Oscillations in Emerging Active Regions on the Sun
Mathew Garcia¹, Andrea Minot², Karin Muglach³, Raphael Attie⁴
¹College of the Desert, Palm Desert, CA, ²Dickinson College, Carlisle, PA, ³NASA GSFC Code 674, ⁴NASA GSFC Code 671

INTRODUCTION
What are Active Regions?
An active region (AR) is an area on the sun with a prominent bipolar magnetic field. This dense magnetic bipolarity is what makes an active region different from the surrounding "quiet" sun. The plasma medium of the sun follows the magnetic field lines of an active region causing characteristic magnetic flux "topps" to emerge. If an active region is on the edge of the solar disk (the "limb"), these coronal loops are traced out against the sky. The appearance of an active region, however, depends on both the wavelength is it viewed in as well as the angle at which it is observed. Figure 1 shows an AR in extreme ultraviolet, in a magnetogram, and at the limb. The sun is a dynamic system and has many processes in play making any one active region temporary and their lifetime depends mostly on their size (Canfield, R. 2000).

Active regions can produce solar flares and coronal mass ejections (CMEs). A CME is the mass discharge of magnetized plasma from the surface of the sun. CMEs are of particular importance to space weather forecasters and scientists in general because they are well known to cause strong geomagnetic storms that potentially have serious impacts on our ionosphere, atmosphere, and on the ground.

Space Weather Forecasting
Space weather forecasters in the Community Coordinated Modeling Center (CCMC) at NASA Goddard are able to use tools like the integrated Space Weather Analysis system (iSWA) to study atmosphere, and on the ground.

RESULTS
Comparing the flux emergence time with the change of the 5-minute and 3-minute oscillations power, it can be seen at the time the AR starts to emerge, the oscillation power decreases. It is a well-known fact that magnetic fields on the sun, above a certain field strength, suppress the plasma dynamics including solar oscillations. The 5-minute oscillation power decreases for a whole period of time (until the end of our observing time). The 3-minute power oscillations first start to decrease at about hour 14, then it starts to increase again. The increased 3-minute oscillation power around ARs have been observed before (e.g. Muglach et al. 2005, Hansell et al. 2015) and are called oscillation power hysteresis. They are most likely the cause of the power increase in Graph 2 although it is spatially integrated.

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