GOES Rapid-Scan Atmospheric Motion Vectors: Contributions to Field Experiments and Analyses

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Automated Satellite-Derived Atmospheric Motion Vector Processing Developed at UW-CIMSS

Uses a sequence of geostationary satellite images to generate three dimensional atmospheric motion vector products by the following fully-automated procedures:

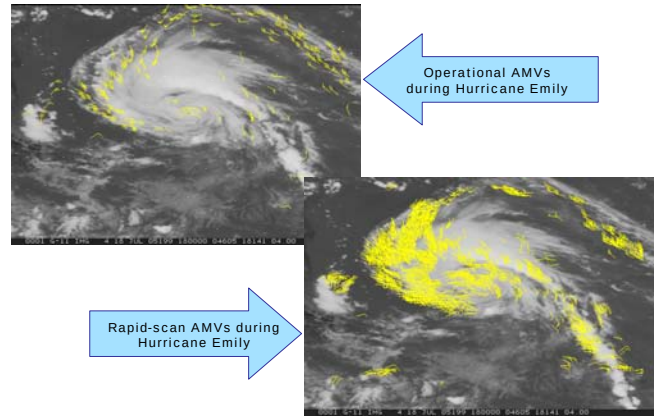
- •Checks and corrects image registration
- •Identifies cloud and water vapor targets
- •Assigns target heights (hPa)
- •Calculates displacement vectors from targets
- •Performs quality control steps
- •Outputs data files for end users

What Are "Rapid-Scan" AMVs?

Geostationary satellite-derived atmospheric motion vector (AMV) sets are traditionally generated from image triplets with 15, 30 or 60 minute intervals.

During GOES special rapid-scan operations, co-located images are available at intervals of 7.5, 5, 3, and even 1 minute. The scanning area covered is reduced as the interval decreases, however the improved consistency of cloud features at these decreased intervals allows for the derivation of more AMVs of higher quality.

Velden, et al, 2005: Recent Innovations in Deriving Tropospheric Winds from Meteorological Satellites. *Bull. Amer. Meteor. Soc.*, 86, 205-223.

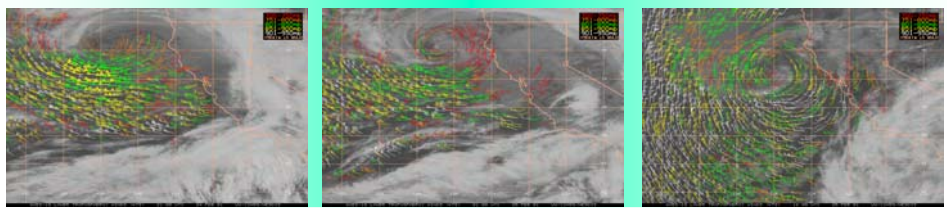


Field Experiment	Dates	Satellite Coverage
GWINDEX	Jan.-Mar., 2001	GOES-10 Hourly
GRACE	Jul.-Sep., 2001	GOES-8 Hourly for Selected Events
GWINDEX-2	Jan.-Mar., 2002	GOES-10 Three Hourly
GWINDEX-3	Jan.-Mar., 2003	GOES-10 Three Hourly
ATReC	Nov.-Dec., 2003	GOES-12 Hourly for Selected Events (six hour blocks)
TCSP	Jul., 2005	GOES-11 Hourly
TROPEX	Aug.-Nov., 2005	GOES-12 Hourly for Selected Events
TROPEX	Jun.-Sep., 2006	GOES-12 Hourly for Selected Events

What is GWINDEX?

The GOES Rapid-Scan WINDs EXperiments had the objective of demonstrating an improvement in quantity and quality of cloud-motion winds using 7.5 minute interval rapid-scan visible and infrared imagery from GOES-10. These winds were provided in order to improve the available remotely sensed data products over the eastern North Pacific for NWS forecasters, support PACJET and THORPEX initiatives, and assess data impact on the RUC model short-term forecasts

Lower troposphere winds around a land falling storm near California, 24-25 February, 2001



What is GRACE?

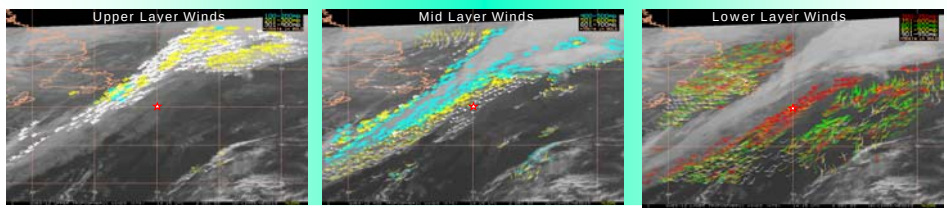
The GOES RApid-Scan for CAMEX Experiment's objective was to provide rapid-scan wind sets in support of CAMEX-4 (the Fourth Convection and Moisture Experiment). GOES-8 rapid-scan image schedules were made available for targeted tropical cyclone regions or other regions of interest for 24 hour periods on request.

Upper, Mid, and Lower Layer winds around Tropical Storm Gabrielle, 14 September, 2001

What is ATReC?

The North Atlantic THORPEX Regional Campaign (ATReC) was an international field experiment conducted over the North Atlantic Ocean and adjacent land areas. By targeting observations in areas deemed sensitive to numerical analyses and subsequent prognoses, the ATReC hoped to demonstrate improved accuracy in forecasts of high-impact weather systems. Targeted GOES-12 three minute interval images were made available in six hour blocks on request as needed for experiment observation periods.

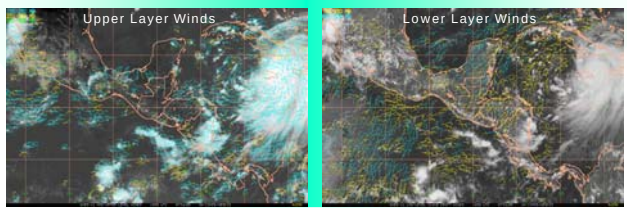
ATReC Observation Period 12, Day 1 13 November, 2003
The ☆ indicates the center location of the ATReC observation area.



What is TCSP?

The Tropical Cyclone Systems and Processes experiment was an investigation of developing tropical cyclones. Nearly continuous GOES-11 five minute interval images were made available for providing high temporal resolution image sets and rapid-scan winds sets to aid mission planners and for use in post experiment analysis.

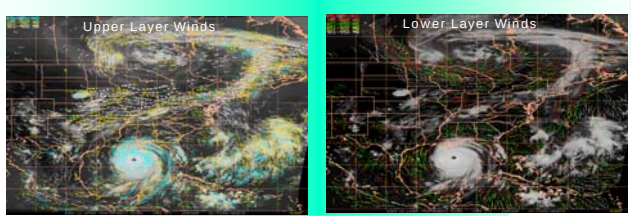
Upper and Lower Layer winds in the TCSP observation region, 7 July, 2005



What is TROPEX?

The TROpical cyclone Predictability EXperiments objective was to obtain special data sets of GOES rapid-scan AMVs to assimilate and test for improvements in the Navy global numerical model (NOGAPS) tropical cyclone forecasts during the 2005 and 2006 North Atlantic seasons, and to conduct predictability, targeting, and data assimilation research.

Upper and Lower Layer winds during Hurricane Katrina, 28 Aug., 2005



WEB Links for Archived or Current Products

GWINDEX:
http://gale.ssec.wisc.edu/
GRACE:
http://gale.ssec.wisc.edu/camex/camex.html
GWINDEX-2:
http://gale.ssec.wisc.edu/gwindex2/
GWINDEX-3:
http://gale.ssec.wisc.edu/gwindex3/
ATReC:
http://gale.ssec.wisc.edu/thorpex/thorpex.html
TCSP:
http://cimss.ssec.wisc.edu/tropic/tcsp/
TROPEX:
http://cimss.ssec.wisc.edu/tropic/tropex/

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