convection zone is too turbulent to 
maintain large-scale magnetic fields, the solar dynamo 
may be operating in the stable region just below the convection 
zone. There our simulated angular velocity increases with 
depth and helicity is much smaller. We describe our attempt 
to simulate such a dynamo in a stratified, rotating, 
spherical shell that includes a stable (subadiabatic) region 
below the unstable (superadiabatic) region.

06.11
Reference Points in the Sunspot Cycle
H.H. Sargent III (NOAA/Boulder)

Epochs of sunspot minimum and maximum are frequently used 
as reference points for relating a variety of phenomena to 
the eleven-year sunspot cycle. It is shown that the minima 
are generally preferable to maxima, for reference purposes. 
Using minima, the average length of sunspot cycles is shown 
to be unchanged over 200 years, although there has been a 
dramatic reduction in the variance of the lengths in the 
modern era. A forecast for the length of the current sun-
spot cycle and the epoch of the next sunspot minimum is 
presented, and the bounds of this forecast are discussed 
briefer.

06.12
Limits on a Stochastic Gravitational Wave Background From 
Observations of Terrestrial and Solar Oscillations
S. P. Boughn and J. R. Kuhn (Princeton U.)

Realistic models of the earth and sun have been used to 
calculate their respective responses to a homogeneous, 
isotropic background of gravitational radiation. Solar 
velocity data constrain the energy density of such a back-
ground at a frequency of 4 x 10^{-11} Hz to be less than 10^{23} 
times the closure density of the universe as does earth 
seismic data at frequencies of 2 x 10^{-3} Hz and 2 x 10^{-2} Hz. 
With improved data soon to be available it is likely that 
both of these limits will be lowered to below closure 
density.

This research was supported in part by the National Science 
Foundation.

Session 7: Solar Corona
1000–1200 (Room 321)

07.01
Coronal Holes: Leaky MHD Waveguides
Joseph M. Davila (NASA/GSFC)

The notion that high speed solar wind streams 
originate in coronal hole regions near the Sun is 
now well established observationally. Models of 
the solar wind flow based on this observation 
indicate that heat conduction alone cannot account 
for the observed properties of the wind and that 
other sources of heat and/or momentum must be 
sought. One suggested source for this additional 
acceleration is "wave pressure" generated by MHD 
waves propagating up from the solar surface. 
These waves should have periods ∼ few hundred 
seconds. But waves with periods this large have 
wavelengths ≤ R_s where R_S is the characteristic 
transverse size of the coronal hole. For these 
waves the coronal hole acts like a "leaky" 
waveguide. The flux leakage through the sides of 
the coronal hole can provide momentum to the wind 
even in the absence of conventional wave 
pressure. The physical principles involved in the 
leaky waveguide approach will be discussed. Some 
of the consequences for a MHD wave driven wind 
will be indicated.

This work was performed while the author was a 
NAS/NRC Resident Research Associate at NASA/GSFC.

07.02
Harmonic Analysis of the Solar and Heliospheric 
Magnetic Fields
J. Todd Hoeksema and P. H. Scherrer (Stanford University)

Using photospheric field measurements from the Stanford 
Solar Observatory from 1976–1983 and a potential field 
model, the spherical harmonics of the global solar 
magnetic field have been calculated.

Near minimum the heliospheric field is predominantly a 
dipole field with a small quadrupole warp which affects 
the IMF at the latitude of the Earth. For several years 
around maximum the magnitudes of the quadrupole and 
octopole components are comparable to the dipole. There-
fore, during most of the cycle the field cannot be 
adequately described as a dipole or tilted dipole.

Analysis of the dipole component shows that the polar and 
equatorial dipoles evolve independently through the cycle. 
This means that the evolution of the field during the 
solar cycle should not be described as a "rotating 
dipole".

The amplitude modulation of the harmonics is suggestive 
of a beating phenomenon among a few signals with closely 
spaced periods. Spectral analysis of the equatorial 
dipole shows dominant peaks at 27.0 and 28.2 days. 
The higher order harmonics have similar characteristics.

07.03
Coronal Currents and the Coronal Magnetic Field
R. Wolfson (Middlebury College)

A coronal magnetic field model is presented that 
includes both volume currents and an equatorial 
current sheet. Two model parameters provide 
flexibility in both the position of the current