

## CHAPTER 5

### Conclusions

The result of this research shows correlation between fitted data and observed data of Io's magnetic footprint in northern and southern auroral regions. The strong volcanic eruptions in late February 2007 and late May 2007 suggest to have strong influence over Io's magnetic footprint brightness. One explanation is that volcanic activities could result in the enhancement of charged particles, which travel from Io toward Jupiter atmosphere. In addition, the extended angle of each spots were analyzed with the duration of volcanic eruptions on Io. This conclusion is as follows:

1) One of the key factors has effect to brightness of Io's magnetic footprint is volcanic activity on Io. In addition, the extended angle as a result of Alfvén disturbance and limb brightening factor correspond with position of Io in plasma torus.

2) In northern hemisphere, Io's magnetic footprint has a high variation than those in southern hemisphere. This brightness variation could be influenced by Jupiter's magnetic field intensity. Consistent with model of VIP4 by (Connerney et al., 1998), the intensity of magnetic field in northern hemisphere is stronger than that in southern hemisphere. However there is no confirmation for the actual cause of this asymmetry.

3) The brightness of Io's magnetic footprint corresponds to positions of Io in plasma torus, as a function of Io's system III longitude, while the magnetic field corotates with Jupiter's rotation. These factors could affect the extended angle of the footprint. On the other hand, the variation of magnetic field strength in Jupiter's ionosphere should be taken into consideration. The roles for all these factors of controlling the morphology of Io's magnetic footprint should be investigated further in detail.

## 5.1 Future Work

This work presents the different brightness variation of Io's magnetic footprint in northern and southern hemisphere. Several expectations of influence from magnetic field strength and asymmetry of magnetic field between both hemispheres was arised. Including with the factors that controlled extended angle of Io's magnetic footprint, there should be studied in more detail about;

- 1) Analyzing the effect of magnetic field strength variation on extended angle and brightness variation of Io's magnetic footprint.
- 2) Based on the magnetic field strength in ionosphere of Jupiter, and its effect on Io's magnetic footprint brightness and extended angle of footprint spots, the connection between Io's system III longitude, corresponding to Io's location in plasma torus, and magnetic field mapping into Jupiter's ionosphere, should be investigated.