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Plenary Speaker: Weather and Climate

Alaska Climate Trends

Global climate models have projected that the Arctic is an area where changes to the climate will likely be the largest in the world. The models predict a greater warming for the Arctic than the rest of the world. Alaska, as part of the Arctic, is already experiencing climate change. Observed data indicate that over the last 50 years, mean annual surface temperatures have increased 3-5 °C with some of the largest increases occurring along the Alaska North Slope. Sea ice is showing a 10% decrease in extent since 1978, with winter freeze up and spring melt arriving more than three weeks later and earlier, respectively. The waters around Alaska are also showing an increase in sea level. On land, an increased seasonal thaw depth of the active layer is causing accelerated permafrost thaw. There is also increasing evidence of changes in storm frequency, intensity and shift in storm track. These observations all point to climate change occurring now and that change is affecting short term weather forecasts. For instance, there is a greater incidence of aviation icing conditions especially along the Bering and Chukchi Sea coasts. Many pilots in Alaska fly by rules of thumb from the “old days” and pilots are making bad decisions. There are more frequent high amplitude weather episodes such as mid-winter “break ups”; heavy precipitation causing local flooding; low water events affecting river transportation and subsistence; episodic high wind events; more variable weather affecting regime-dependent fuel moisture conditions resulting in the greatest wildfire season (6.5 million acres) ever in 2004.

NOAA Products and Services

The U.S. and NOAA’s contribution to the U.S. Multiagency and International Arctic Observation Network will be 29 Climate Reference Network (CRN) sites in Alaska. This is an extension of the CRN sites initially deployed across the continental U.S. and Hawaii to provide a benchmark of quality climate observations. Since 2001, four sites have already been deployed as operational prototypes: Point Barrow, St. Paul, Sitka, and Fairbanks.

NOAA’s NWS plans to enhance the climate record based on four primary initiatives:

1. Cooperative Network (COOP) Paperless Initiative - which will provide an electronic ingest of manual observations and an automatic quality control thereby greatly reducing the data collection and processing costs.
2. COOP 21st Century Transition Plan – which has remedial actions to ensure maximum quality data through NWS field office expertise as well as collaboration with Regional Climate Centers and State Climatologists.
3. Historical Climate Network (HCN) – which will automate some of NOAA’s longest-record stations with Alaska Region modernized as a future goal. 40 sites are planned for Alaska.
4. Fisher/Porter Automated Rain Gauge Upgrade – a comprehensive hourly precipitation network.

The NWS Alaska Region is in the process of enhancing its climate products and services to meet the needs of its customers, especially decision makers, with the leadership and support of NOAA, NWS National Climate Services Division and the Climate Prediction Center. The Alaska Region has three Weather Forecast Offices (WFOs), the Alaska Pacific River Forecast

Center (RFC), the 12 Weather Service Offices (WSOs). The WSOs provide a further extension of NWS climate products and services to our remote sites across the state. The WFOs are located in Juneau, Anchorage and Fairbanks, the RFC is co-located with the Anchorage WFO, and the WSOs are located in Barrow, Kotzebue, Nome, Bethel, McGrath, St. Paul, King Salmon, Cold Bay, Kodiak, Valdez, Yakutat, and Annette. Climate services focal points have been identified at all of the Offices. While focal point duties are in addition to the production of warning and forecast products, the requirement for operational and management of regional climate services has surfaced.

Partnerships and Research

Alaska has a unique relationship between the State Climatologist located on the University of Alaska, Anchorage campus and the Alaska Climate Research Center located on the University of Alaska, Fairbanks campus. Working with NWS and NCDC, the State Climatologist and Climate Research Center have the capability to store all the climate data for Alaska and can be another regional source of climate data and information for Alaskan customers. This provides the potential core for an Alaska Region Climate Center.

A successful climate services program in Alaska must include taking data from observations through research to decision support applications as well as an effective outreach and education program. This is currently being accomplished through NOAA's Regional Integrated Science and Assessments Program now known as the Alaska Center for Climate Assessment & Policy (ACCAP). ACCAP was created in 2006 to assess the socio-economic and biophysical impacts of climate variability in Alaska and make this information available to local and regional decision-makers. Another major player within the regional research community is the International Arctic Research Center (IARC) located on the University of Alaska, Fairbanks campus. The Fairbanks WFO is co-located with the IARC and has the potential to play a major operational role in high impact decision support. This arrangement allows Alaska NWS personnel to conduct and participate in the research; evaluate and test results, techniques and applications from the research; and directly assist in the transformation of the research into decision making tools. Useful products and services derived from the research will be added to the operational climate information suite provided to the users. Without research to address operational high impact events, decision support assistance will be highly limited.