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Bureau of Meteorology satellite data use - introduction

The Bureau of Meteorology makes heavy use of satellite data in support of its weather forecasting and warning services, climate monitoring and water management responsibilities.

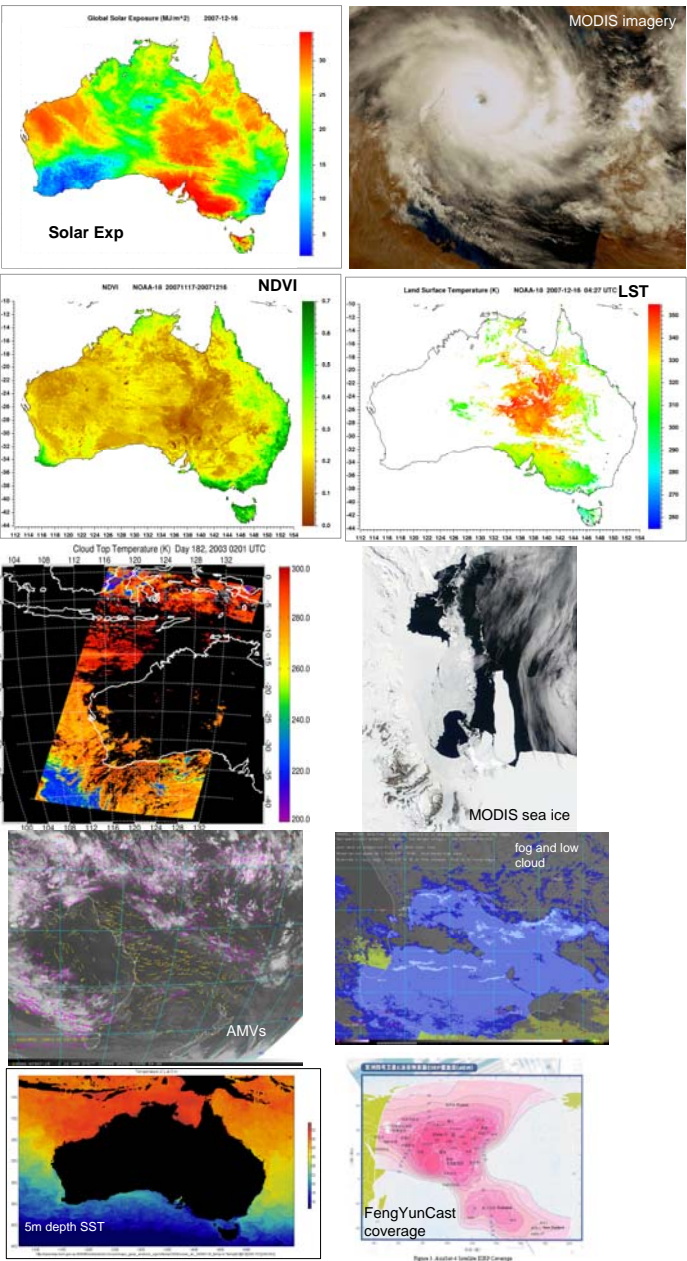
This poster describes some of the satellite products produced and used by the Bureau of Meteorology, and exchanged with international agencies. In particular, the rapid regional exchange of direct broadcast ATOVS data available in Asia-Pacific Regional ATOVS Retransmission Service is described.

Satellites and instruments used include noaa polar orbiters (ATOVS, AVHRR), EOS satellites (MODIS, AIRS), MTSAT-1R, and FY1 and 2 series direct broadcast data. Other data imported are from metop (ATOVS, soon IASI), AMSR-E, Quikscat, GPS (TPW) and others.

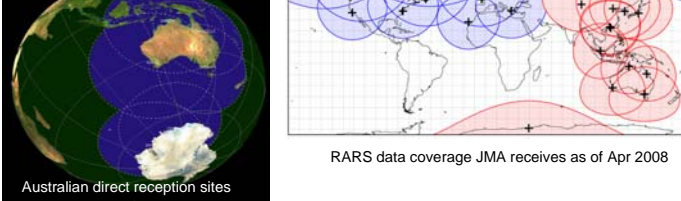
The Bureau is making increased use of satellite data within NWP, in part through adoption of the UKMO NWP system, and also through improved use and availability of direct readout data, particularly ATOVS data processed using the AAPP standard.

Products generated include solar exposure, land surface temperature, NDVI, sea ice, fog and low cloud, SSTs, AMVs, and GPS total precipitable water. Some of these products are shown below.

Satellite Products



Satellite data exchange - AP-RARS



Australian, RARS and EARS coverage

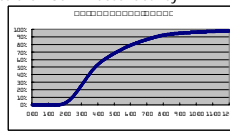
Australia currently operates L-band stations at Casey, Davis, Crib Point, Perth and Darwin. The Bureau also has access to L-band data from Townsville, which has just been augmented with X-band reception. Perth already has X-band reception, with Darwin and Crib Point to be added in mid 2008, and Casey in summer 08/09.

RARS (including EARS (blue)) coverage is shown in a slide from JMA. Additionally, there are Brazilian and Argentinean stations in South-American RARS. Also, data from New Zealand is part of AP-RARS. There is a large data gap in the Pacific, with the possibility of data from Honolulu, Guam or vicinity, McMurdo, Tahiti and New Caledonia being pursued.

WMO aims for 90% coverage of the globe with RARS data with less than 30 minutes latency.

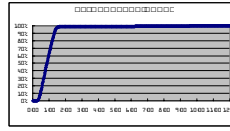
Importance of timeliness

The slide at the right from JMA shows typical latencies in hours for global (top) and EARS (RARS) (bottom) data. The RARS network adds several hours of the most recent ATOVS data before typical operational NWP cut-off times.

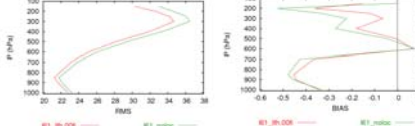


Impact on NWP accuracy

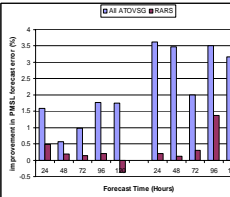
The Australian region impact of locally received ATOVS data (in addition to all other available data sources) was tested in an operational trial, as shown below. The direct broadcast data adds skill.



The direct broadcast data adds skill.



The slide at the right from the UK Met Office shows the impact on skill of NWP assimilating ATOVS data after it has all arrived (mauve) versus ATOVS data operationally available (magenta), including RARS, in both cases relative to a control of all other data in use. The difference in skill is due solely to data timeliness. An expansion of the RARS network would add to global NWP skill.



AP-RARS data is available on the GTS. Some changes to filename format and contents are expected by the end of 2008.

Further information on AP-RARS, including data availability and further links, may be found at <http://www.bom.gov.au/weather/satellite/RARS/index.shtml>

Other RARS websites are maintained by the NWP SAF (including extensive QC):

http://www.metoffice.gov.uk/research/interproj/nwpsaf/ears_report/index.html and JMA: <http://mscweb.kishou.go.jp/rars/index.htm>

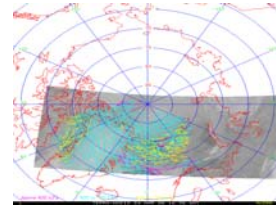
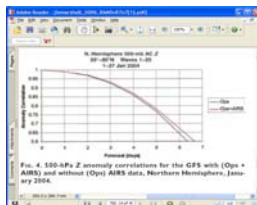
Upcoming work

The Bureau intends to begin or make greater use of various data sources. For NWP, the priority order is provisionally

- AIRS data (under test)
- SSM/I radiances
- MODIS (and noaa) Polar AMVs
- IASI
- GPS occultation data.

Other plans are to include additional scatterometer data, AMSR(E) data, GPS total column water data (available from a significant and growing Australian network), SMOS, ...

The importance of AIRS data is well known. Early JCSDA impacts are shown below (since improved). Sample polar AMVs are also shown. AMVs are expected to be generated from Davis and Casey (Antarctic) data from the second half of 2008 (L-band), and early 2009 (X-band). Communications limitations are the main issue for optimal use of Antarctic data. Alternative Dissemination methods, including FengYunCast (coverage in slide at left) will grow in importance. The Bureau has a demonstration FengYunCast system installed by Shinetek.



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