

Development of a Bayesian Cloud Mask for All GOES-R Applications



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Purpose of project: Reduction of project risks related to quality of cloud detection / masking for multiple applications over land and sea. Will provide a Bayesian clear sky probability that can be used by multiple GOES-R applications.

Concept: Extension of Bayesian detection methodology (currently successful for GOES SST) to exploit GOES-RRR channel suite, and extending to land

Approach: Prototyping on SEVIRI, bootstrapping from existing SEVIRI cloud masks

Perceived strengths of Bayesian alternative cloud detection:

Increased maintainability from generalized nature of approach combined with use of in-house maintained NWP and CRTM capability

Bayesian method is resilient to channel updates (e.g. proxy-to-GOES-R) and/or failures

Apparent improved detection rates and decreased false detection rates compared to threshold-based methods (including current GOES-R cloud mask)

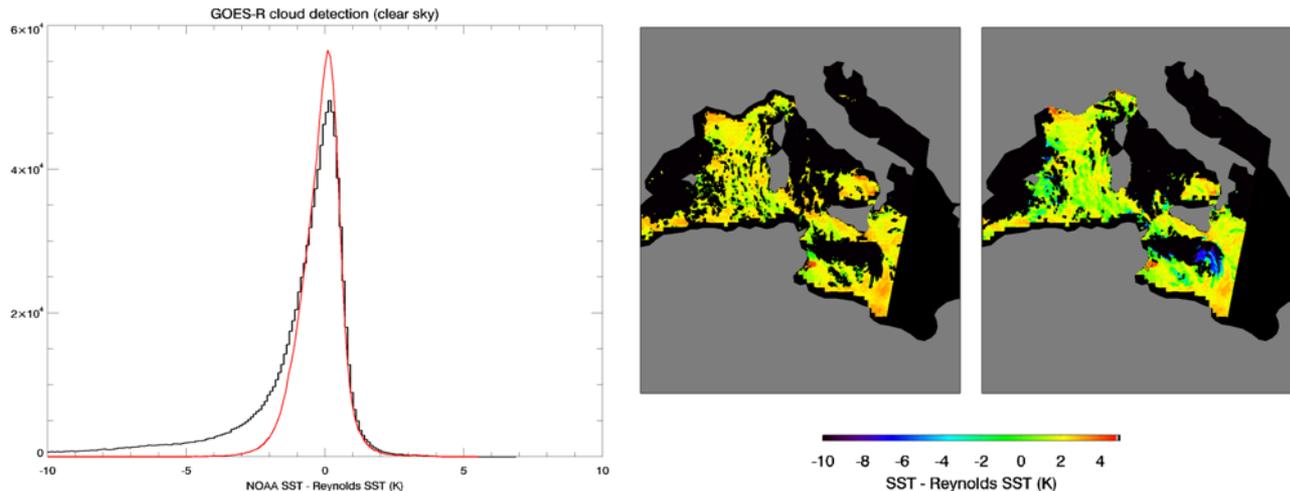


Figure Left panel shows histograms of SEVIRI-retrieved SST minus Reynolds Daily-OI SST. The black line shows the distribution obtained using the current GOES-R cloud mask while the red line is the result of applying our Bayesian scheme. The right hand side shows a comparison of part of the SEVIRI minus Daily-OI SST. The Bayesian mask has been applied to the left-hand image while the result for the current GOES-R mask is shown on the right.

Year 1 milestones and progress:

Project kick-off telecon in July 2011

Establish common version control of software between partners (ongoing)

Obtain precursor cloud masks (complete)

Exploit precursor cloud masks for Bayesian probability distributions (PDFs)

Specify NWP/CRTM simulation capability for reflectance and emissivity

Implement simulation and PDFs in software

Major Year 2 and 3 milestones

Univ. Edinburgh

Refine land PDFs iteratively

Assess performance against CALIPSO/SEVIRI data base

Compare cloud mask impacts on selected retrievals

Documented, integrated software transferred to NOAA

NOAA

Update NOAA software with Univ. Edinburgh updates from Year 1

Derive Ocean PDFs using combination of Geo-SST SEVIRI cloud masks and CALIPSO data

Refine Ocean PDFs iteratively

Assess performance against CALIPSO/SEVIRI data base

Compare cloud mask impacts on selected retrievals

Combine with final Land cloud mask software

Document and run final tests