We analyzed the polar and equatorial emission at 17 GHz, 171 Å and 304 Å through synoptic limb charts constructed from NoRH and AIA maps (Figure 1). The synoptic charts cover the period of 2010-2015 show increasing solar activity in the equatorial region, as well as a reduction in the radio polar brightening during the period of maximum activity.

**Equatorial region**

At the equatorial region, the results for the three wavelengths clearly show the hemispheric asymmetry in the solar activity (see for example: Hathaway, 2010). The dominance of the northern hemisphere coincided with the first SSN peak, whereas the second SSN peak occurs simultaneously with increase in the activity at the south (see Fig. 2). There is an interval between the peaks (around the beginning of 2013), which indicates an inversion in the asymmetry of the hemispheric activity. Moreover, the comparison between the hemispheres shows that the peak of activity in the south is more intense, for all three wavelengths.

The stronger southern activity started in the first semester of 2013 and is coincident with the complete polar field reversion of the north pole (Mordvinov et al., 2015). Since solar cycle 20, polar field reversals occurred first in the north (Svalgaard & Kamide, 2013), all those cycles showed a more intense first peak. This trend has clearly changed in the present cycle, being the more intense the second one.

The monthly equatorial radio \( \langle I_R \rangle \) in both hemispheres presented an overall positive correlation with the EUV. The trend has clearly changed in the present cycle, in which the second peak is more intense. A stronger activity in the southern hemisphere was more noticeable at 17 GHz and 304 Å, both formed in the lower atmosphere.

**Polar regions**

In the polar regions, the presence of stable and long lived coronal holes is evident at both EUV wavelengths, identified by the darker patches in Fig.1. We also note an asymmetry of their hemispheric activity, in which the darker patches at the north pole started to disappear earlier than at the south pole, in agreement with the results obtained by Karna et al. (2014). Remarkably, the south pole showed coronal holes in the beginning of 2015, whereas no coronal holes were observed at the north pole in the same period.

The 17 GHz radio emission at the south pole clearly decreases while the SSN increases, and vice-versa; on the other hand, the radio emission at the north pole is almost constant during the studied period. For the EUV bands, \( \langle I_R \rangle \) at the north pole is more intense than the \( \langle I_R \rangle \) at the south throughout the entire analyzed period. At 17 GHz, the south pole dominated in the period (cf. Selhorst et al., 2011; Gopalswamy et al., 2012; Nitta et al., 2014).

This work strengthens the association between coronal holes and the 17 GHz polar brightenings as it is evident in the synoptic limb charts showed in Fig. 1, in agreement with previous case study works (Gopalswamy et al., 1999). The enhancement of the radio brightness in coronal holes is explained by the presence of bright patches closely associated with the presence of increased unipolar magnetic regions underlying the coronal holes (Gopalswamy et al., 1999; Brajša et al., 2007; Selhorst et al., 2010). However, the physical mechanisms that link the radio brightenings and coronal holes are not yet fully understood. Observations of these brightenings with better spatial resolution and also at different radio wavelengths, such as solar observations with the Atacama Large Millimetric/Submillimetric Array (ALMA) (Wedemeyer et al., 2016) might be fundamental to investigate this association.

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Figure 1: Synoptic limb charts obtained for 171 Å (top panel), 304 Å (middle panel) and 17 GHz (bottom panel). Running means of 3 days were applied in the synoptic charts of each wavelength. The dotted lines delimit the south (60° and 120°) and the north (240° and 300°) poles.

Figure 2: Monthly mean equatorial $I_R$ at (a) 171 Å, (b) 304 Å and (c) 17 GHz. The red and blue curves are the mean equatorial $I_R$ in the south and north hemispheres, respectively. For comparison, the monthly sunspot number for each hemisphere are also shown (d).

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