paring the observed line intensities of selected multiplets
an attempt has been made to determine the optical thickness
of the lines. Strong saturation effects determine the line
strength at the x ionized elements Fe II, C II, Si II,
while all the other lines are less saturated or optically
thin. For optically thin lines the line width, if inter-
preted the observed broadening, is determined from non-thermal
velocities of 12 km/sec to 25 km/sec in layers where
Si III, Si IV, C IV, N V, e.g., are formed.

*a NASA funded project.

Absolute Intensity of the Continuum in the
Ultraviolet Spectrum of the Sun between 1650-1800A.*
G. BREUCKNER, O. MOB, and E. PITT, E. O. Hulbert Center
for Space Research, Naval Research Laboratory. The
photographic spectra of the August 13, 1970 flight have
been calibrated absolute using a deuterium lamp in the
spectral range 1665 to 1784A, calibrated by Dr. E. PITT
against the German Electron Synchrotron. The lamp cali-
bration was cross-checked with a diode of known quantum
efficiency, measured by R. Camfield at the National
Bureau of Standards. A satisfactory agreement between
both calibrations was found. Calibration spectra were
taken prior to and after flight with the flight instru-
ment in its flight condition. No change in the overall
accuracy of the instrument could be observed within a
calibration r.m.s. error of 26%. Because of the presence
of straylight in the flight spectra, the comparison of the
flight and the calibration spectra was difficult and
leads to some uncertainties. The obtained absolute inten-
sities of the solar spectrum represent a lower limit,
because the effective film sensitivity dropped due to
straylight. A preliminary correction factor is being
determined to account for this systematic error. The high
spatial resolution of the spectra allows an accurate deter-
mination of the center-to-limb variation. The intensity in
the continuum at 24 and 40 arc sec limb distance drops
to approximately 0.6 ± 0.1 from its value at 5 arc min
limb distance.

*a NASA funded project.

Theory of Formation of Solar Rare-Earth Lines.
RICHARD C. CAMFIELD, Sacramento Peak Observatory, AMCR.
It is suggested that the observed appearance of rare-
earth lines in emission over the solar disk inside H and
K and near the solar limb outside H and K is due to
deviations from LTE. These deviations are normal in
weak spectra of atoms whose atomic structure permits
strong interlocking via radiative excitations (Camfield, 1970, paper presented to Boulder AAS meeting).

Fraunhofer-Line Weaknesses in Solar Faculae.
G. A. CHAPMAN, The Aerospace Corporation. Weaknesses
of a limited number of Fraunhofer lines, observed in
the photospheric network (faculae) by Dr. N. Sheeley
at Kitt Peak, are compared to weaknesses computed,
assuming LTE, for several widely different models of
faculae. The computed weaknesses, for that facular
model that satisfies continuum observations, greatly
exceed the observed weaknesses by factors of from
1.5-4 for neutral lines and by factors of 6 or more
for ionized lines. For the neutral lines, the com-
puted weaknesses exceed the observed weaknesses even
for the most conservative facular model used. The
most likely explanation for the discrepancies between
observation and theory is the inadequacy of LTE in
describing the formation of Fraunhofer lines.

Circumstances at Times of Major Flares in Regions
with Small or No Spots. HELEN W. DOSSON and E. RUTH
HEIDEMAN, McMath-Hulbert Obs., Univ. of Mich. In general,
Hg flares of importance 2 and 3 occur during the flare-
rich, nature phase of centers of activity at times when
the large, well developed spots and strong, complex magnetic
fields are present. There are, however, well documented
observations of flares of importance 2 and 3 in con-
stantly spotless and nearly spotless regions. In the
10.5 year interval, 1957.5-1968, such flares constituted
7% of the confirmed flares of importance 2. These flares
were frequently associated with activity in dark filaments.
In a number of cases, the flare emission included two
bright ribbons more or less parallel. Other characteris-
tics of major flares in regions with small or no spots
already have been evaluated and published. (Solar Physics
in press.)

Study of the centers of activity in which the
flares occurred indicated that in many cases these iso-
lated major flares took place close to the time of final
dissolution of the respective regions. Of 66 major flares
in regions with small or no spots, 42 occurred during the
transition in which the last residual spot in the region dis-
appeared. Of these flares, 15 took place 1 to 3 days
before the final disappearance of the spot and 21 devel-
oped after the region had become spotless. Twenty flares
in the study occurred near the time of formation of a
small transient new spot in a dying region. Four of the
flares developed in regions entirely free from spots
during the pertinent disk transit.

According to this study, limited flare occurrence
may represent one aspect of the process by which centers
of activity are dissipated.

Ultraviolet Emission Lines: Density Sensitive Multiple
WITHBROE, Harvard College Observatory. A standard
two-level approximation is found to be inadequate to
analyze the intensities of multiplets from ions of the
Beryllium sequence (i.e., C III, N IV, O V, Ne VII,
Mg IX etc.). Statistical equilibrium calculations show
that each multiplet in an ion has a different dependence
on electron density. Consequently, ratios of multiplet
intensity may be used as a direct measure of the electron
density in the regions of line formation. Theoretical
intensity ratios are used in conjunction with far ultra-
violet spectra from the Harvard experiment on OSO-VI to
derive electron densities in both active and quiet regions
of the solar atmosphere. The implications of these
results upon abundance determinations will also be dis-
cussed.

Inhomogeneous Convection and the Equatorial
Acceleration of the Sun. B. R. DUPREE, National Center
for Atmospheric Research, and I. W. ROXBURGH, Queen
Mary College, London. The interaction of rotation and
turbulent convection gives rise to an inhomogeneous lati-
dude dependent turbulent energy transport. Energy bal-
ance then requires a slow meridional circulation in the
outer convective zone of the sun. The angular velocity
transported by this circulation is balanced in a steady
state by turbulent viscous transport down an angular
velocity gradient. A detailed model is constructed
allowing for the transition from convective transport to
radiative transport at the boundary of the convective
zone, although we assume a narrow convective zone for
computational convenience. The resulting solution gives
equatorial acceleration and a hotter equator than pole,
assuming that convection is preferentially stabilized
at the equator. For agreement with the solar differential
rotation, the model would predict an equatorial
temperature excess of 70K.

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