

## オーロラ帯から中緯度まで含む緯度帯で Pi2 は Cavity/waveguide モード？

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### Are Pi2 pulsations cavity/waveguide modes from auroral zone to mid latitudes?

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We show that the cavity/waveguide modes (Allan et al., 1996) explains the polarization characteristics (ellipticity and orientation of the major axis) of the ground Pi2 pulsations from the auroral zone to mid latitudes, when the third harmonic deformations of the poloidal component of the geomagnetic field lines were taken into account in the auroral zone (Saka et al., 2012).

Specific points are as follows:

1. The cavity/waveguide modes with the third harmonic deformations generate a pair of loop currents in the ionosphere, one propagating westward in the western sector and the other eastward in the eastern sector. The propagating current pair produces the wave polarizations in the auroral zone in a manner consistent with ones in the polarization map in Samson and Harrold (1983).
2. The current pair extending  $\sim 60^\circ$  in longitudes ( $\sim 3000\text{km}$ ) in the auroral zone may yield magnetic field perturbations in the mid latitudes resembling ones associated with the substorm current wedge. The cavity/waveguide modes propagated to the mid latitudes plus perturbations by the current loops explain the wave polarizations of the mid-latitude Pi2's in Lester et al. (1983).
3. The cavity/waveguide modes accompanying the closed Hall currents in the ionosphere are not a part of the substorm current wedge but may form a new M-I coupling (see Fig.1).

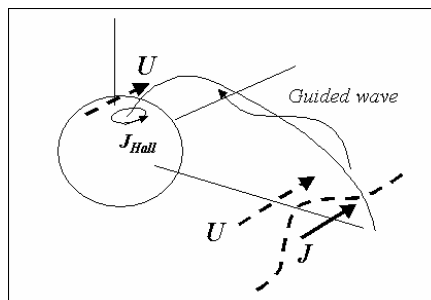


Figure.1 A new perspective of M-I coupling caused by the Alfvén waves (Saka et al., ANGEOS, 2014)

**References**

Saka et al., Pre-onset auroral signatures and subsequent development of substorm auroras, *ANGELO*, 2014.

Saka et al., Third harmonic excitation of Pi2, *JGR*, 2012.

Allan et al., Are low-latitude Pi2 pulsations cavity/waveguide modes?, *GRL*, 1996.

Samson and Harrold, Maps of polarizations of high latitude Pi2's, *JGR*, 1983.

Lester et al., Polarization patterns of Pi2 magnetic pulsations and the substorm current wedge, *JGR*, 1983.