

# CONTRIBUTION OF NEW *rms*-BASED GEOMAGNETIC ACTIVITY INDICES TO THE SWARM MISSION

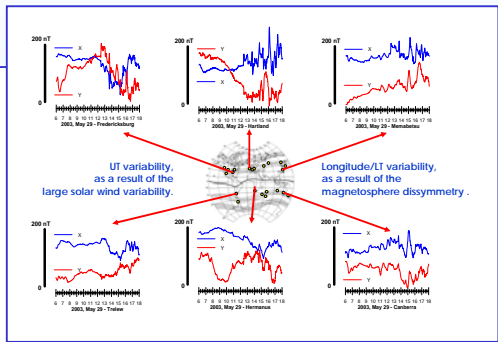
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Magnetic activity is Longitude/LT dependent and has time constants smaller than 3 hours, in particular during intense events.



## The K index

The K index is deduced from the range of irregular variations during the considered 3-hour interval, ...

... and it is the code characterising the class in which the range falls. The limits of these classes depend on the station, and they are proportional to:

K 0 1 2 3 4 5 6 7 8 9  
nT 0 5 10 20 40 70 120 200 330 500

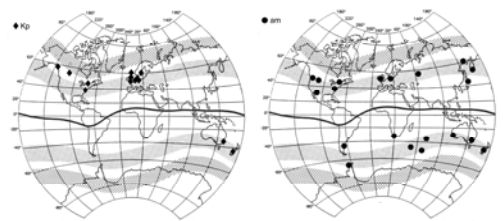
$$\Delta B_x(t) = \Delta B(t) - S_x(t)$$

Estimated on a daily basis

The K index is a proxy of the magnetic energy density when it is measured at a sub-auroral latitude station.

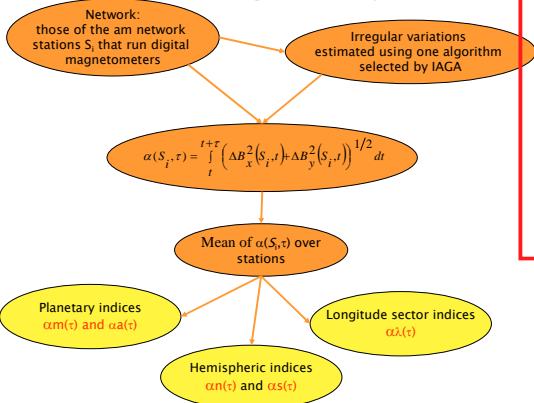
am, aa et Kp magnetic activity indices are based upon K indices measured at planetary networks of observatories and thus monitor geomagnetic activity at the planetary scale, with a 3-hour resolution.

## Kp and am networks

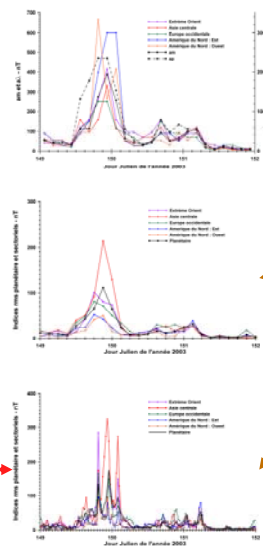


## Time resolution

Indices based upon the root mean square of the irregular activity

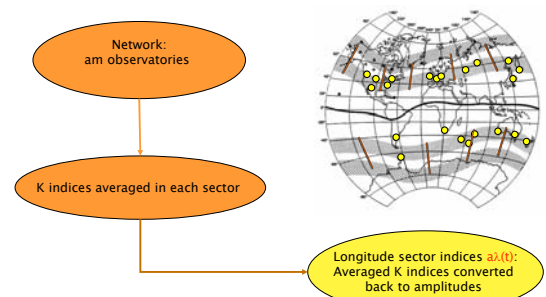


## The late May 2003 event



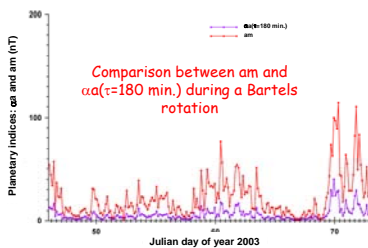
## spatial resolution

Indices based upon clustering into longitude sectors of the observatories of the am network



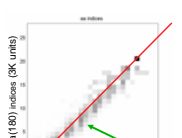
## Comparison between K-derived and rms planetary indices

### Time series

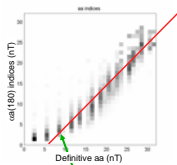


### Statistics

As a first approximation, aa and aa(180 min.) are proportional: aa(180) / aa ~ 0.4...



... but the relation between aa and aa is not the same for low and high magnetic activity...

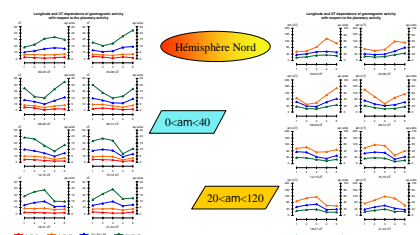
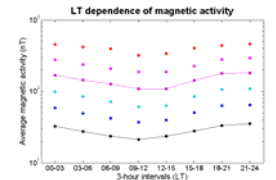


... as it is the case between the range and the rms.

Thermospheric applications: see poster by Lathuillère and Menvielle

## Variation of geomagnetic activity with Local Time and longitude

Mean LT dependence of the regional geomagnetic activity for different levels of the planetary magnetic activity calculated over 1985-2005. Each color corresponds to a different activity level from Km = 3 (black) to Km = 6 (orange) in steps of 1.



Mean longitude dependence of regional geomagnetic activity for different levels of planetary magnetic activity and for each of the 8 3-hour intervals used for K-indices derivation, between July 1976 and June 1977.

am indices are available on-line with a 2 days delay, and aa indices are available on-line with a 30 minutes delay at

<http://isgi.cetp.ipsl.fr>.

Integration of routine new proxies processing in the ISGI service (typically with 15 or 30 mn time intervals) is under development. In the case of aa processing, products may be delivered less than 30 minutes after the end of the interval, i.e. on a 30 minute basis instead of the present 3-hour basis for the quick-look aa indices.



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