一、參加會議經過
The topics mainly attended were in the session related to solar terrestrial physics that included coupling in atmosphere, ionosphere and magnetosphere, dynamic processes in the ionosphere and magnetosphere, physical and chemical processes in the atmosphere and ionosphere, ionospheric irregularities, space weather and space climate, and also the advances in ionosphere forecasting through observations and modeling. There were multiple sessions discussing space weather effects. Also, there were a few sessions focusing on understanding atmospheric and ionospheric signatures associated with natural hazards, emphasizing on earthquake related effects. The
meeting had several Axford and Distinguished lectures by renowned scientists in various fields. There was also opportunity to listen to some of the presentations in sessions related to planetary sciences, atmospheric sciences and meteorology.

二、與會心得

The meeting had multiple sessions related to the studies of magnetosphere-ionosphere coupling as well as space weather effects in ionosphere. There were presentations discussing the variations in high-latitude regions related to changes in solar wind dynamic pressure as well as on the magnetospheric energy input to ionosphere through the interaction of precipitating energetic particles with the atmosphere. Energetic particle precipitation at high latitudes is one of the sources of atmospheric variability during magnetic disturbances. There was a session dedicated to discussing the space weather research operations in Asia Oceania region. The speakers detailed the on-going efforts related to space weather studies in Japan, Korea, and Taiwan, and the following discussions highlighted the importance of more regional as well as global collaborations for coordinated observations and modeling efforts. There were many presentations and detailed discussion related to the efforts about forecasting space weather events. The current efforts are related to forecasting the magnitude and direction of solar wind magnetic field following earth directed CMEs using data and modeling, making real-time interplanetary shock prediction system, and ring current prediction. Many talks emphasized on the importance of having satellite observations to gather information about the space weather drivers that could be used for making forecasts. The talks elaborated the attempts to develop plasmasphere-ionosphere models and emphasized on the requirement for more measurements and data assimilation efforts to improve model forecasts. One of the speakers illustrated how raid variation in Dst could be
used as an indicator of understanding severe space weather events. Such rapid variations occur in response to impulsive variations of solar wind pressure. There was also discussion regarding new index to represent equatorial ionosphere using satellite observations.

Dynamic processes in the ionospheric-magnetospheric coupling in the high-latitude region was discussed in some of the sessions. All sky auroral imagers were used for studies of high-latitude ionosphere, together with scintillation measurements and SuperDARN. There were many presentations discussing the modeling efforts to understand the coupling processes, especially related to modeling storm time ionosphere. Whole atmospheric coupling models are being developed including input from lower atmosphere and MLT dynamics and ionosphere variations. There were also presentations showing strong vertical coupling between lower atmosphere and ionosphere by studying the variability of equatorial electrojet and Sq currents. There are also attempts to develop interface to merge existing models in different regions such as SAMI3, GITM and RCM. Another presentation showed the application of SAMI3 in investigating sporadic E layers. There were also presentations showing attempts to study global plasma bubble occurrence using Swarm satellite measurements.

There were many talks showing the results of coupling between thermosphere and ionosphere. There were studies to investigate the possible relationship between MTL dynamics and geomagnetic storms. The results revealed different patterns in the behavior of tidal components, showing that the energy during the storm period cause additional variations in the dynamics. The influence of dynamics and variabilities during sudden stratospheric warming periods in the generation medium scale traveling ionospheric disturbances was illustrated using ground-
based GPS network.

三、發表論文全文或摘要

Investigation of Equatorial Plasma Bubbles During 2015 St. Patrick’s Day Storm by Data Assimilation and Model Simulations

This study examines equatorial plasma bubble activity during the 2015 St. Patrick’s Day storm that occurred when solar activity had reached its maximum after a prolonged minimum. The forecast results after assimilating total electron content (TEC) measurements using ground network of global positioning system (GPS) receivers into thermosphere ionosphere electrodynamics global circulation model are used for the study. Ground based all sky imager observations as well as rate of change of TEC index are used to infer plasma bubble activity during the storm. The observations show plasma bubble occurrence over Indian and American longitudes, whereas their absence over Taiwan and African longitudes. The growth rates of Rayleigh-Taylor instability are calculated using the data assimilation output and the results are compared with the bubble observations to understand the behavior of plasma instability process at different longitude sectors during the storm. The calculated growth rates agree with the bubble observations, indicating that the influence of penetration electric fields and the electron density gradients at altitudes around 300 km or above provide favorable conditions. To further understand the irregularity generation, simulations are carried out using SAMI-3 ESF model, after projecting the data assimilation results to the model grid. The results of the simulations and the ionospheric response during the storm leading to the generation/inhibition of plasma bubbles over different longitudes are discussed.

四、建議

The conference had several distinguished lectures and invited talks, events such as meet the experts and short presentations by young researchers, as well as special presentations during poster viewing hours. Several important topics related to thermosphere and ionosphere dynamics were very useful and many studies emphasized on the importance of neutral wind in thermosphere-ionosphere coupling processes. The presentations on space weather studies, especially related to modeling and forecasting ionospheric response during such events were encouraging. The success of using the data assimilation
forecast from NCKU to calculate plasma bubble growth rates during magnetic disturbance is an important step in this direction.

五、攜回資料名稱及內容

The meeting materials, leaflets and flyers of several scientific projects and upcoming missions, information about several scientific journals for reporting research results.

六、其他

There was great opportunity to meet and interact with many scientists. Regarding the results reported in the meeting, some of the researchers working on similar research problems found the results very useful for their work and were very interested in more discussions. There were several excellent presentations and very useful discussions also. Overall it was a nice learning experience to listen some of the recent developments and also gave a good platform to exchange information and ideas and interact with many scientists from other countries with similar interests.