2.9 Science IPT

During the April-June period, Science IPT has provided review panel members and observer expertise for the front end PDRs, the backend CDR and the computing CRD2. The Science IPT initiated an approved change request (CRE) for sideband separation with the use of 90 degree phase switching (ALMA-56.00.00.00-001-A-CRE), a feature overlooked in the system design. The progress of millimeter astronomy prompted an additional change request, for the increase of the Band 9 upper frequency to 373 GHz (ALMA—40.02.07.00-003-A-CRE), which has been approved.

Scientific Advisory Committees

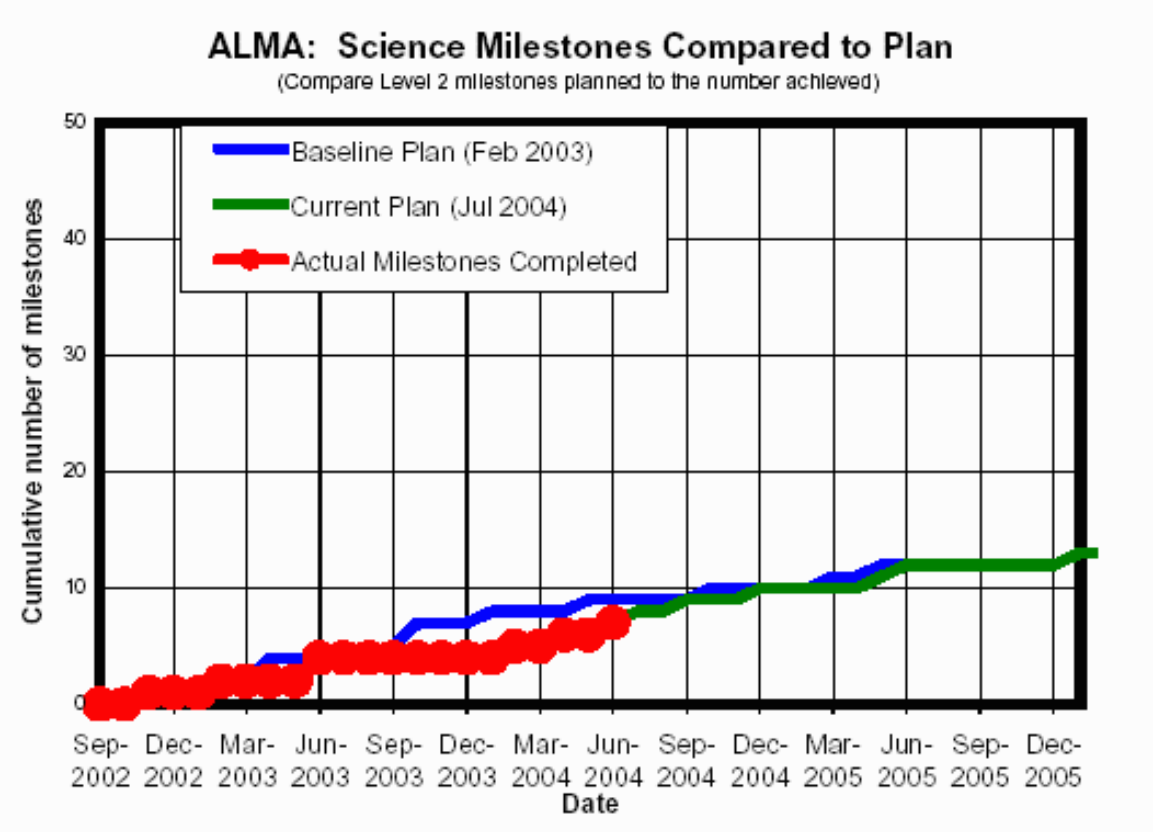
As planned, the Science IPT facilitated the meeting of the ALMA Scientific Advisory Committee as it met in Cambridge during 2004 May 10-11. The Science IPT provided support to the ASAC as it responded to its Charges from the Board. The IPT distributed that report to other IPT leads in the project. Additionally, the Science IPT/NA provided planning and support to the ALMA North America Science Advisory Committee at its 2004 May 15 face-to-face meeting. Similarly, the Science IPT/EU has provided support to the European Science Advisory Committee as it plans for its meeting 2004 September 23. Advice on ALMA Regional Centers and Early Operations was provided to the project based on the input of the community via these committees.

Milestones

The Table gives the status of Level 2 milestones due during the current quarter and the next quarter.

Milestone	Level	Title	Date	Status
9818	2	ICD between Science and Site Approved	2004-Apr-30	Draft submitted
9825	2	Science aspects of operations plan complete	2004-Jun-30	Draft H2 submitted
9830	2	Plan for early science configurations complete	2004-Jun-30	In Document Approval Queue
9835	2	Report WVR strategy / implementation / operations	2004-Sep-30	See comment.

Note that Milestone 9835 in its original form depended upon tests of the WVR at the ATF. In the currently understood schedule, that has slipped to April 2005. Therefore we will issue a report without ATF tests on the WVR strategy. Given the weather patterns at the ATF it is unlikely that WVR field testing can now be completed before winter 2005/6. As reported in June 2003, the baseline at the ATF is likely to be too short for atmospheric phase correction demonstrations; the field testing is mainly to demonstrate operation of the instrument.



The Figure shows status of Milestones versus date for the Science IPT.

Calibration

As planned, the Calibration Group has been reinvigorated under the leadership of Jeff Mangum. The Calibration Plan has been presented to Science Advisory committees; feedback from those committees and from the project is being incorporated into the Plan. A feasibility study is under way for the multiple load amplitude calibration device described in ALMA Memo No. 461. Meanwhile, measurements of a fallback amplitude calibration device utilizing a semi-transparent vane, halted at the IRAM 30m owing to poor performance of that device, are underway in Madrid. Plans are being developed to perform astronomical tests of a semitransparent vane amplitude calibration device at the ATF in autumn 2004. A feasibility study for a system to measure absolute flux is in its final stages at the BIMA Interferometer under the guidance of W. J. Welch. Holdaway, Stirling, Richer and Hills are working to produce a grid of atmospheric models with which to model WVR performance in a study to determine the most effective way to combine fast switching and WVR correction of atmospheric phase perturbation.

Authors of projects in the ***Design Reference Science Plan*** have been polled to provide details of the calibration needs, particularly the accuracy, for their projects. The responses have been presented to the ASAC and reviewed, and a document summarizing them is being prepared for issue during 2004 August.

Commisioning and Science Verification

A preliminary version of the Commisioning and Science Verification Plan was presented at the mini-ALMA week in March 04, to the ASAC and to the North American community at the ALMA Science Workshop; the final version is in the last stages and should be finished in about 1 month. A CSV team has been formed, comprised of Laing, Emerson, Chandler, Lucas, Mangum, Shepherd, Wilson, Wootten, Saito, Morita and Kawabe.

Configuration, Antennas

The inner array pad locations are approved, outer pad locations have been in the document approval queue for over a year, the antenna movement plan is in the document approval request queue, and the Early Science configurations also await document approval. The plan for calibration of ALMA baselines, a complex process for an array in which several elements move every few days, is in its final draft stages and will appear during July.

Site Characterization

Monitoring of site conditions continues, with monthly posting of data to the ALMA/NA website. Particular focus has turned to atmospheric characterization data needed during operation of the array, with monthly telecons devoted toward definition of the instrumentation needed. The preliminary document is available in the Science IPT documents area of ALMAEDM and has been provided to members of other IPTs for comment (comments are in hand from the Computing IPT Control Subsystem group).

Science Requirements

The Science Requirements document was discussed with the Project Engineer, resulting in clarification of wording in the document. Approval is expected for this document very soon.

Organization, interaction with other IPTs

One result of the Back End CDR was that the total power system was in need of redesign. The Science IPT has worked closely with the Back End IPT to ensure that an effective design is produced. Science IPT members regularly attend telecons of the Software System Requirements team; Brian Glendenning of the Computing IPT regularly attends meetings of the Science IPT/NA and Robert Lucas of the SSR regulatly attends Science IPT and ASAC meetings.

Meetings, Outreach and Public Education

The major event of the quarter has been the ALMA Science Workshop, held at the University of Maryland 2004 May 14-15. Members of the ANASAC actively participated in the organization of the Workshop and many were able to attend. The ANASAC acts as a conduit between NRAO and the North American ALMA Science Community; the ANASAC issued a report summarizing discussions at the Workshop. This report formed an essential element in the definition of the North American ALMA

Science Center now being framed at NRAO under the guidance of its Head, Paul vanden Bout, who has returned to Charlottesville during this period.

Approval of the Council of the American Astronomical Society was obtained for an ALMA Town Meeting to be held at 1:00 pm on 2005 January 11 (Tuesday) during the 205th AAS Meeting held in San Diego, CA. Planning of that meeting will begin during July.

ALMA newsletters for North America and Europe have been released. The planning for European ALMA Community day, Sept. 24 in Garching, is nearly finished.