Complex behaviours of solar wind and ionospheric plasmas can be investigated directly by observing radio scintillation. In this talk I will summarize some interesting results stemming from the use of radio scintillation observations of plasma irregularities in the solar wind during a complex series of transient solar wind events in 2007. I will also describe opportunities for using scintillation to study the behaviour of the high-latitude ionosphere in combination with statistical modelling of data from other sources. These studies demonstrate how important scintillation observations are in providing a level of detail in our understanding of plasma behaviour in a solar-terrestrial context, which is not easily obtainable by other means. I will also give a brief overview of the Advanced Ensemble Electron Density Assimilative System (AENeAS); a tool for forecasting ionospheric scintillation at equatorial latitudes by assimilating observable data into a physics based background model using local ensemble transform Kalman filtering.

Slide 1

Ok so to follow on from Alan, this part of the talk will be an overview of some of the results we've obtained in a recent statistical study on the coupled ionosphere-thermosphere which is now out in the current issue of JGR Space Physics.

So just to recap, as we know, the ionosphere is a weakly ionised plasma which is embedded within the thermosphere - the neutral atmosphere - and as such it stands to reason that these two populations of particles will interact with each other. Futhermore we should expect that any space weather driven variability in the ionosphere is going to have some knock on effects in the thermosphere, and vice versa.

So these two populations are coupled physically.

Slide 2

So why a statistical study? Well I show this slide principally to demonstrate why which is that there are a very large number of geophysical variables which can affect how the ionosphere-thermosphere system behaves.

Most of these effects can be traced indirectly back to solar activity, but as you can see, there are many ways in which this acticvity is effective upon the ionosphere-thermosphere system.

Describe a select few variables

Slide 3

Introduce the Dungey cycle.