1. INTRODUCTION

A suite of products has been developed and evaluated to assess meteorological hazards to aircraft in flight derived from the current generation of Geostationary Operational Environmental Satellite (GOES). The existing suite of products includes derived images to address seven major aviation hazards: fog, aircraft icing, microbursts, turbulence, volcanic ash, convective initiation, and enhanced-V and overshooting top detection. Some products have been developed for the purpose of implementation into the National Weather Service AWIPS. The fog, icing, volcanic ash, convective initiation, and enhanced-V and overshooting top detection products, derived from the GOES imager, utilize algorithms that employ temperature differentiating techniques to highlight regions of elevated risk to aircraft. In contrast, the GOES microburst products employ the GOES sounder to calculate risk based on conceptual models of favorable environmental profiles for convective downburst generation. It is proposed to adapt the current suite of aviation product algorithms, with modifications and enhancements, for the GOES-R Advanced Baseline Imager (ABI). In addition, a product for nowcasting convective initiation based on the GOES imager developed at CIMSS is anticipated to be incorporated into the suite of GOES-R derived aviation products. This poster will provide a general overview of legacy candidate algorithms as well as outline proposed development activity pertaining to aviation weather applications.

2. VOLCANIC ASH

Example experimental products recently developed at NOAA/CIMSS

- **Ash Mask**
- **Microphysics**
- **Cloud Height and Emissivity**

3. ICING

Basis for Icing Detection

- Supercellular liquid water (SLW) in cloud
- Equal water content, LWC
- Presence of large droplets, SLD
- VISST detects SLW: Tc < 272 K, phase = water
- Liquid water path: LWP = f(SLD)
- Effective radius, re = f(SLD)

Preliminary Icing Classification Algorithm

1. No icing: Tc > 272 K, clear, or ice cloud with OD > 6
2. Moderate: ice cloud, OD > 6
3. Heavy: ice cloud, OD > 6

Icing severity (IS)

For observed re, IP(re) = f[IP(5), IP(16)]

IP < 0.7; high, IP > 0.7

4. Convection Initiation

**CI Nowcast Algorithm: 4 May 2003**

- Satellite-based CI indicators provided 30-45 min advance notice of CI in E. and N. Central Kansas.
- PODs = 55% at 1 km (FARs = 40%)
- NEW Linear Discriminant Analysis methods provide > 65% POD scores for 1-hr convective initiation.

5. OVERSHOOTING TOPS/ENHANCED-V DETECTION

- Overshooting Tops
- Enhanced-V

6. TURBULENCE

- Mountain Wave Turbulence
- Convectively Induced Turbulence

7. FOG AND LOW CLOUDS

- **Fog**
- **Low Clouds**

8. MICROBURSTS

The GOES Microburst Windspeed Potential Index (MWPI) algorithm, derived from merging VISST and retrieves, is designed to infer the presence of a convective boundary layer. MWPI = CAP(6/100) + G + (T - Td)850 -( T - Td)670

Corresponding author addresses:

Wayne F. Feltz, Cooperative Institute for Meteorological Studies UW-Madison
- 700 W. Dayton St, Madison, Wisconsin 53706
  - E-mail: waynef@wisc.edu
- John R. Mecikalski, Assistant Professor
  - Department of Atmospheric Sciences
  - University of Alabama in Huntsville (UAH)
  - 320 Sparkman Drive
  - Huntsville, Alabama USA 35805-1912
  - Web: http://nsstc.uah.edu/johnm
  - E-mail: john.mecikalski@nsstc.uah.edu
- Michel J. Pavolonis (NOAA/NESDIS), 1225 W. Dayton St.
  - Madison, WI 53706
  - E-mail: mpav@ssec.wisc.edu or Mike.Pavolonis@noaa.gov
- Kenneth Pryor, Satellite Meteorology and Climatology Division, Operational Products Development Branch, NOAA/NESDIS/STAR, Room 711
  - 5200 Auth Rd., Camp Springs, MD 20746-4304
  - Web: http://nsstc.uah.edu/johnm

This research was supported by the NASA LARC Subcontract #4400071484. More information can be found at http://cimss.ssec.wisc.edu/snap/