

1 Meeting Summary

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3 The 12th Workshop on Antarctic Meteorology and Climate

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18 1. Overview

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20 The 12th Workshop on Antarctic Meteorology and Climate (WAMC), formerly known as the
21 Antarctic Meteorological Observation, Modeling, and Forecasting (AMOMF) Workshop
22 (AMOMFW), was held at the National Center for Atmospheric Research (NCAR) in Boulder,
23 Colorado, USA on June 26–28, 2017. The annual workshop dates from 2006, and recent meetings
24 have been the 10th AMOMF Workshop held in 2015 in Cambridge, United Kingdom (Colwell, et
25 al. 2016) and the 11th AMOMF Workshop held at the Byrd Polar & Climate Research Center at
26 The Ohio State University in 2016. This year, NCAR’s Mesoscale and Microscale Meteorology
27 (MMM) Laboratory hosted the event. The 12th WAMC was followed by two other meetings
28 related to Southern Hemisphere science: one covering the plans for the Year of Polar Prediction–
29 Southern Hemisphere (YOPP–SH) effort and the other covering the activities of the Southern
30 Ocean Regional Panel (SORP). The WAMC objective is to bring the Antarctic meteorological and
31 climate communities together to share developments, discuss results and issues, and consider
32 collaborative plans. The workshop reviewed current and future Antarctic observation efforts,
33 numerical modeling and forecasting, and a spectrum of polar scientific studies, with an emphasis
34 on atmospheric research. The workshop had approximately 60 attendees from over 10 countries.

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36 2. Observing Systems and Studies

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38 Presentations on Antarctic meteorological observing systems and efforts kicked off the
39 workshop. The University of Wisconsin-Madison (UW-Madison) Automatic Weather Station
40 (AWS) program field activities from the 2016-2017 season were reviewed, with a short season
41 being noted due to limited logistical support available. UW-Madison personnel outlined issues

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42 with UHF Communications in the Wisconsin AWS network near McMurdo Station, along with the
43 likelihood that Pegasus North AWS will be replaced by a new AWS at Phoenix Air Field, after a 1–
44 2 year “side-by-side” observing test period. The community also learned of a Major Research
45 Instrumentation (MRI) project that has started at Madison College in partnership with UW-
46 Madison to develop a next-generation electronics core for a new polar AWS. The British Antarctic
47 Survey (BAS) reported on their program activities from the 2016-2017 season, also the move of
48 Halley station where the main station was moved 23 km and their plans for winter automation
49 going into the future. They also reported about the Halloween crack in the Brunt Ice Shelf that
50 has forced Halley station to be close for the 2017 winter season. The Korean Polar Research
51 Institute (KOPRI) reviewed South Korea’s staffed-station meteorological efforts and planned AWS
52 deployments, as well as plans to move its observations to BUFR format for distribution to the
53 Global Telecommunications System (GTS). Additionally, the observations will be relayed from
54 King Sejong Station via the Korean Meteorological Administration to the GTS instead of being
55 routed through Chile’s Eduardo Frei station. Lastly, KOPRI informed the workshop of the variety
56 of meteorological capabilities of the King Sejong and Jang Bogo stations, including launching
57 radiosondes and observing via a 30-meter, 5-level instrumented tower recently installed at Jang
58 Bogo station. A new precipitation study starting in the 2017-2018 field season in the Ross Island
59 area was announced. The project will include several sites that will be instrumented in the
60 McMurdo area, co-located at nearby AWS sites, to measure precipitation via various methods.

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62 3. Numerical Modeling Systems and Studies

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64 The workshop covers numerical modeling and forecasting systems for the Antarctic and studies
65 using them. Reviews addressed the performance of the Australian Bureau of Meteorology’s
66 operational model and the United States’ Antarctic Mesoscale Prediction System (AMPS).
67 Regarding AMPS, one issue of the past year was a surface pressure bias found in the model used
68 in AMPS(the Weather Research and Forecasting Model (WRF)), and was connected to missing
69 observational data. A concerted effort to include observational data from a host of sources
70 including GTS, AMRC, and BAS solved this problem. New computing available for AMPS on the
71 National Center for Atmospheric Research’s community platform “Cheyenne” will enable
72 increased model resolution and an expanded forecast ensemble. Lastly, an assessment of the
73 Model for Prediction Across Scales (MPAS) being run in the AMPS environment found MPAS’s
74 performance relative to WRF has improved over the year, although overall WRF retains a
75 statistical edge. A presentation on the use of WRF-Ice in surface mass balance modeling across
76 the Antarctic Peninsula was given where the model includes snow, ice, blowing snow, snow
77 surface albedo as well as firn percolation processes. A presentation on the analysis of the
78 regional climate model CCLM (COSMO-CLM) in the Weddell Sea region identified boundary layer
79 problems, and was used to look at climate change in Antarctica as seen via a high-resolution
80 regional climate model. A final presentation outlined the issues of downscaling high regional
81 resolution global climate models and the bias these GCMs can create.

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83 4. Research Investigations

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85 The WAMC provides an opportunity for the Antarctic community to hear the latest results from
86 a range of polar meteorological and climatic studies. This year, investigation topics included:
87 atmospheric rivers impacting Antarctica; analyses of regional climate models and GCM
88 ensembles; Antarctic weather and climate events (e.g., the 2016 west Antarctic melt event and
89 the 2015 extreme temperature event in the Antarctic Peninsula); and tropical influences on the
90 Antarctic atmosphere. On the operational side, there were presentations on the development
91 of fog forecasting tools, meteorological support for base air operations, and analysis of a fog
92 event by the American, Argentinian, and Australian forecasting groups respectively. Finally, there
93 was an analysis done to help explain a new approach for analyzing the near-surface air
94 temperature by calculating the freezing period at King George Island.

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96 5. Measurement and Observation Applications

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98 There were a number of reports on observational-based studies. These included: a project
99 studying thin clouds at South Pole and their infrared radiative impact; the development of an
100 improved ice water content and cloud particle morphology from cloud particle imagery collected
101 in the Southern Ocean; observations of snowfall in the sea ice zone from the Antarctic
102 Circumnavigation Expedition; an overview of the GABLS4 Model inter-comparison; and a project
103 examining long-term temperature trends across Antarctica. In addition, the community was
104 briefed on the ARM West Antarctic Radiation Experiment (AWARE) which has taken
105 measurements to investigate Antarctic clouds and their radiative impact. Its data are now
106 publicly available and have already been used in an investigation of a 2016 melt event presented
107 at the workshop.

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109 A special session was held on the outlook for the management of American Antarctic
110 meteorological observation efforts and, specifically, for support of the United States
111 meteorological data archive and distribution and the generation of satellite composite imagery.
112 Central support for this cyberinfrastructure effort is no longer funded by NSF as a science project.
113 This tasking, which has been spearheaded by the Antarctic Meteorological Research Center
114 (AMRC) at UW-Madison, is currently looking at either splintered and limited funding from non-
115 NSF sources or no funding at all in the coming year. The community was informed of this and
116 engaged in discussion on the perceived impacts and possible strategies, such as on what should
117 be archived and what the future role of AMRC should be.

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119 6. Year of Polar Prediction– Southern Hemisphere (YOPP-SH) Meeting

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121 During the main workshop, Kirstin Werner of the YOPP program office presented an overview of
122 the YOPP-SH effort. Following the workshop, YOPP-SH had its own meeting. Topics ranged from
123 components of the YOPP program to active and planned field experiments such as MARCUS
124 (Measurement of Aerosols, Radiation, and Clouds over the Southern Ocean) and SOCRATES
125 (Southern Ocean Clouds, Radiation, Aerosol Transport Experimental Study).

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127 The participants were informed that the YOPP project office now has a YouTube video channel.
128 In addition, the YOPP has an endorsement process for proposed projects and experiments, and

129 this and the list of sanctioned efforts was reviewed. As of the Summer of 2017, a new category
130 of endorsement— institution endorsement— has been announced. This category is intended for
131 institutions that have many projects that are contributing to the goals of YOPP, and its creation
132 is expected to reduce the paperwork required for YOPP project endorsement. The YOPP data
133 explorer will be a metadata clearing house for all YOPP projects that offer datasets associated
134 with the project. There will be no actual data holdings in this clearing house, and other existing
135 repositories are encouraged for the archival of any datasets generated during the campaign. One
136 existing system is Pangea <http://www.pangea.de>, which is a recommended repository for YOPP
137 investigators to place their datasets (Koing-Lango 2013).

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139 At the meeting, each national contribution to YOPP-SH was reviewed. While some projects are
140 funded and will definitely be a part of YOPP-SH, many investigations are waiting for funding or
141 are at present undefined. Enhanced atmospheric observation for the core period of YOPP-SH is a
142 central theme across all national efforts. Some countries will deploy extra AWS's (e.g., China),
143 while others will increase the number of radiosonde launches (e.g., South Korea, Chile).

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145 7. Southern Ocean Research Panel (SORP)

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147 The week concluded with a meeting of the Southern Ocean Research Panel (SORP). The topics
148 included the role and activities of several initiatives, including the Southern Ocean Observing
149 System. Numerical modeling efforts, especially those involving coupled systems, were an
150 emphasis. Other areas outlined some targeted improvements such as in Southern Ocean and
151 adjacent areas data management efforts. The new effort of the Southern Ice Prediction Network
152 (SIPN) has debuted, providing the first set of forecasts for Southern Ocean sea ice extent. David
153 Bromwich gave a presentation that outlined the problems found in the variety of numerical
154 model reanalysis efforts over the Antarctic and Southern Ocean. Another signature presentation
155 was given by Sharon Stammerjohn, on the Polynyas, Ice Production and Seasonal Evolution in
156 The Ross Sea (PIPERS) cruise which she had just returned from. PIPERS main objective is to study
157 air-sea-ice interactions during the austral autumn and into winter-spring time in the Ross Sea.
158 The focus of the project is on observations of the atmospheric and oceanic heat balance along
159 with accompanying sea ice changes – both growth and evolution.

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161 8. Student Engagement

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163 With support from International Association of Meteorology and Atmospheric Sciences (IAMAS)
164 via the International Commission on Polar Meteorology (ICPM), the Scientific Committee on
165 Antarctic Research (SCAR), and the World Meteorological Organization (WMO), funding was
166 available for graduate students and young scientists to attend the WAMC. Nine graduate
167 students and young scientists were selected from a large applicant pool for complete or partial
168 travel support. With encouragement for applicants across the international community, this
169 support provided access to the workshop for those who would otherwise not be able to attend.

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171 9. Summary and Recommendations

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173 The WAMC provides an excellent forum for the Antarctic meteorological and related
174 communities to discuss scientific and logistical issues. While the purposes of the meeting are to
175 exchange information, and facilitate collaboration and coordination, a few recommendations
176 emerged.

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- 178 • Increased and coordinated atmospheric and oceanic observing during YOPP-SH is desired.
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- 180 • During the YOPP-SH special observing period (mid-November 2018-mid-February 2019),
181 the workshop advocates injection into the GTS of as many of the special observations as
182 possible so the data can be utilized by the community in real time. This is especially for
183 the benefit of numerical weather prediction efforts (e.g., centers such as the National
184 Centers for Environmental Prediction (NCEP) and the European Centre for Medium-Range
185 Weather Forecasts (ECMWF)).
- 186
- 187 • Maintenance of community archive/data center focused specifically on Antarctic
188 meteorological data, such as AMRC over the years, is important. The concept has strong
189 community support, but a clear understanding and exposition of why to archive such data
190 in this setting is necessary. This has now been formulated and is available online
191 http://amrc.ssec.wisc.edu/CyberinfrastructureReport_August01_2017.pdf
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194 All of the presentations from the workshop as well as extended abstractions are available from
195 the 12th WAMC web site, [https://www.mmm.ucar.edu/workshop-antarctic-meteorology-](https://www.mmm.ucar.edu/workshop-antarctic-meteorology-climateyopp-sh-meetingsorp-meeting)
196 [climateyopp-sh-meetingsorp-meeting](https://www.mmm.ucar.edu/workshop-antarctic-meteorology-climateyopp-sh-meetingsorp-meeting). The 13th WAMC (2018) is scheduled for July 16-19, 2018
197 and will be hosted by UW-Madison and Madison College in Madison, Wisconsin, USA
198 <http://amrc.ssec.wisc.edu/meetings/meeting2018.html>. Themes for the workshop will continue
199 to be centered around Antarctic observations, numerical modeling, weather forecasting, and
200 atmospheric research. Topics associated with YOPP-SH will also be included.

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202 10. Acknowledgement

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Figure 1. Attendees at the WAMC workshop attentively listening to presentations.



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Figure 2. Dave Mikolajczyk (left) and Lee Welhouse (right) jointly present the challenges with the UHF transmissions with the UW-Madison AWS network.