**The Formation and Evolution of Large Scale Magnetic Fields in Venus Ionosphere** Y. J. Ma[1], G. Toth[2], A. F. Nagy[2], C. T. Russell[1], [1]Department of Earth Planetary and Space Sciences, University of California Los Angeles, Box 951567, Los Angeles, California 90095 (yingjuan@igpp.ucla.edu), [2]CLAPS, University of Michigan, Ann Arbor, MI, 48105

**Introduction:** Early statistical studies based on magnetometer observations of Pioneer Venus Orbiter (PVO) show that although the dayside ionosphere of Venus is often "field-free" except for fine scale features, large-scale magnetic fields are occasionally observed [1]. These large-scale fields are mainly horizontal, usually shows a distinct minimum near ~ 200 km altitude, and often occur during high solar wind dynamic pressures periods. The formation and evolution of these large-scale fields are not well understood due to the lack of coordinated multi-points measurement at Venus.

**Methodology:** In this study, we use a sophisticated multi-species MHD model that has been recently developed for Venus [2] to characterize the changes of magnetization state of the dayside Venus ionosphere under varying solar wind dynamic pressure. The global MHD model solves the densities of four ion species ($H^+$, $O^+$, $O_2^+$ and $CO_2^+$), and plasma bulk velocity, temperature and magnetic field vectors. Ion chemistry is self-consistent included in the model when calculate the densities of individual ion species. The model uses a spherical grid, with the finest radial grid size of 5 km, comparable to the neutral scale height near the inner boundary of the calculation domain, which is set at 100 km altitude. In the simulation, the solar wind density is enhanced by a factor of 2 at 1 hour and the density enhancement lasted for 1 hour and then return to normal condition.

**Numerical Results:** The time-dependent model results are examined in detail to understand the system response to the varying solar wind conditions. we found that the compression/relaxation time of the bow shock and the induce d magnetosphere are quite short (~ 1-2 min). Large horizontal field gradually forms when the solar wind dynamic pressure is larger than the ionospheric thermal pressure. However, it takes much longer time (~ hour) for the field to penetrate into the ionosphere and the decay time of the magnetic field in the ionosphere is also significant. Model results also show that the large scale magnetic field in the ionosphere acts as additional obstacle to the solar wind.

**References:** [1] Luhmann et al. (1980) GRL, 7, 917-920. [2] Ma et al. (2013) JGR, 118, 321–330.