Forecasting Challenges & Improvements for the Future

Forecast Accuracy to Innovation Relationships

Avg low 90

Avg high 80s

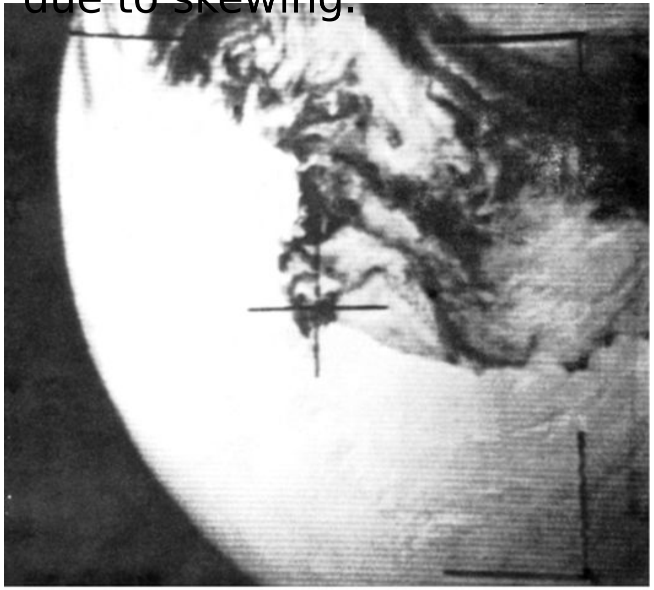
Avg low 80s

vg high 70s

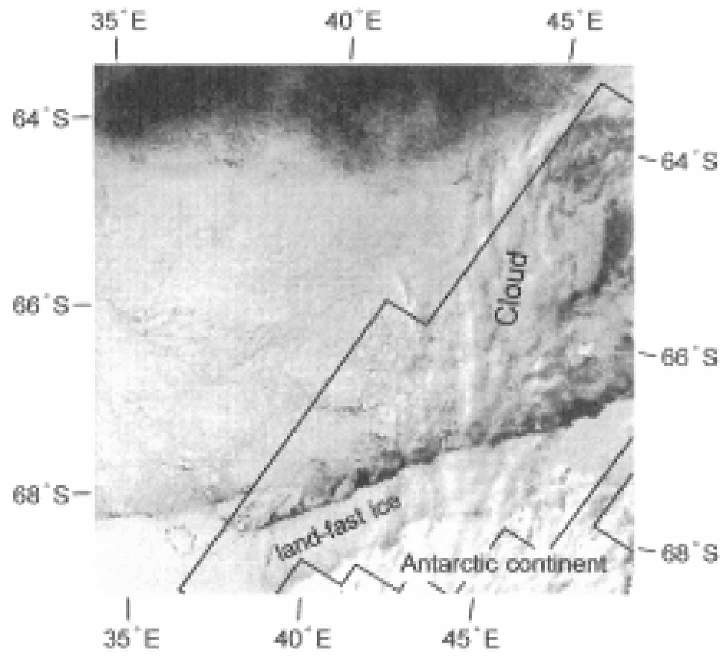
Satellites

From the 60’s through the mid 80’s satellite assisted the forecasting effort but were limited in printed quality and enhancement capabilities.

Resolution was limited and animation required transposing location of major features by hand due to skewing.



ANTARCTICA SHOWING ROSS SEA ICE
SHELF AND LITTLE AMERICA
TIROS IX ORBIT 0022
DATE 1-23-65



NOAA AVHRR Image Dec 10, 1989 –
Kunimitsu Ishida et al

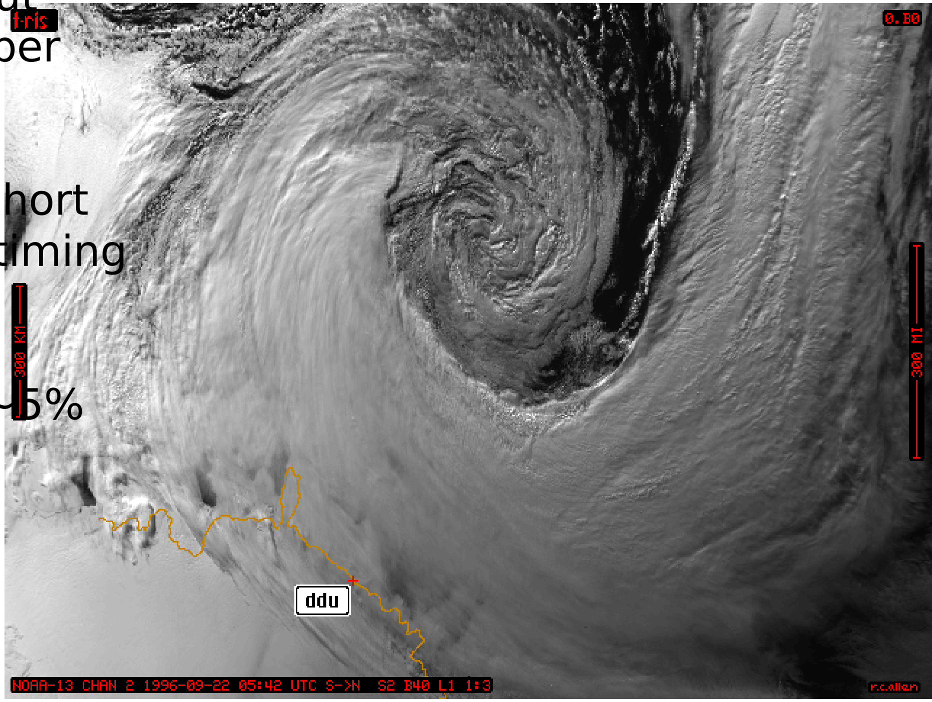
Satellites

In 1987 the invention of the GODDESS by Sea Space, Inc. (version 1 TeraScan) allowed the polar orbiting images to be flattened, and overlaid for still animation.

In addition the recorded image could be enhanced readily on the monitor to pull out features without using valued printing paper process.

This produced a near instant increase in short term forecasting accuracy with this new timing and feature identification tool.

Short range forecast accuracy improved ~5% (based on go-no go tracking).



Modeling

1991 to 1994 – After the end of the cold war and Russia economic collapse forced the closure of Molodezhnaya and Novolazarevskaya stations and applicable intercontinental air transport. The reduction of the Russian Antarctic Program eliminated many manned stations providing weather reporting. Forecast accuracy had a slight and slow decline. Manual analysis and projection had been replaced by modeling world-wide.

In 1990 University of Wisconsin promoted the use of internet connection via a 9.6 connection. This was jointly used by operations to extract FNMOC (then FNOC) NODDS fields. Over time the NOGAPS model was identified to have fair value at 500hPa and particularly above at 400hPa for steering flow and guidance on speed/development. Forecasting tools were established but lacked any significant impacts in low level and minor circulations and periods beyond 18 hours.

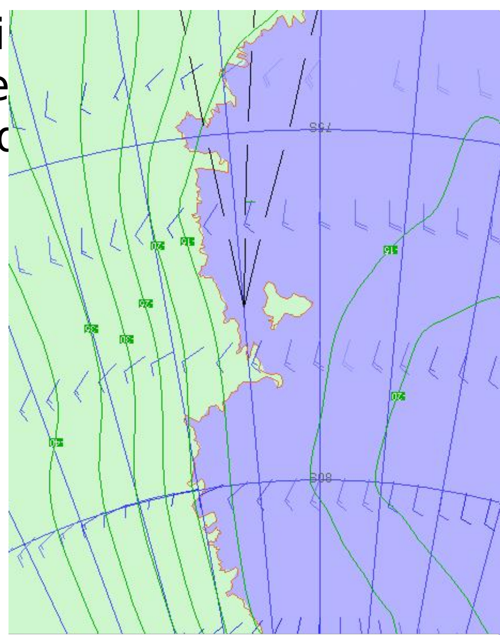
NOGAPS assumed a flat earth and did not offer much in terms of low level forecasting abilities.

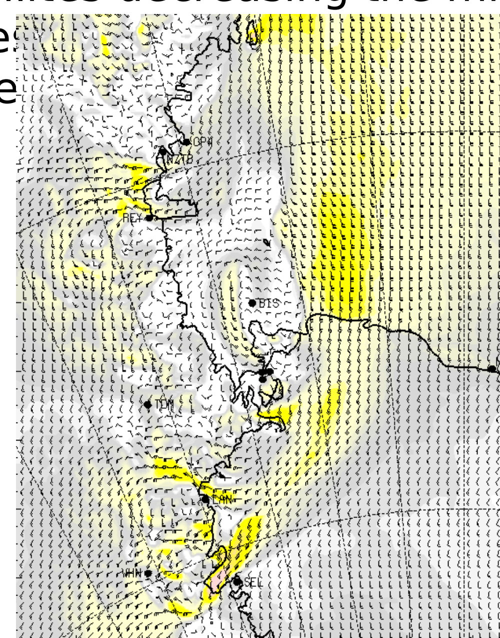
Modeling

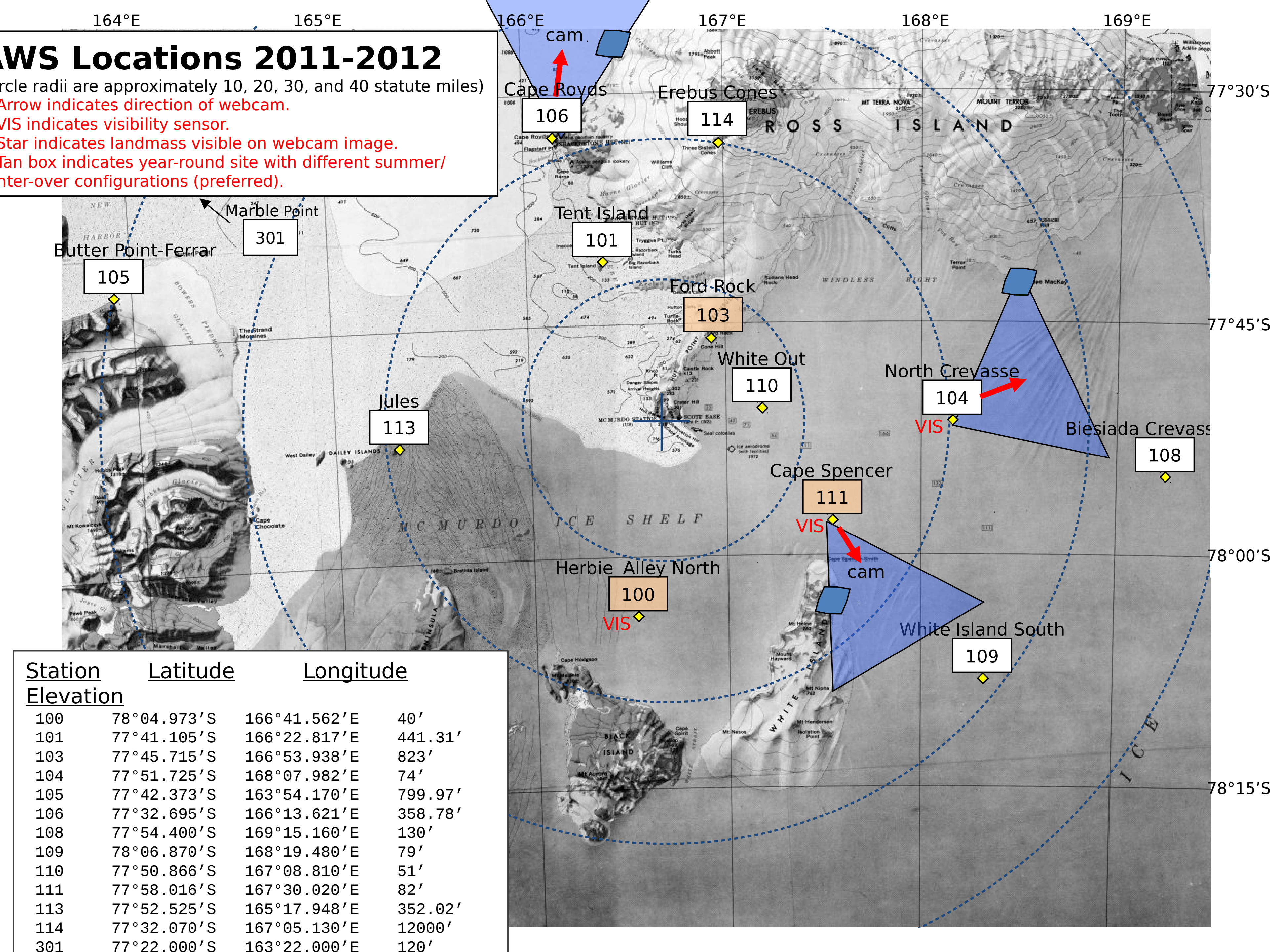
2000 to present – Many improvements have allowed a peak with another roughly 5% increase in short term forecasts from the peak in 1988 – 1991 and an unmeasured notice in the ability to have confidence in longer range projections (24 – 48 hours).

Improvements include:

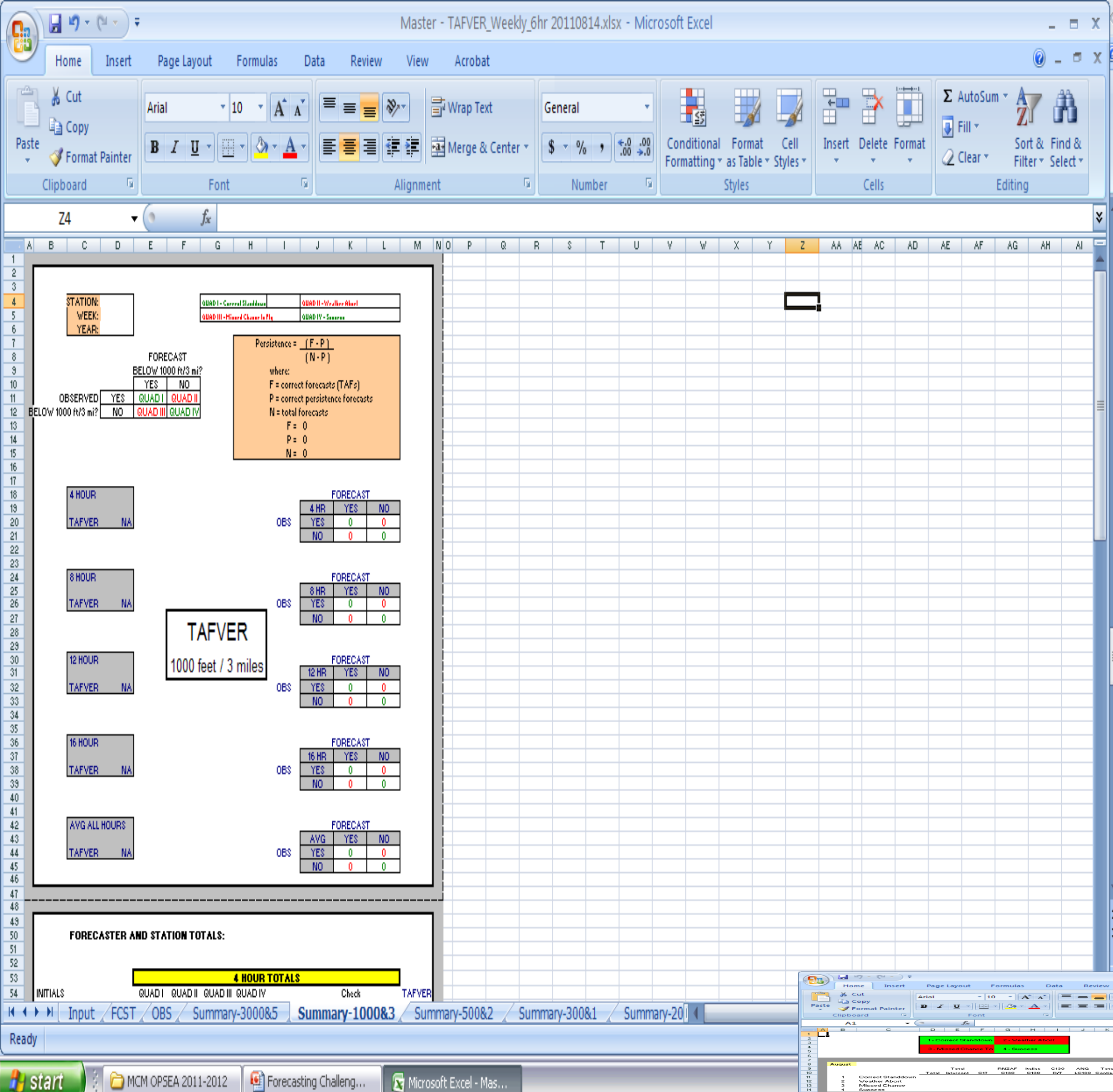
- Cooperative with science / research NCAR, OSU, U/W
- Implementation of AMPS MM5/WRF
- AWS network to include unification through AMRC cooperative and LDM Software
- Increased number of orbital satellites decreasing the mid-day gap
- Joi … warene … relationships, me … esponde … cepts for tools and



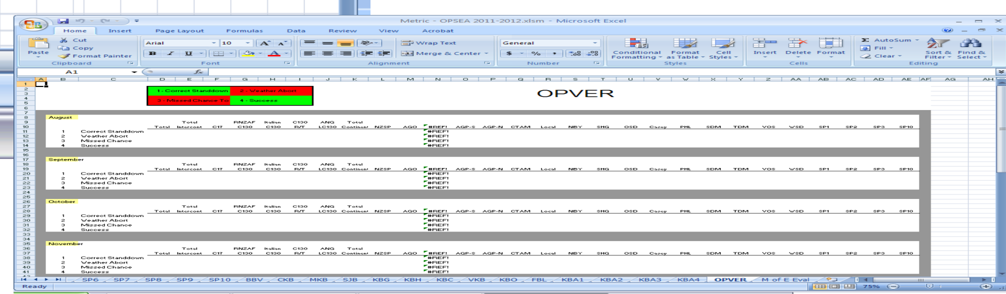




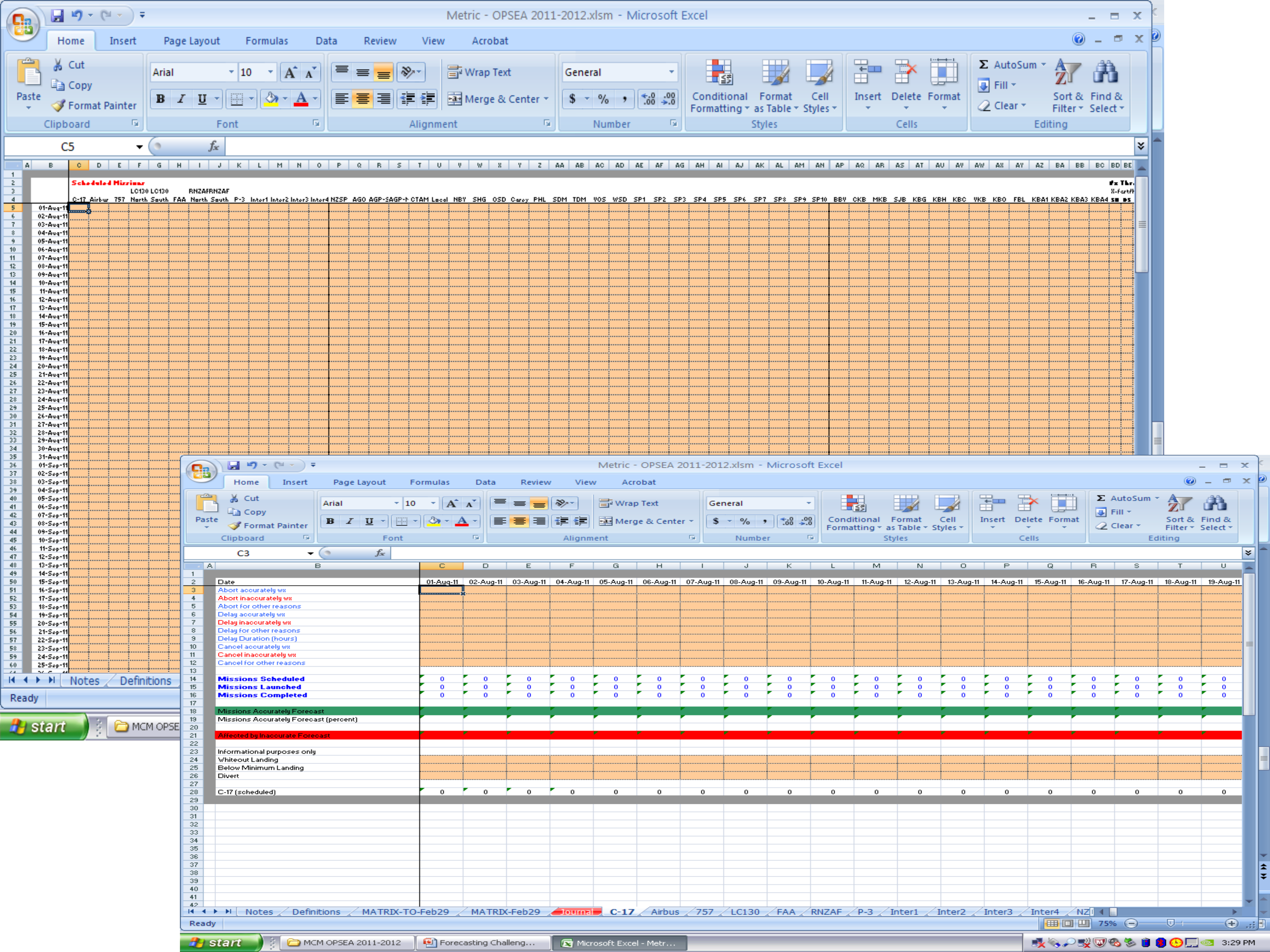
Station	Latitude	Longitude	Elevation
100	78°04.973'S	166°41.562'E	40'
101	77°41.105'S	166°22.817'E	441.31'
103	77°45.715'S	166°53.938'E	823'
104	77°51.725'S	168°07.982'E	74'
105	77°42.373'S	163°54.170'E	799.97'
106	77°32.695'S	166°13.621'E	358.78'
108	77°54.400'S	169°15.160'E	130'
109	78°06.870'S	168°19.480'E	79'
110	77°50.866'S	167°08.810'E	51'
111	77°58.016'S	167°30.020'E	82'
113	77°52.525'S	165°17.948'E	352.02'
114	77°32.070'S	167°05.130'E	12000'
301	77°22.000'S	163°22.000'E	120'



Master - TAFVER_Weekly_6hr 20110814.xlsx - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Acrobat
STATION:
WEEK:
YEAR:
QUAD I - Correct Standdown
QUAD II - Weather Abort
QUAD III - Missed Chance to Fly
QUAD IV - Success
FORECAST
BELOW 1000 ft/3 mi?
YES NO
OBSERVED YES QUAD I QUAD II
BELOW 1000 ft/3 mi? NO QUAD III QUAD IV
Persistence = (F - P) / (N - P)
where:
F = correct forecasts (TAFs)
P = correct persistence forecasts
N = total forecasts
F = 0
P = 0
N = 0
4 HOUR
TAFVER NA
8 HOUR
TAFVER NA
12 HOUR
TAFVER NA
16 HOUR
TAFVER NA
AVG ALL HOURS
TAFVER NA
TAFVER
1000 feet / 3 miles
FORECAST
OBS
FORECASTER AND STATION TOTALS:
4 HOUR TOTALS
INITIALS QUAD I QUAD II QUAD III QUAD IV Check TAFVER
Input FCST OBS Summary-3000&5 Summary-1000&3 Summary-500&2 Summary-300&1 Summary-20
Ready
start MCM OPSEA 2011-2012 Forecasting Challeng... Microsoft Excel - Mas...



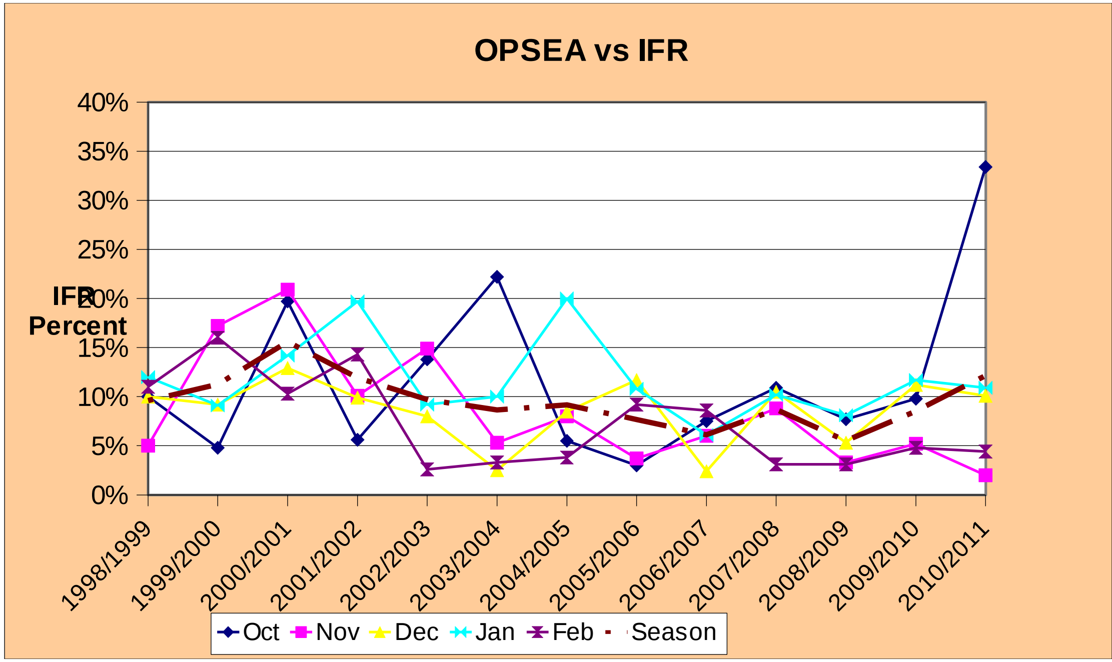
Metric - OPSEA 2011-2012.xlsm - Microsoft Excel
OPVER
August
September
October
November
Correct Standdown
Weather Abort
Missed Chance
Success


Metric - OPSEA 2011-2012.xlsm - Microsoft Excel
Scheduled Missions
Notes
Definitions
Date
Abort accurately wx
Abort inaccurately wx
Abort for other reasons
Delay accurately wx
Delay inaccurately wx
Delay for other reasons
Delay Duration (hours)
Cancel accurately wx
Cancel inaccurately wx
Cancel for other reasons
Missions Scheduled
Missions Launched
Missions Completed
Missions Accurately Forecast
Missions Accurately Forecast (percent)
Affected by Inaccurate Forecast
Informational purposes only
Whiteout Landing
Below Minimum Landing
Divert
C-17 (scheduled)
Notes
Definitions
MATRIX-TO-Feb29
MATRIX-Feb29
Journal
C-17
Airbus
757
LC130
FAA
RNZAF
P-3
Inter1
Inter2
Inter3
Inter4
MCM OPSEA 2011-2012
Forecasting Challeng...
Microsoft Excel - Metr...
3:29 PM

CHALLENGES IN EVALUATION PERFORMANCE

It stands clear the “norm” is merely an average of extremes. Annual tracking shows each season has its own characteristics impacted by variations in the global and regional situations. From the early 2000’s with ice bergs changing the Marginal Ice Zone (MIZ) impacting the seasonal variability to the lack of sea ice during the 2010-2011 summer season where exaggerated meridional flow expressed a greater influx of horizontal heat exchange in the Ross Sea in the spring through early summer period.

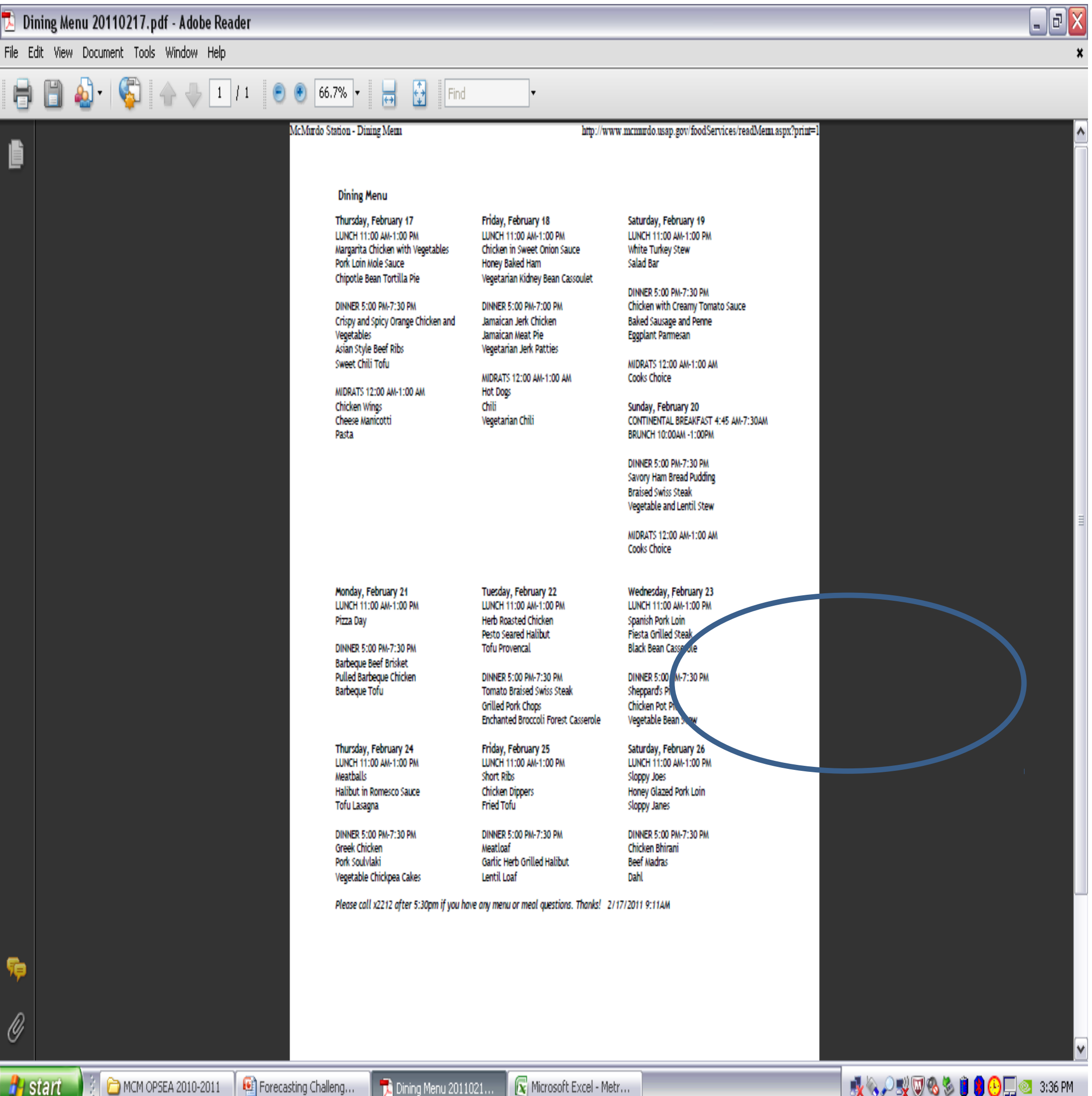
Seasons range from extremely active high transport periods to lulls with limited hazardous weather conditions. It is noted that even seasons with high activity do not follow similar patterns from month to month. This vast difference adds to the difficulties to make seasonal pattern forecasts.



CHALLENGES IN EVALUATION PERFORMANCE

Individual system inconsistencies are mostly driven by extreme terrain issues coupled with small nuances within the system’s structure. Although AMPS provides a great detail of information a greater focus over the upcoming years to identify patterns in grouped observational devices in tandem with system pattern recognition. The outcome is expected to yield the highest level of forecast proficiency with the current guidance available.

Driving Factors



Dining Menu 20110217.pdf - Adobe Reader

McMurdo Station - Dining Menu http://www.mcmurdo.usap.gov/foodServices/readMenu.aspx?print=1

Dining Menu

Thursday, February 17
LUNCH 11:00 AM-1:00 PM
Margarita Chicken with Vegetables
Pork Loin Mole Sauce
Chipotle Bean Tortilla Pie

DINNER 5:00 PM-7:30 PM
Crispy and Spicy Orange Chicken and Vegetables
Asian Style Beef Ribs
Sweet Chili Tofu

MIDRATS 12:00 AM-1:00 AM
Chicken Wings
Cheese Manicotti
Pasta

Friday, February 18
LUNCH 11:00 AM-1:00 PM
Chicken in Sweet Onion Sauce
Honey Baked Ham
Vegetarian Kidney Bean Cassoulet

DINNER 5:00 PM-7:00 PM
Jamaican Jerk Chicken
Jamaican Meat Pie
Vegetarian Jerk Patties

MIDRATS 12:00 AM-1:00 AM
Hot Dogs
Chili
Vegetarian Chili

Saturday, February 19
LUNCH 11:00 AM-1:00 PM
White Turkey Stew
Salad Bar

DINNER 5:00 PM-7:30 PM
Chicken with Creamy Tomato Sauce
Baked Sausage and Penne
Eggplant Parmesan

MIDRATS 12:00 AM-1:00 AM
Cooks Choice

Sunday, February 20
CONTINENTAL BREAKFAST 4:45 AM-7:30AM
BRUNCH 10:00AM -1:00PM

DINNER 5:00 PM-7:30 PM
Savory Ham Bread Pudding
Braised Swiss Steak
Vegetable and Lentil Stew

MIDRATS 12:00 AM-1:00 AM
Cooks Choice

Monday, February 21
LUNCH 11:00 AM-1:00 PM
Pizza Day

DINNER 5:00 PM-7:30 PM
Barbeque Beef Brisket
Pulled Barbeque Chicken
Barbeque Tofu

Tuesday, February 22
LUNCH 11:00 AM-1:00 PM
Herb Roasted Chicken
Pesto Seared Halibut
Tofu Provencal

DINNER 5:00 PM-7:30 PM
Tomato Braised Swiss Steak
Grilled Pork Chops
Enchanted Broccoli Forest Casserole

Wednesday, February 23
LUNCH 11:00 AM-1:00 PM
Spanish Pork Loin
Fiesta Grilled Steak
Black Bean Cass[illegible]le

DINNER 5:00 [illegible]M-7:30 PM
Sheppard's P[illegible]
Chicken Pot P[illegible]
Vegetable Bean [illegible]w

Thursday, February 24
LUNCH 11:00 AM-1:00 PM
Meatballs
Halibut in Romesco Sauce
Tofu Lasagna

DINNER 5:00 PM-7:30 PM
Greek Chicken
Pork Soulvlaki
Vegetable Chickpea Cakes

Friday, February 25
LUNCH 11:00 AM-1:00 PM
Short Ribs
Chicken Dippers
Fried Tofu

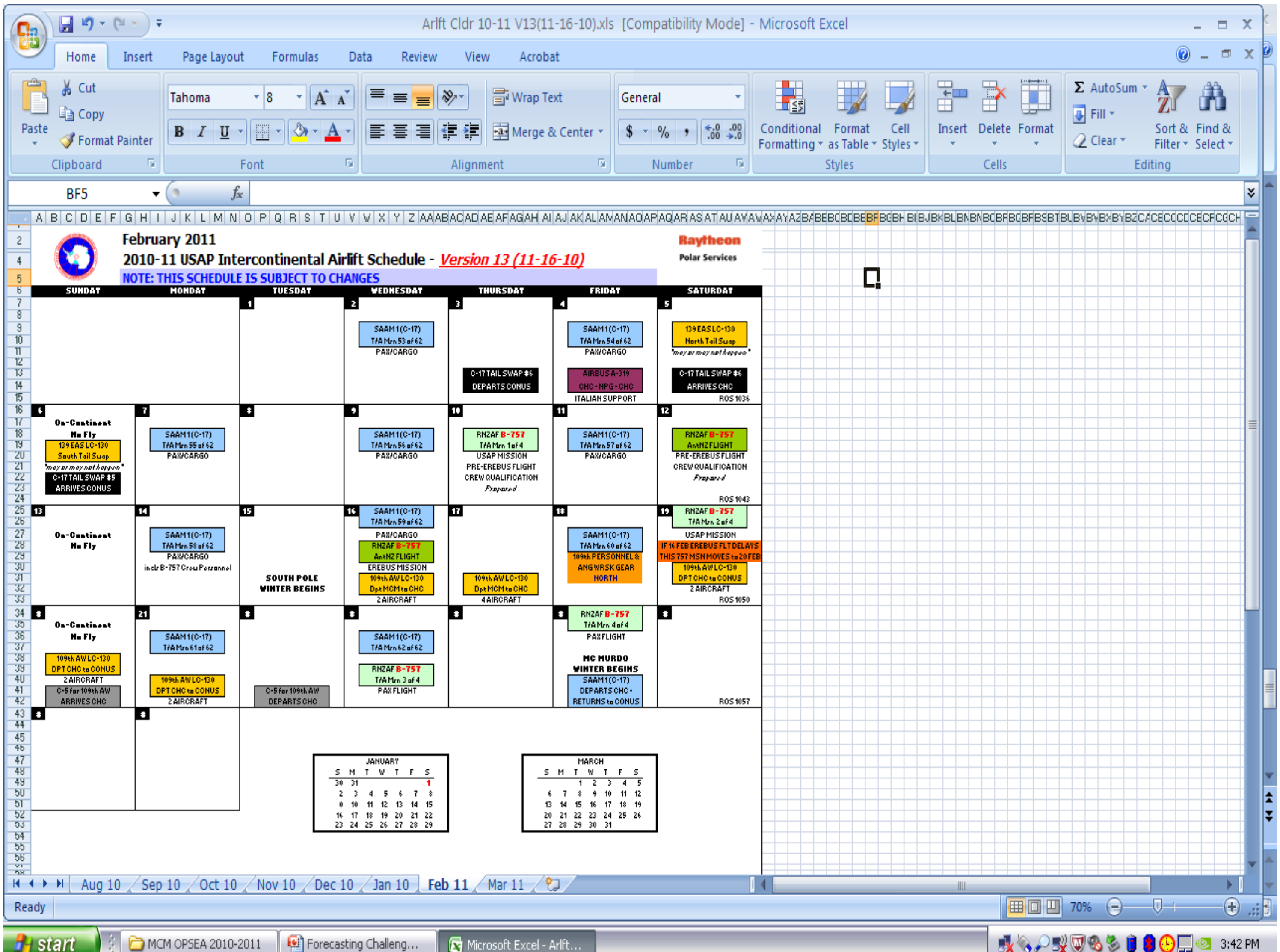
DINNER 5:00 PM-7:30 PM
Meatloaf
Garlic Herb Grilled Halibut
Lentil Loaf

Saturday, February 26
LUNCH 11:00 AM-1:00 PM
Sloppy Joes
Honey Glazed Pork Loin
Sloppy Janes

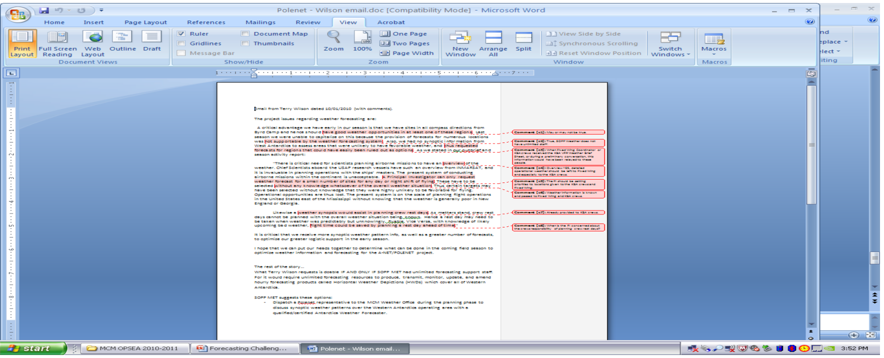
DINNER 5:00 PM-7:30 PM
Chicken Bhirani
Beef Madras
Dahl

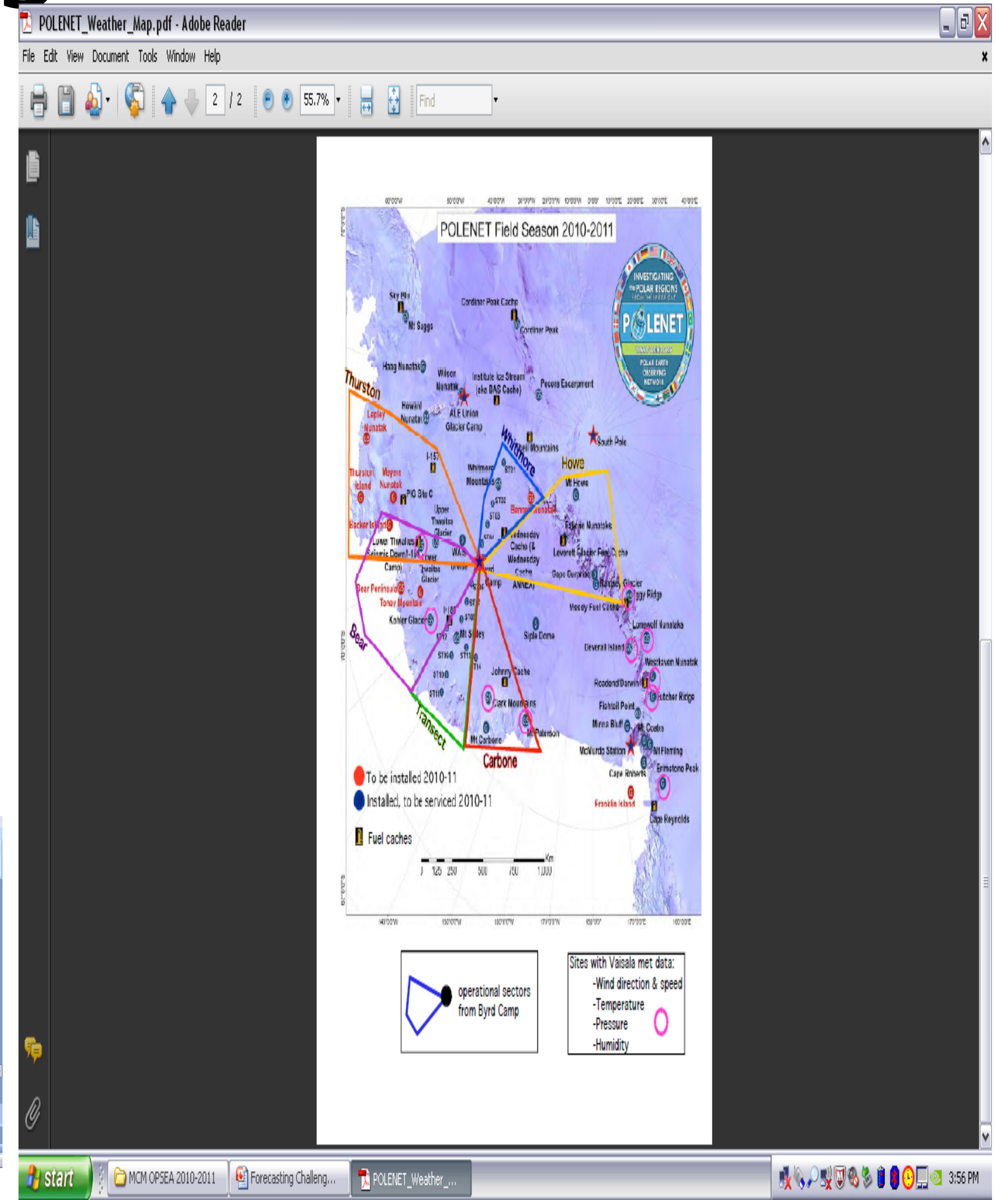
Please call x2212 after 5:30pm if you have any menu or meal questions. Thanks! 2/17/2011 9:11AM

Driving Factors

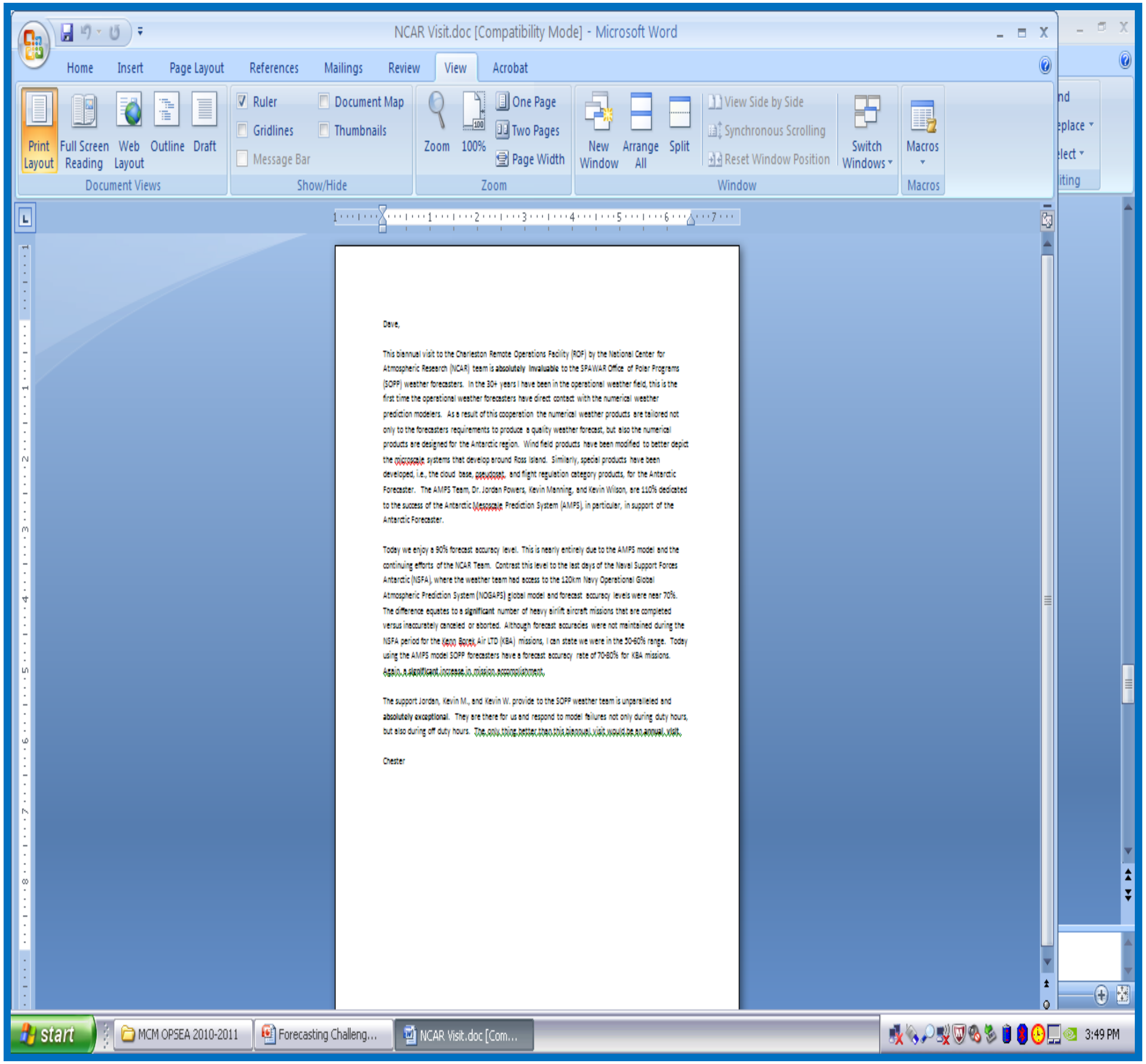


Driving Factors





Driving Factors



Dave,

This biannual visit to the Charleston Remote Operations Facility (ROF) by the National Center for Atmospheric Research (NCAR) team is **absolutely invaluable** to the SPAWAR Office of Polar Programs (SOPP) weather forecasters. In the 30+ years I have been in the operational weather field, this is the first time the operational weather forecasters have direct contact with the numerical weather prediction modelers. As a result of this cooperation the numerical weather products are tailored not only to the forecasters requirements to produce a quality weather forecast, but also the numerical products are designed for the Antarctic region. Wind field products have been modified to better depict the microscale systems that develop around Ross Island. Similarly, special products have been developed, i.e., the cloud base, pseudosat, and flight regulation category products, for the Antarctic Forecaster. The AMPS Team, Dr. Jordan Powers, Kevin Manning, and Kevin Wilson, are 110% dedicated to the success of the Antarctic Mesoscale Prediction System (AMPS), in particular, in support of the Antarctic Forecaster.

Today we enjoy a 90% forecast accuracy level. This is nearly entirely due to the AMPS model and the continuing efforts of the NCAR Team. Contrast this level to the last days of the Naval Support Forces Antarctic (NSFA), where the weather team had access to the 120km Navy Operational Global Atmospheric Prediction System (NOGAPS) global model and forecast accuracy levels were near 70%. The difference equates to a **significant** number of heavy airlift aircraft missions that are completed versus inaccurately canceled or aborted. Although forecast accuracies were not maintained during the NSFA period for the Kenn Borek Air LTD (KBA) missions, I can state we were in the 50-60% range. Today using the AMPS model SOPP forecasters have a forecast accuracy rate of 70-80% for KBA missions. Again, a **significant** increase in mission accomplishment.

The support Jordan, Kevin M., and Kevin W. provide to the SOPP weather team is unparalleled and **absolutely exceptional**. They are there for us and respond to model failures not only during duty hours, but also during off duty hours. The only thing better then this biannual visit would be an annual visit.

Chester

What’s Next

1. **Use what we have to its fullest ability. We still have a lot we can learn from what we have**

2. **Train, Train, and re-Train**
   - **Don’t repeat errors**
   - **Work at maintaining peak percentage even during poor weather seasons**

3. **Keep our ears to the ground for even the smallest advancements**

4. **Be patient and support**