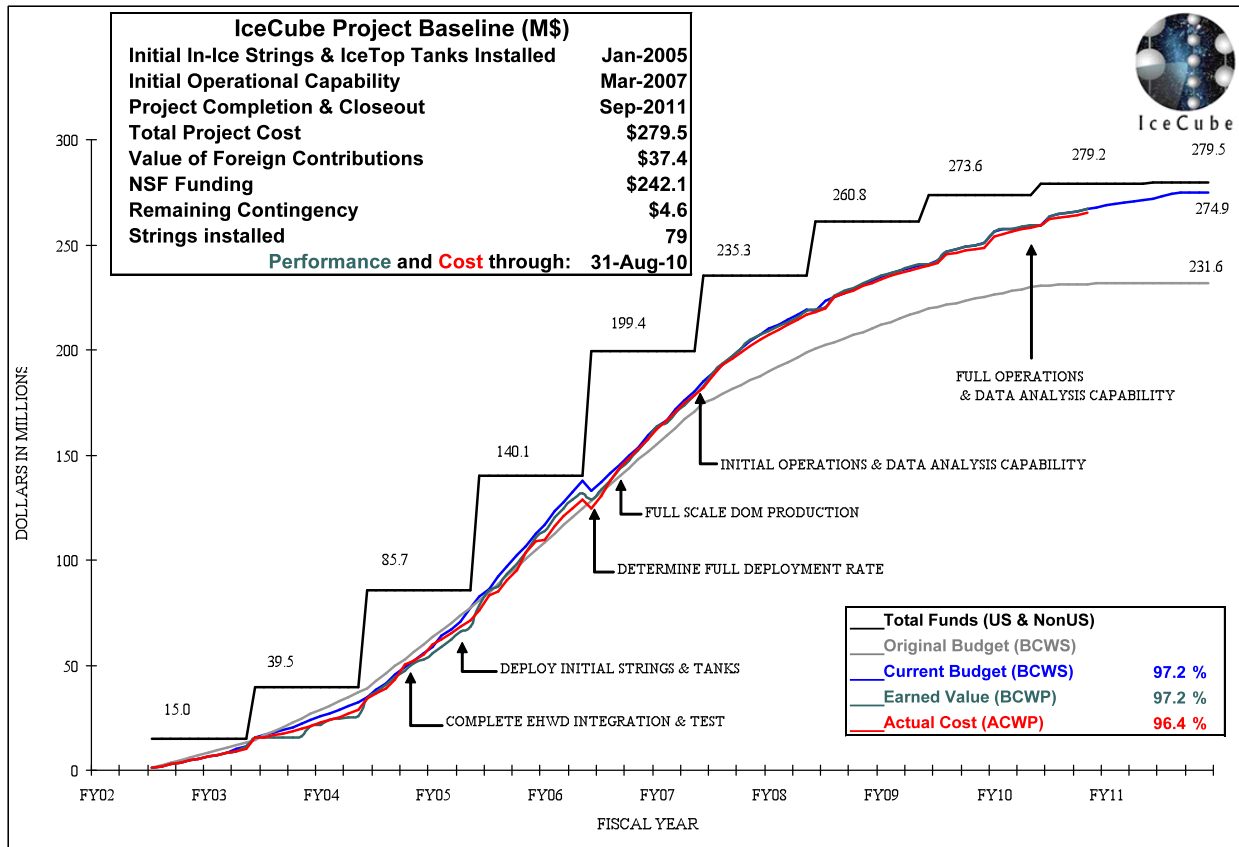


IceCube Project Monthly Report - September 2010

Accomplishments

- 19,000 pounds of repaired equipment, spares, and materials have been shipped to the South Pole.
- IceCube conducted a successful internal readiness review on September 16th and a support review on the 29th with Raytheon Polar Services Corporation to confirm all project support was scheduled and synchronized.
- The IceCube 79 string detector configuration is being examined for simulation purposes, and dedicated test datasets will be generated shortly.
- A new Data Acquisition software release was deployed on the South Pole System, addressing two major issues: a reduction in the number of detector configuration files and an increase in the data buffer memory allocation.
- A new IceCube poster series is being designed, with three separate posters focusing on Neutrino Science, Digital Optical Modules, and Life at the South Pole.
- The IceCube Collaboration meeting will be in Brussels from September 20-23, followed by the International Oversight and Finance Group meeting on September 24.



Cost and Schedule Performance – The project is 97.2% complete. Remaining contingency is \$4.6 million. The NSF IceCube MREFC funding of \$242.1 million remains unchanged since the project baseline was established in early 2004.

IceCube Neutrino Observatory Cost Schedule Status Report Reporting Period Ending: 8/31/2010										Note 1
Cumulative (AY K\$)							At Completion Note 4	Complete (%)		
OBS Structure L2	Budgeted Cost ²		Actual Cost of Work Performed	Variance Cost	Risk Contingency ^{Notes}		Budgeted AY \$s	Sched	Perf	Actl Cost
	Work Scheduled	Work Performed			Assigned	% Remain Work				
Project Support	26,421	26,421	26,353	68.0	125	15.6%	27,223	97.1%	97.1%	96.8%
Implementation	43,758	43,758	43,460	297.8	560	18.8%	46,732	93.6%	93.6%	93.0%
Instrumentation	76,709	76,709	76,548	160.6	30	16.1%	76,895	99.8%	99.8%	99.5%
Data Acquisition	33,855	33,855	33,855	0.6	0	0.0%	33,855	100.0%	100.0%	100.0%
Data Systems	26,449	26,449	26,488	-39.5	50	10.2%	26,940	98.2%	98.2%	98.3%
Detector Comm. & Verification	20,550	20,550	20,536	14.4	25	25.4%	20,649	99.5%	99.5%	99.5%
Pre Operations	4,482	4,482	4,286	195.5	50	9.7%	4,999	89.7%	89.7%	85.7%
Subtotal	232,224	232,224	231,526	697.4	840	16.6%	237,293	97.9%	97.9%	97.6%
RPSC SUPPORT	33,681	33,681	32,417	1,263.8	300	11.4%	36,323	92.7%	92.7%	89.2%
NSF	1,176	1,176	1,176	0.0	15	17.1%	1,263	93.1%	93.1%	93.1%
Total	267,080	267,080	265,119	1,961.2	1,155	14.8%	274,880	97.2%	97.2%	96.4%
CONTINGENCY ^{Note 3}							4,593			
IceCube Total ^{Note 2}	267,080	267,080	265,119	1,961.2	1,155		279,472	97.2%	97.2%	96.4%

Notes: 1 Incorporates approved baseline changes.
2 Total Budget at Completion includes \$37.4 M
3 Remaining Contingency is: \$4.6 M
4 The BAC (Budget At Completion), reflects PY9-10 detailed Baseline Review.
work.

The cost variance at the end of August 2010 was \$1,961k. This favorable cost variance is primarily due to Raytheon and NY Air National Guard FY10 on-ice fuel and labor cost savings. Favorable cost variance in Implementation is due to lower than planned training travel and labor costs and the favorable cost variance in Instrumentation and Pre-Operations is mostly due to lagging invoices.

Contingency Status and Plans – No change requests were implemented this month.

8/31/2010

Change Log - IceCube Total Project Budget Baseline (\$K)

No.	Description	Approval Date	Total Baseline	Allocated Budget	Allocated Budget Change	Contingency Budget
CR165	Additional PY9 Simulation & Calibration effort	08/03/10	279,472	274,513	93	4,959
NA	Status as of June 2010		279,472	274,513	0	4,959
CR166	Pre-Operations Budget Plan through Sep.2010-2nd phase	07/12/10	279,472	274,880	367	4,593
NA	Status as of July 2010		279,472	274,880	0	4,593
NA	Status as of August 2010		279,472	274,880	0	4,593

The IceCube project is conducting reviews of the various MREFC subsystems to ensure completeness and readiness for reliable operations. The action item lists resulting from these reviews typically generate the need for additional resources, e.g., programming support, computing hardware purchases, documentation effort, etc. The cost is considered in the risk assessment process and will be addressed within the available contingency.

If the final drilling season is successful, the remaining contingency will be adequate to complete the approved scope. A no-cost extension will be requested for the project from March 31, 2011 to March 31, 2012 to accommodate activities associated with the final disposition of the IceCube Enhanced Hot Water Drill (EHWD); the orderly termination of construction activities; and the preparation of a comprehensive completion report on construction. In January 2011 the EHWD will be prepared for shipment from South Pole. Only a limited amount the drill equipment can be shipped out of South Pole in January and February 2011 due to retro cargo limitations. The current plan is to ship the majority of drill equipment out of South Pole during the 2011-12 summer.

Risk Assessment & Potential Contingency Adjustments

Item	Estimate (\$K)
1. Potential cost exposure for the approved scope of work based on Level 3 technical, cost and schedule risk assessment.	\$1,155K
2. Computing infrastructure and software development.	\$1,560K
3. Estimated cost to retro IceCube equipment/materials from the South Pole at the end of the project.	\$1,050K
4. Potential labor cost to retain experienced personnel in the final year of construction to ensure that the final season will be a success.	\$150K
Total	\$3,915K
Available Contingency as of Aug 31, 2010	\$4,593K

Drill Operation and Installation – Drilling and deployment teams are preparing to travel to the Pole by completing equipment repairs, packing materials for the season, and participating in readiness reviews with internal and external partners.

19,000 pounds of repaired equipment, spares, and materials have been shipped and repairs and reconfigurations on the Enhanced Hot Water Trencher are complete.

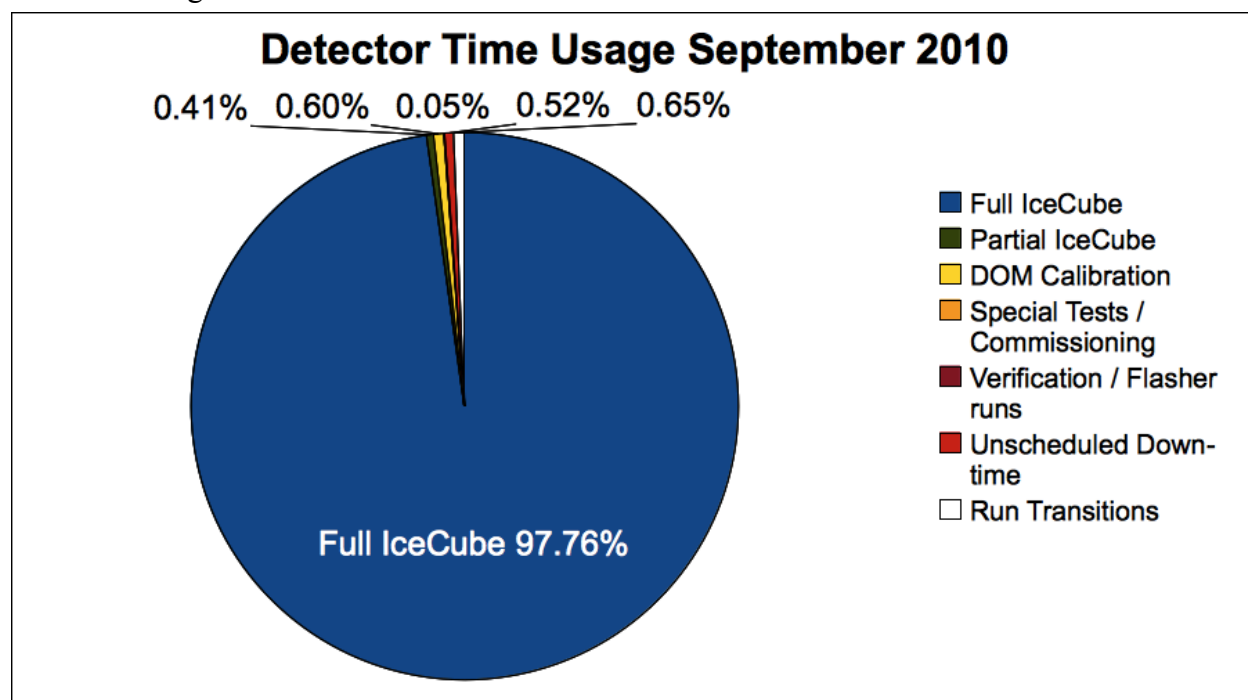
Progress continues on EHWD documentation. All video has been edited, with several reshoots planned and drawing updates are on-going. The project is 60% complete. The final plan for transitioning the EHWD into a long term storage configuration has been developed, and materials for bracing and winterization have been procured.

IceCube conducted an internal readiness review on September 16th to assure that all personnel, equipment, methods, and plans were ready for the season. A support review was held on the 29th with Raytheon Polar Services Corporation to confirm all project support was scheduled and synchronized.

Special Device projects continue to be coordinated and monitored with regular meetings for status and technical or logistical assistance. A final readiness review of these was held October 5th.

Winterization plans for the IceCube Test Bed at the University of Wisconsin Physical Sciences Laboratory are developed with a targeted shut-down of October 20th.

Detector Time Usage – Detector up-time of 98.77% was achieved in September despite interruptions to data-taking by two serious hardware incidents. Several major issues were resolved last month, leaving only a small number of test and special runs to September. Consequently, at 97.52%, the clean up-time is also very high due to the increasingly stable detector configuration.



In the current Data Acquisition (DAQ) software version, the DAQ is stopped and restarted at each eight hour run transition, resulting in two to three minutes of detector downtime for each run. The upcoming DAQ release will run continually, eliminating the 0.65% run transition downtime currently accounted for in “Full IceCube.”

Definition of the terms:

“**Detector Up-Time**” is the percentage of the time period for which the pDAQ data acquisition was acquiring data and delivering at least 500Hz of event rate. This uptime measure therefore includes periods in which the detector was taking data with a partial detector enabled or with light contamination from calibration sources.

“**Clean run Up-Time(s)**” is the percentage of the time period considered to have pristine data (standard hardware and software configurations) with the full nominal detector enabled, not contaminated with light from calibration sources and for which no serious alerts were generated by the monitoring, verification or other. The criteria applied are not algorithmic but rather represent the Run Coordinator’s overall impression of the quality (including uniformity) of the runs/data.

Data Acquisition Hardware & Software – In addition to eliminating run transition downtime, the DAQ update planned for mid-October will include improvements to the trigger system and the control and deployment infrastructure.

This South Pole summer season was scheduled to see a significant replacement of older servers as part of the three year replacement cycle of South Pole hardware. After last years replacement servers had to be deactivated due to high failure rates, a different server model had to be identified and tested and a new hardware vendor had to be identified.

To optimize the sparing situation and have an easier transition, it was decided to advance next years server replacement and do a full replacement of all server platforms at the South Pole System. After careful evaluation of the offerings from all major hardware vendors, a robust high-end server from DELL was selected.

Fifty-five servers for the South Pole System plus 30 servers to refresh the South Pole Test System in Madison was placed. After receiving a huge shipment of servers, inspection and testing began. A careful installation plan was developed, given the limited space, power and cooling resources available to IceCube. Testing was successful, and the new hardware has been packaged and shipped to the Pole. Meanwhile, work continues in preparing a detailed script to orchestrate replacing the hardware on the live IceCube detector with minimal interruption.

Data Management and Simulation – Data verification continues without issue, and the integration of verification into IceCube Live should be completed in October. Calibration and monitoring work groups are focusing on measuring the optical properties of the ice and examining the dust layer.

Simulation teams continue work on benchmark datasets. The IceCube 79 string detector configuration is being examined for simulation purposes, and dedicated test datasets will be generated shortly.

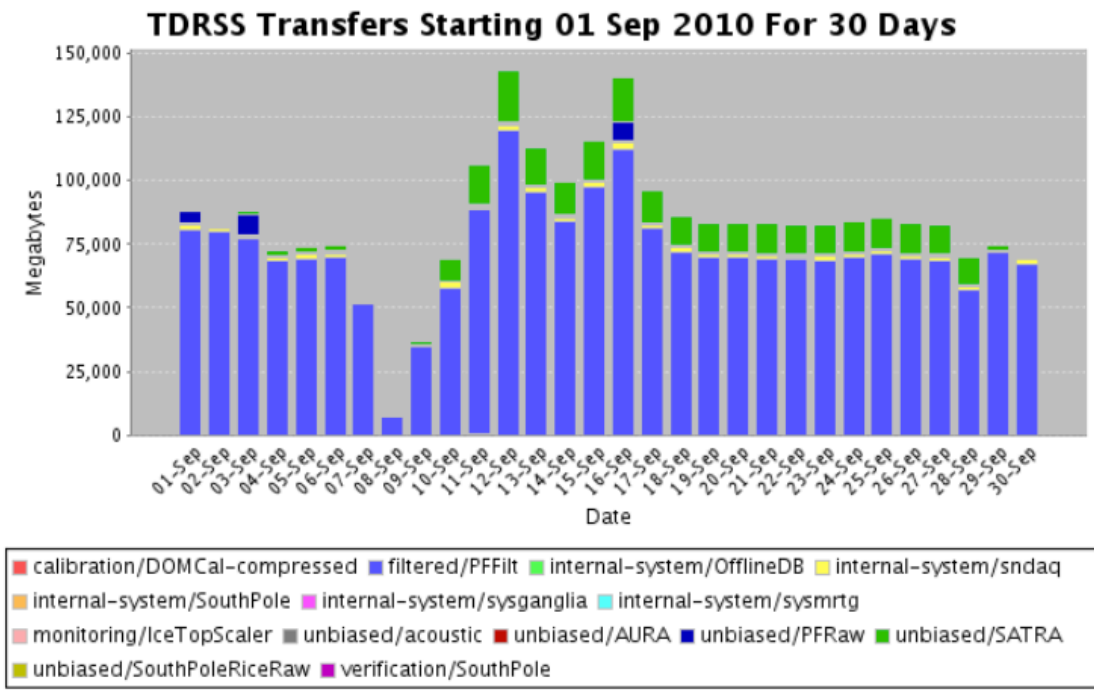
Collaboration partners worldwide continue work on 59-string background production, with the European Grid processing approximately 34% of the data. The Ruhr-Universität Bochum and Universität Mainz also process significant portions.

The Grid Laboratory of Wisconsin continues to process over 50% of 59-string neutrino signal event production, with Stockholm University, the University of Wisconsin Computer Sciences, NPX3 Designs, and the University of Maryland making significant contributions.

Level 3 off-line production processing of the 59 string run configuration continues. This processing run is the first to incorporate the needs of collaboration working groups at this level, which will reduce dataset sizes and spilt the sets out for different working groups.

Online filtering of 79-string data continues smoothly. Remaining MREFC tasks include fine-tuning the performance, improving monitoring and communications with the IceCube Live system, and final documentation.

The figure below shows the daily satellite data transfer rates in MBytes/day for September. The blue is for the steady 79-string filtered physics data, which dominates the total bandwidth. During the period around September 8th there were troubles with a couple satellite passes. The detector continued running normally, buffering the data for transfer, and the data transfer caught up over the next week with no lose of data or detector uptime.



Education and Outreach – The IceCube winterovers and collaboration member Nick van Eijndhoven were part of the European Researchers' Night on September 24th. The event, an important initiative of the European Community, aims to let the public discover the value of scientific research. This year the event was held simultaneously in over 260 cities in 31

European and the Mediterranean countries. Over 11,000 viewers watched the event on the web and the event was broadcast on some Italian television networks. The winterovers participated in a videoconference from the South Pole that was included in the main event schedule. Professor van Eijndhoven, from the Utrecht University in the Netherlands, was on hand at a public gathering in Rotterdam, Netherlands to give insight and comments on the evenings events. Thousands of people, including 5,000 middle and high school students, attended the Rotterdam showing.

At the University of Wisconsin, Madison, Professor Stefan Westerhoff led off the series of IceCube talks at the UW Space Place on September 14. He described the history and science of cosmic rays and explained how neutrinos are the ideal messenger particle. The series will continue for four weeks and include talks on building the hot water drill, how Digital Optical Modules work, and what the data from IceCube can tell us.

Work has begun on a prototype for a desktop sized 3-D fiberoptic event viewer, displaying neutrino events from the IceCube detector.

2011 Detector Completion Planning – Based on feedback from the IceCube Board, the 2011 Collaboration meeting has been extended for two more days. Following a presentation of the speaker list for “IceCube Invites Particle Physics,” concerns arose that collaboration members would be motivated to attend the meeting and two days of the collaboration meeting would be lost.

The current schedule is as follows:

Tuesday, April 26

8:30-4:30 IceCube Collaboration Meeting Monona Terrace

Wednesday, April 27

8:30-4:30 IceCube Collaboration Meeting Monona Terrace
 8:30-4:30 Future Ice Drilling Symposium UW Memorial Union

Thursday, April 28

8:30-3:00 IceCube Collaboration Meeting Monona Terrace
 8:30-3:00 Future Ice Drilling Symposium UW Memorial Union
 4:00-9:00 Inauguration Program
 4:15-5:45 Formal Remarks Monona Terrace
 6:15-7:15 Reception Overture Center
 7:15 Dinner Overture Center

Friday, April 29

8:30-4:30 IceCube Invites Particle Astrophysics Monona Terrace
 5:00-7:00 Wine and Cheese Reception

Saturday, April 30

8:30-12:30 IceCube Invites Particle Astrophysics Monona Terrace

Sunday, May 1

8:30-4:30 IceCube Collaboration Meeting

Monona Terrace

Monday, May 2

8:30-4:30 IceCube Collaboration Meeting

Monona Terrace

Upcoming IceCube Meetings and Events

Special Devices Readiness Review

October 5, 2010

Targeted shut-down of IceCube Test Bed

October 20, 2010

IceCube Collaboration Meeting, Madison

April 25 – May 2, 2011

Acronym List

EHWD Enhanced Hot Water Drill

DAQ Data Acquisition