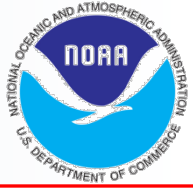# Cloud User Feedback

Andrew Heidinger, NOAA/NESDIS/STAR, Team Lead

January 7, 2013
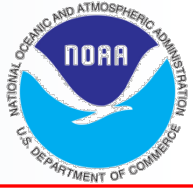
Cloud Product Users

- ## U.S. Users
  - AFWA – Air Force Weather Agency – (Jeff Cetola)
  - NOAA NWP (GFS, RAP)
  - FNMOC
  - NWS through JPSS PG

- ## User Community
  - Navigation, Transportation
  - Operational Weather Prediction
 - Climate Research through NOAA CLASS.
  - DOD

Outline

- User Applications

- User Specific Issues with the VIIRS Cloud Properties
  - Cloud Product Coverage
  - Cloud Product Quality Flags

Potential Application of VIIRS Cloud Heights

- One immediate application of VIIRS CTH would be the inclusion in the PSDI funded project to "morph" AVHRR CLAVR-x CTH over Alaska.
- CLAVR-x is the legacy NOAA Operational AVHRR system which also processes VIIRS.
- Wide Swath of VIIRS is ideal.
- Current biases between IDPS and CLAVR-x would need to be addressed.
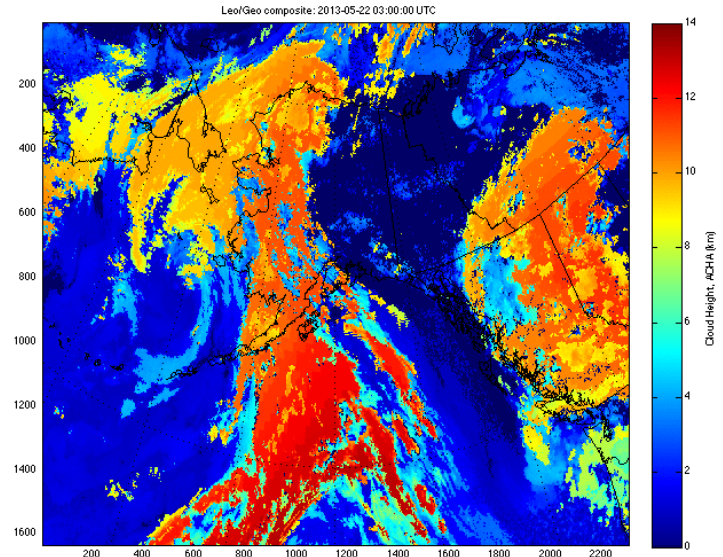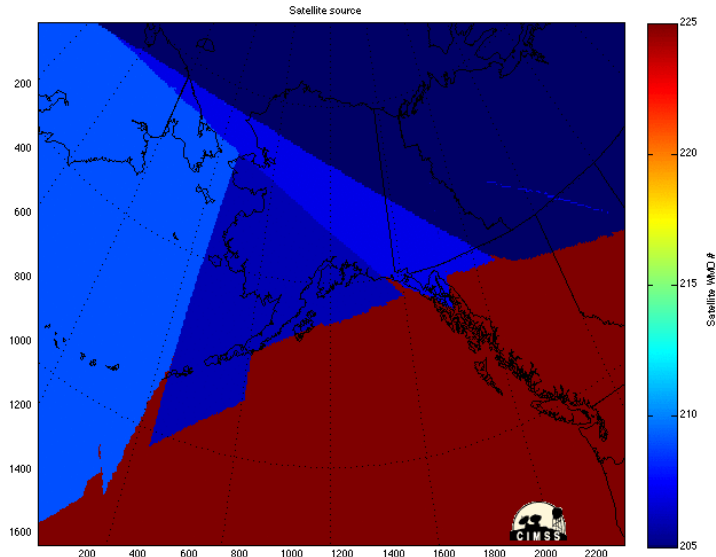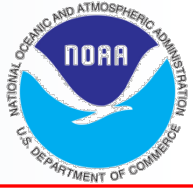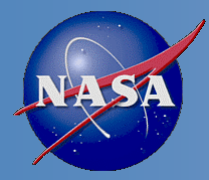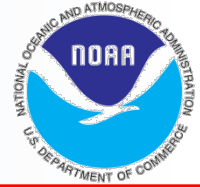
- Information has not changed from Beta Briefing.

- POES Cloud Products (CLAVR-x) used for there verification database for GFS and NAM.

- CLAVR-x output being reformatted to GRIB to increase ease of use by NCEP. No plan to do same to VIIRS.

- IDPS cloud amounts lower than CLAVR-x and MODIS – may cause difficulty in Monitoring.

- The IDPS does not generate cloud products for Probably-Cloud Pixels.

- This differs from CLAVR-x and MODIS.

- Roughly 5-10% of Globe is Probably-Cloudy by the VCM.

- Also, VCM tends to detect less cloud (right or wrong) than CLAVR-x or MODIS.

- These two effects cause a shift in the distribution of IDPS cloud products. (thin cloud disappear)

- Image shows distributions of daytime cloud optical depth (COD) for September 21, 2013 for IDPS and CLAVR-x.

Impact of probably-cloudy exclusion
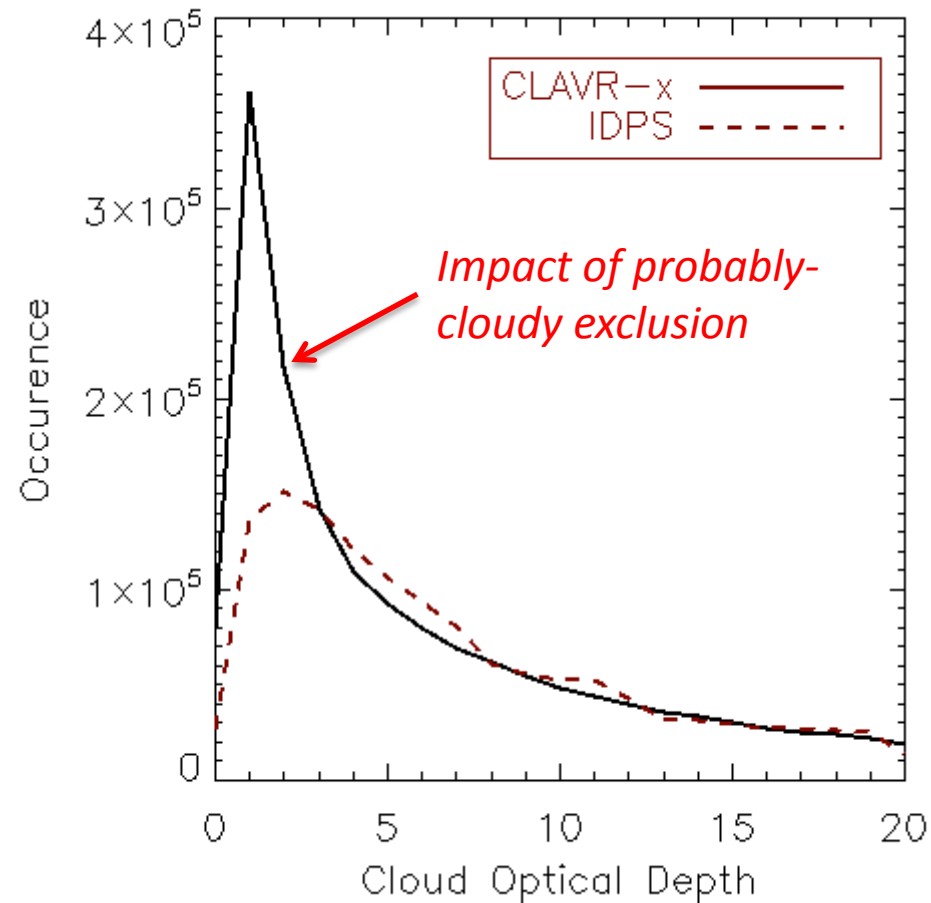
- IDPS Cloud Product Quality Flags are geared towards CAL/VAL activities.

- Recommend having a user-lead discussion on enhancing the Quality Flags for user applications.

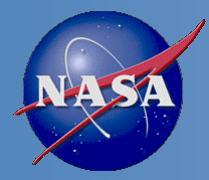- Making flags similar to GOES-R format would be a definite benefit.

Suggestion for a COP Quality Flag Specification

QF1	Bit	Description	
COP_PRCS_FLAG	0	0 - not processed 1- processed	**Process Flags**
COP_QF_OVERALL	1	0 –Valid retrieval 1- not valid	
COP_QF_COT_OUT_BOUNDS	2	0 – Inside 1 - outside	**Quality Flags (Fail or Pass)**
COP_QF_EPS_OUT_BOUNDS	3	0 – Inside 1 - outside	
COP_QF_CONVERGENCY	4	0 – convergent 1- not	
COP_QF_GLINT	5	0- outside glint 1- in sun glint	**Degraded**
COP_DEGRADED_ICE_COT	6	0 – not 1 – COT > 10	If Q1/B0 EQ '1

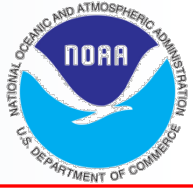| QF2	Bit	Description	When to apply
COP_INFO_ICE_WAT	0	0- Ice, 1- Water	**Information**
COP_INFO_DAY_NGT	1	0- Day 1- Night	
COP_INFO_TYPE	2-4	0-5 Cloud Types	If Q1/B0 EQ '1

Thank You!

Quality flag definition evaluation
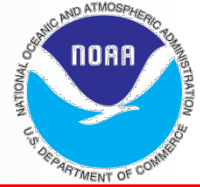
- **Missing information in quality definitions:**
  - It is not clear which pixels are used for ice and water phase tables
  - Information of terminator criteria is missing.
  - Some Quality flags are relied on these information; it is not possible to use them without terminator or ice/water separation definition.
  - It is not clear if a quality flag is a warning or a failure.
  - Quality flags have contradictory lower bounds for COT
- **Physical concerns**
  - COT is defined as valid only from 0 to 30 (Much higher values are possible without quality limitations at daytime)
  - Effective Particle Size range is defined between 0 and 50 micron also for water clouds (Cloud liquid droplets bigger than 40 micron are physically unlikely)
  - Nighttime has identical bounds, even the sensitivity for the given algorithm approach is not given for clouds thicker than COT equal 8 (but, there are different informmation in the tables in the ATBD and the OAD)

- **Summarize**: It should be considered to revise the present quality flag definition

Quality flag analysis of COP

- For the following evaluation we assumed the following:
  - Water phase: (COP_PHASE_WATER , COP_PHASE_MIXED)
  - Ice Phase (COP_PHASE_CIRRUS, COP_PHASE_OPQ_ICE, COP_PHASE_MUL_LYR)
  - Day : solar zenith below 70
  - Night: solar zenith above 100

- Result: Daytime success rates (out of all cloudy pixels) (NOAA-AWG values)
  - Considering all quality flags: 58.1%
  - Considering all, but not out of bounds: 69.1%
  - Have any COT value, don't consider any QF ; Using QF1/B0 as cloud mask : 94.1% (99.4%)
  - Using VCM Cloud mask : 99.6%
  - QF Out of bound rate: 21.7%

- Success rate improved since last version if not considering any QF.