Potential Use of Remotely Sensed Winds for Oceanic Weather Applications

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Geostationary Meteorological Earth Satellite Views

75 West  GOES-12
United States

0 East  Meteosat-7
European

63 East  Met-5
European

105 East  FY-2
China

155 East  GOES-9
Japanese

135 West  GOES-10
United States

Images adapted from David Johnson, NCAR, Boulder, CO
Future Geostationary Meteorological Earth Satellite Views

- 75 West GOES-12/13/14 United States
- 0 East MSG European
- 63 East Met-6/GOES-11/12-INSAT-3A International
- 105 East FY-2C China
- 140 East MTSAT Japanese
- 135 West GOES-12/13/14 United States

Images adapted from David Johnson, NCAR, Boulder, CO
Geostationary Winds
Concept

Procedure:

- Accurately calibrated and navigate 15 or 30-minute interval imagery (vis/IR/WV).
  - separate image landmark registration routine.
- Initial targeting and height assignment with image triplets.
- Wind vector derivation.
  
  Work on targets one by one.
  
  Track features between images a-b-c using NOGAPS as background field.
  
  Keep track of comparisons with NOGAPS winds and surrounding vectors.

- Run 3-D quality control, keeping only vectors that pass all tests.
- Run 3-D QC using the winds from a-b and a-c and NOGAPS fields.
- Save only vectors that satisfy constraints between both image pairs and NOGAPS checks.
Geostationary Winds

Concept

Quality Control:

- Automatic editing and quality control.
  - quality indicator (QI).
    - 3-D in space and time with other vectors and NOGAPS.
    - QC on height and temperature of the tracer.
  - Three-dimensional objective analysis.
    - two stage, 3-D recursive filter analysis using NOGAPS as background field.
    - heights reassigned through minimization of variational penalty function.
- Cirrus cloud check.
- Slow water vapor wind check.
- Low/Mid IR vectors that are slow.
- Check vis winds for direction.
- Jet streak winds
Geostationary Winds

GOES-9 Australia
Geostationary Winds

CIMSS Near Real-time Web Page

Real-Time Data

NW Atlantic (GOES-8)
  Winds & Analyses
  Mean Layer Wind Analyses
  Images & Movies

NE Atlantic (MET-7)
  Winds & Analyses
  Mean Layer Wind Analyses
  Images & Movies

NW Pacific (GMS-5)
  Winds & Analyses
  Mean Layer Wind Analyses
  Images & Movies

NE Pacific (GOES-10)
  Winds & Analyses
  Mean Layer Wind Analyses
  Images & Movies

Australia (GMS-5)
  Winds & Analyses
  Images & Movies

Indian Ocean (MET-7)
  Winds & Analyses
  Images & Movies

Global Mosaics
  Images & Movies

Tropical Cyclones

University of Wisconsin–Madison
Cooperative Institute for Meteorological Satellite Studies

Tropical Cyclone: Chris Velden, Tim Olander, Dave Stetzer
Research Team: Gregg Gallina, Howard Berger, Brian Katat
Remote Collaborators: Kurt Breslau (USAF), Jason Dunion (HRD)

DATA STATUS:
(as of 07 Nov 2001 / 21:21 UTC)

All products currently available.

STORM COVERAGE

North Atlantic
  No Active Storms
  Tropical Weather Discussion
  Tropical Weather Outlook
  Recon Plan of the Day

East/Central Pacific
  No Active Storms
  Tropical Weather Discussion
  Tropical Weather Outlook—NHC
  Tropical Weather Outlook—CPHC

West Pacific
  Tropical Storm 27W
  No Active Storms
  Tropical Weather Advisory

Australia Region
  No Active Storms
  Tropical Weather Advisory

Indian Ocean
  No Active Storms
  Tropical Weather Advisory

Portion of funding by NRL-MRY
Geostationary Winds

GOES - East: Water Vapor

Sample Size

GOES-East Water Vapor

Ground Truth: Radiosonde

Layer: 100–1000 MB
Lat: 90S–90N

NOAA-NESDIS
Geostationary Winds
GOES - East: 25 N – 25 S (100-400 mb)

Ground Truth: Radiosonde

NOAA-NESDIS
Geostationary Winds

GOES - East: Short Wave IR + IR

NOAA-NESDIS
Geostationary Winds

Higher Density WPAC winds using GOES-9

UNCLASSIFIED

Courtesy of FNMOC/CIMSS
Satellite/Model Wind Product

200 MB - Geo Winds [CIMSS]
Cloud-Tracker Winds
MODIS IR Winds (Polar)

Courtesy of CIMSS
Water Vapor-Tracked Winds

MODIS Water Vapor Winds (Polar)

Courtesy of CIMSS