Solar inputs

Plasma with frozen in magnetic field

Sources:
- quiet Sun
- coronal holes
- CMEs

Observations:
- in situ, at L1

(not at scale)

(SOHO, ESA & NASA)

Interaction with the Earth:
- main magnetic field
  - magnetosphere

Solar wind

Radiations

UV, EUV, X

Sources:
- particle emission in the Solar corona

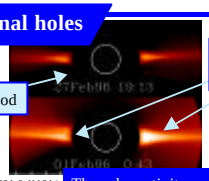
Observations:
- ground based and satellite

Interaction with the Earth:
- atmosphere
  - ionization

Solar indices

Coronal holes

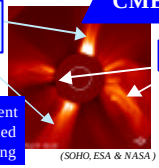
Quiet period



High velocity solar wind related to coronal holes

CMEs

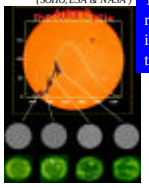
CMEs



(SOHO, ESA & NASA)

There is at present no index dedicated to CMEs monitoring

(SOHO, ESA & NASA)



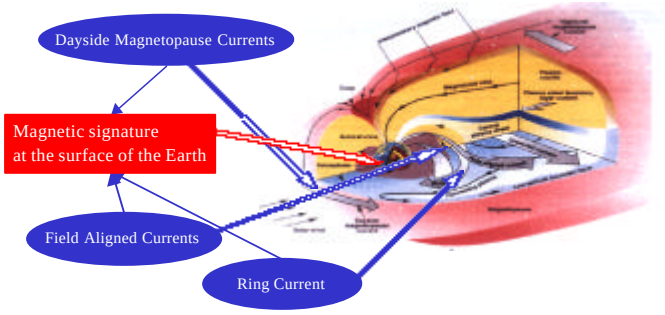
The solar activity related to coronal holes is monitored by the sunspot numbers

Radiations

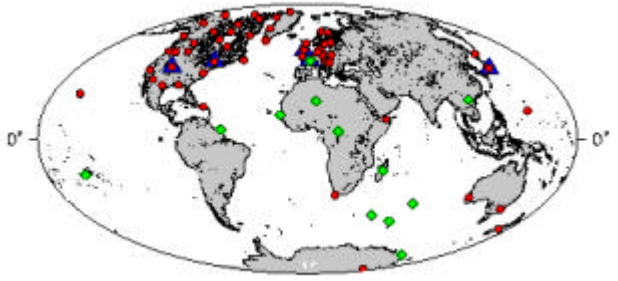
The Solar radiations are monitored by the F10.2 and MgII indices

(Krazshmir & Tilenius, personal communication)

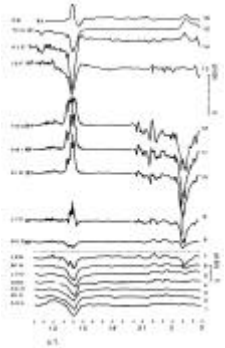
The Earth magnetosphere

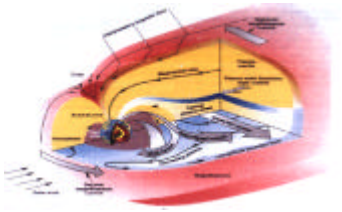


Geomagnetic observatories



Geomagnetic variations





Geomagnetic activity indices

Dst index

Aims at monitoring the Ring Current intensity

The ring current is associated to the flux of trapped particles driftng around the Earth

Dst

AE indices

Aim at monitoring the Auroral Electrojets intensity

The auroral electrojets are associated to the field aligned currents closing in the ionosphere

AU, AL, AE, A0

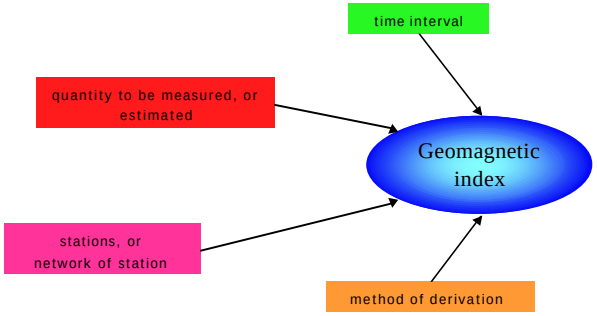
Planetary indices

Aim at monitoring the average intensity of the transient magnetic variations at subauroral latitudes

At subauroral latitudes, the transient magnetic variations are sensitive to different magnetosphere current systems

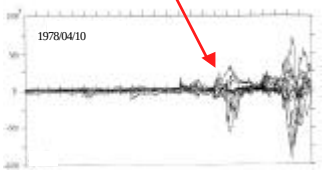
am, an, as; aa; Kp

How to build an index



The quantity to be measured

At present, IAGA indices are computed either from observed deviations with respect to a base line ...



... or from ranges of the variations during a given time interval

The routine on-line availability of digital minute values makes possible to consider new quantities.

Geomagnetic indices: networks

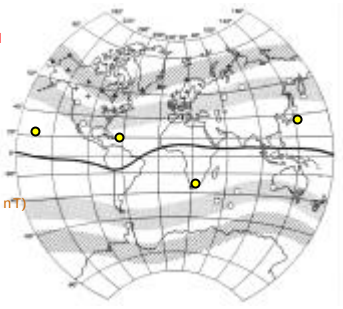
Dst indices

• **Deviation** ΔH (unit: nT) of the horizontal component from a baseline;

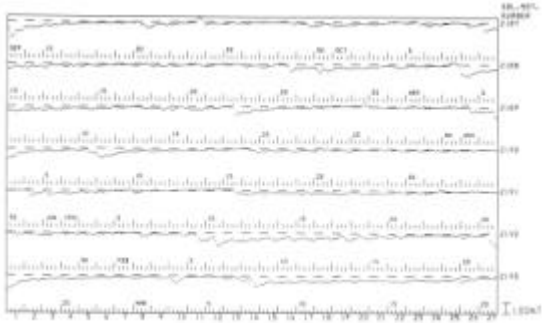
•**hourly values**;

•Network: 4 low latitude stations;

•Hourly values of the disturbance D_i (unit: nT) are calculated for each station.
Dst = [average of D_i] / [average of $\cos\phi_i$]
(ϕ_i: dipole latitude of station i).



Dst indices



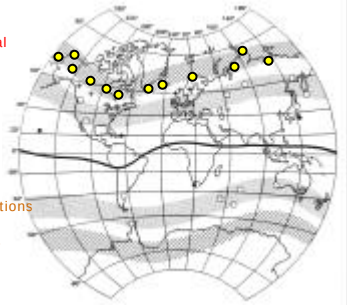
AE indices

• **Deviation** ΔH (unit: nT) of the horizontal component;

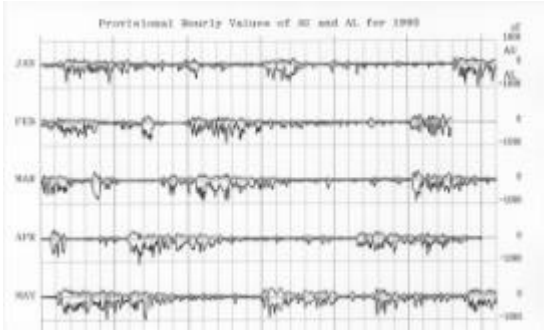
•**1-minute values**;

•Network: **12** stations in the **northern** auroral zone;

•AU is the largest ΔH recorded at the stations of the network at a given time (Upper envelope); AL is the smallest one (Lower envelope).
AE = AU – AL, and A0 = (AU + AL) / 2.



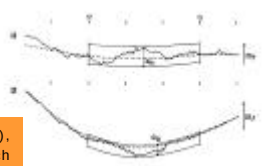
AE indices



The K index

Based upon ranges of the H and D (or X and Y) variations; baseline: Solar Regular variation

Local index



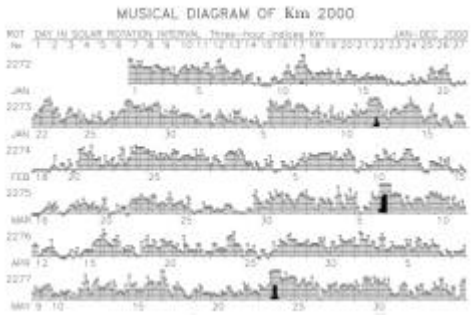
The K index is a code (0 to 9), that indicates the class to which the measured range belongs

3-hour UT time interval

am indices

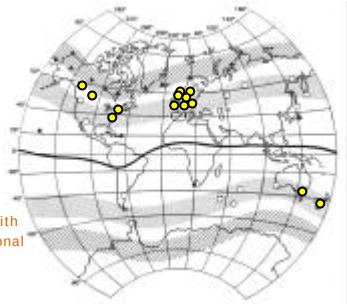
- **K indices** ;
- **3-hour values** ;
- Network: **21 stations** (12 North, 9 South) at subauroral latitudes. The stations are **arranged in groups representing longitude sectors**;
- For each longitude sector, K codes are averaged, and converted into range amplitudes. an (as) is the weighted average of those amplitudes for the northern (southern) hemisphere. am = (an + as) / 2 (unit: nT).

am indices

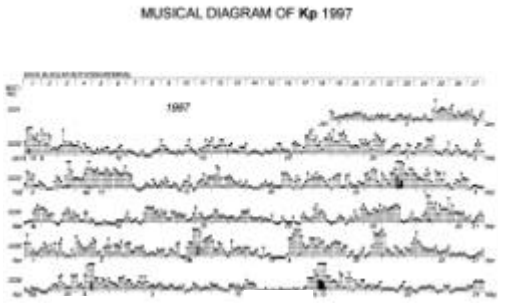


Kp indices

- **K indices**;
- **3-hour values**;
- Network: 13 stations (4 in northern America, 7 in Europe, 2 in Australia);
- K codes from individual stations are converted into standardised codes 3Ks with tables aiming at cancel out UT and seasonal variations. 3Kp = Σ3Ks/13.



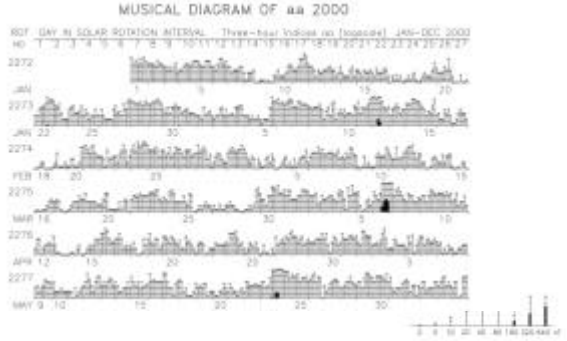
Kp indices



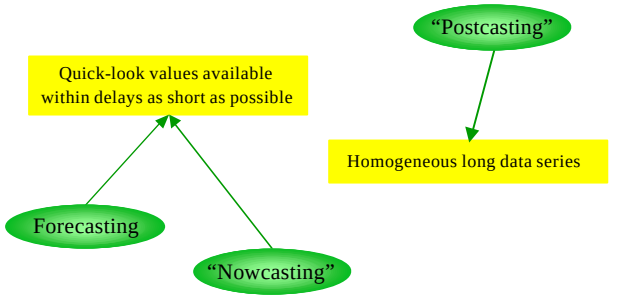
aa indices

- **K indices**;
- **3-hour values**;
- Network: **2 antipodal** stations at subauroral latitudes;
- K codes are converted into range amplitude; aa is the average of the two amplitude values (unit: nT).

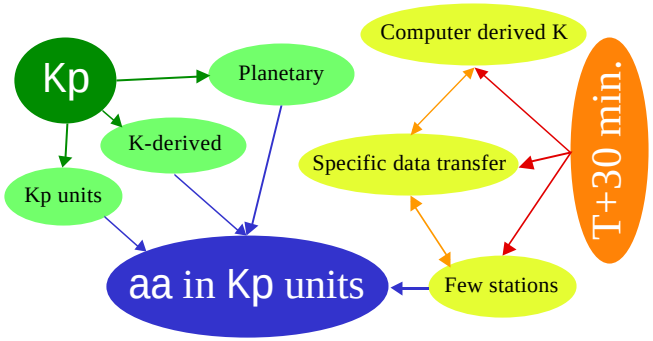
aa indices



Geomagnetic indices and SW



Shorter delay: which index?



The ISGI WWW homepage