3.4 AMPERE

The Ampere shows basically the magnetic field on Earth, resulting in a field aligned current density, and this field is measured by satellites, where in the plot, for instance, if the field vectors point in a certain direction, the tail refers to the satellite position.
For the current density, choosing the North pole, we can see an pattern where the currents encircle the pole, and its intensity are represented by intensity in the color, and the two different colors represent the direction of these currents, where:

Red – Upward currents;
Blue – Downward currents.

Now we must analyse for each time interval the behaviour of these fields and currents, and for each one hour, we plot values which will help us to see when the aurora starts to happen with respect to these parameters.

1800-1900: Between 1800-1810, occurs the highest magnetic activity in this period, after that, the current density is narrow, and no significant phenomena for our case is suggested.

1900-2000: The current density remains narrow with a short increase at 1930, but nothing more.

These results agree with the IMF data, where we see no interaction in this period, and what we expect is that after 2000, the pattern will change.

2000-2100: Around 2010, and also 2050, B gets slightly more intense, so as the current density, but just at 2100, there is a significant increase in activity, comparing to previous times.

2100-2200: The slight increase at 2100 of the current density gets bigger 10 min after, but in the interval 2120-2140, decreases again. But, at 2150, the current density suddenly gets bigger considerably.

2200-2300: This increase continues approximately linear until 2210, where the current density becomes intense, mostly around the area of Greenland, Norway and Russia. At 2250, the currents become more distributed, and higher.

2300-2400: The magnetic activity becomes highly intense from now on, with the current well distributed, around the North pole, and so the B vectors have their peak of magnitude, especially from, 2320 and, this happens also in the Svalbard area, where the other data we are analyzing comes from.

3.5 Ground-Based Magnetometers

Looking at the z-component of B, it it possible to check the field in the Earth. On the plot for Ny Ålesund station, represented bt NAL, we choose the time interval 1800-2400, Svalbard area, scale value «automatic» for the instrument scale in the right order of B value, and a 10s averaging value. The z-component remains approximately constant from 1800 until 2210, where magnetic activity starts to increase, and a sudden even bigger increase around 2240, peaking at 2300, with just a local minimum at 2330 and increasing again to basically the same point in a short period of time, until 2400.