Information to Provide to Rene':

TITLE**: A PROTOTYPE HAIL DETECTION ALGORITHM AND HAIL CLIMATOLOGY DEVELOPED WITH THE ADVANCED MICROWAVE SOUNDING UNIT (AMSU)**

AUTHOR(S) & EMPLOYER(S) NAME or AFFLIATION: **Ralph Ferraro (NOAA NESDIS), James Beauchamp (University of Maryland), Dan Cecil (NASA MSFC), Gerald Heymsfeld (NOAA GSFC)**

TYPE OF PUBLICATION:
        Abstract __x__ Book _____ Conference Paper _____ Conference Presentation _____ ;
        Technical Publication _____ Public Website _____ Journal Manuscript __ ;
        Other (describe)_____; Meeting Presentation _____ ;

 CONFERENCE, MEETING, or WORKSHOP: **20th Conference on Satellite Meteorology and Oceanography**

CONFERENCE SPONSOR: **American Meteorological Society**

CONFERENCE LOCATION: **Phoenix, AZ**

CONFERENCE DATES: **Jan 4-8 2015**

JOURNAL OR BOOK NAME:

WEBSITE URL: http://annual.ametsoc.org/2015/index.cfm/programs-and-events/conferences-and-symposia/20th-conference-on-satellite-meteorology-and-oceanography-11th-symposium-on-new-generation-operational-environmental-satellite-systems-and-third-ams-symposium-on-the-joint-center-for-satellite-data-assimilation/

Author: Ralph Ferraro, James Beauchamp, Dan Cecil, Gerald Heymsfeld

Short Abstract: In previous studies published in the open literature, a strong relationship between the occurrence of hail and the microwave brightness temperatures (primarily at 37 and 85 GHz) was documented. These studies were performed with the Nimbus-7 SMMR, the TRMM Microwave Imager (TMI) and most recently, the Aqua AMSR-E sensor. This lead to climatologies of hail frequency from TMI and AMSR-E, however, limitations include geographical domain of the TMI sensor (35 S to 35 N) and the overpass time of the Aqua satellite (130 am/pm local time), both of which reduce an accurate mapping of hail events over the global domain and the full diurnal cycle. Nonetheless, these studies presented exciting, new applications for passive microwave sensors. Since 1998, NOAA and EUMETSAT have been operating the AMSU-A/B and the MHS on several operational satellites: NOAA-15 through NOAA-19; MetOp-A and -B. With multiple satellites in operation since 2000, the AMSU/MHS sensors provide near global coverage every 4 hours, thus, offering a much larger time and temporal sampling than TRMM or AMSR-E. With similar observation frequencies near 30 and 85 GHz and additionally three at the 183 GHz water vapor band, the potential to detect strong convection associated with severe storms on a more comprehensive time and space scale exists. In this study, we develop a prototype AMSU-based hail detection algorithm through the use of collocated satellite and surface hail reports over the continental U.S. for a 12-year period (2000-2011). Compared with the surface observations, the algorithm detects approximately 40 percent of hail occurrences. The simple threshold algorithm is then used to generate a hail climatology that is based on all available AMSU observations during 2000-11 that is stratified in several ways, including total hail occurrence by month (March through September), total annual, and over the diurnal cycle. Independent comparisons are made compared to similar data sets derived from other satellite, ground radar and surface reports. The algorithm was also applied to global land measurements for a single year and showed close agreement with other satellite based hail climatologies. Such a product could serve as a prototype for use with a future geostationary based microwave sensor such as NASA's proposed PATH mission.