



EA Development Plan

East Asia ALMA Project Scientist

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EA Resume Discussion

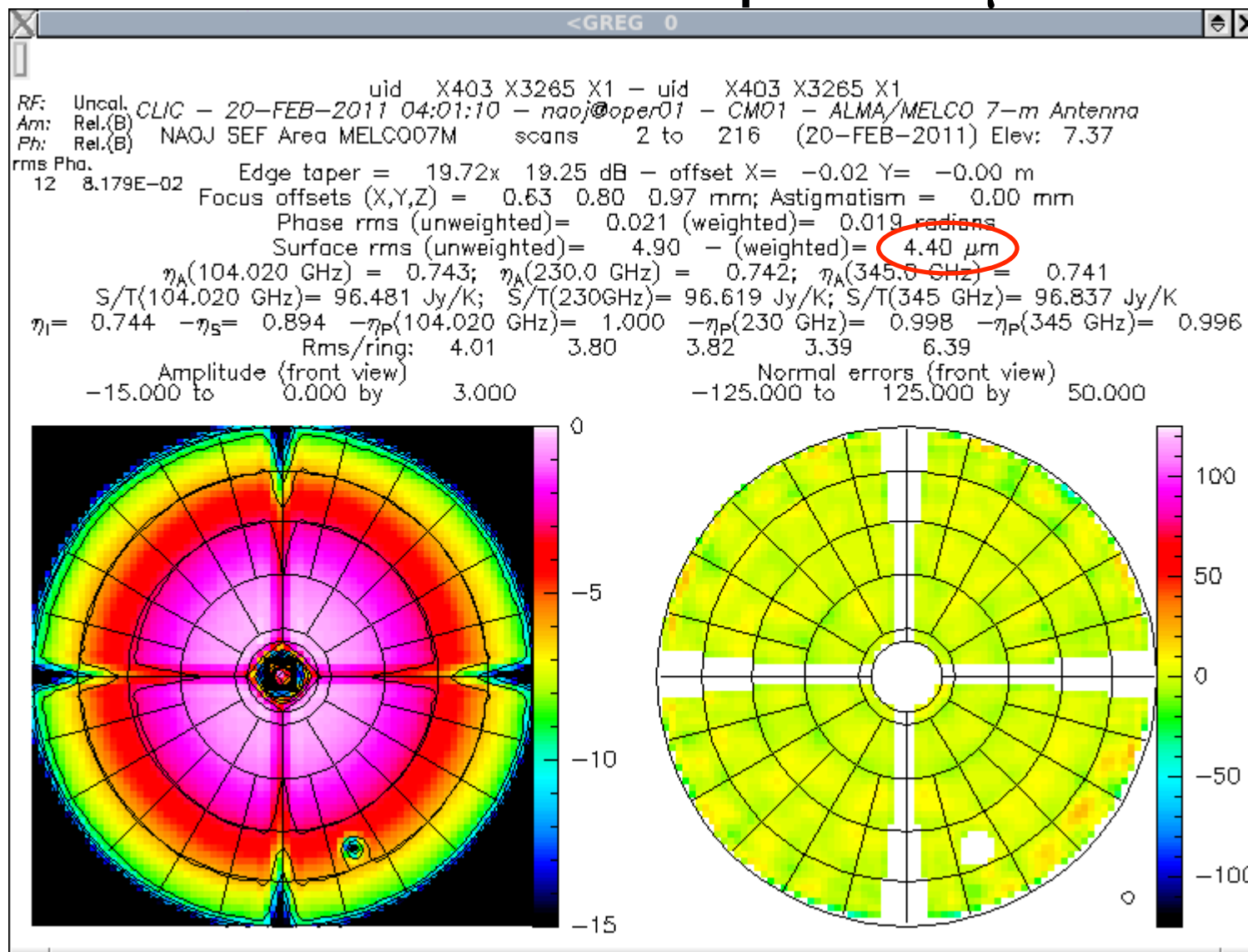
- Possible Development Items
 - Addition of new capabilities
 - Improvement of current capabilities
 - Better calibration schemes
 - New software algorithm

Red: Design study on-going

Addition of new capabilities 1

- Antenna
 - ALMA prototype Antenna dedicated to monitor (e.g. solar flare)
 - Additional 7-m antennas for Band 11 and more
- Front End
 - Band 1 (by ASIAA)
 - Development and Production
 - Band 11
 - Development and Production
 - Multi-pixel Rx
 - 4 elements (can be realized without modification of the current cartridge at submm bands.)

ACA 7m Surface Map 4.40 μm



Addition of new capabilities 2

MZM LS: Mach-Zehnder Modulator type Laser Synthesizer
LLC: Line length corrector

- IF/LO/Backend/Correlator
 - New LO system with MZM LS and LLC
 - improve coherence loss and phase drift for long baselines (It will be effective for phased VLBI)
 - ✓ Development on-going (Kiuchi+ 07, 08, 11)
 - 8-bit digitizer with 8-Gsps (increase sensitivity)
 - IF processor and Data Transmission System for high-speed digitizer and multi-beam etc.
 - Correlator (improve re-quantization loss and realize wideband system)



Addition of new capabilities 3



- Data rate
 - Higher speed between correlator and archive system
- Phase-up VLBI Capability

Upgrade capabilities

- Front End
 - Band 4 (4-12 GHz, 2SB, 20dB IRR, 2/3 Trx spec)
 - Better sensitivity and quality for particularly SD
 - Development and Production
 - Band 8 (4-12 GHz, 2SB, 20dB IRR, 2/3 Trx spec)
 - Better sensitivity and quality for particularly SD
 - Development and Production
 - Band 10(4-12 GHz, 2SB, 20dB IRR, 2/3 Trx spec)
 - Better sensitivity and quality for particularly SD
 - Development and Production

Better Calibration Scheme

- **AOS Reference Signal Source**
 - Characterize Antenna better
 - Holography
 - Beam Pattern
 - Polarization
 - System test or maintenance check
- Any more?

New Algorithm

- Calibration algorithm
 - Improved observation sequence
- Imaging algorithm
 - Improved deconvolution method
 - Improved 3-d data handling or display



Software

- Software development is needed whatever hardware or algorithm is introduced!



Next Step

- Prioritization in terms of science
- Straw-man requirements
- Technical feasibility study

To be discussed with regional SAC and community



www.almaobservatory.org

The Atacama Large Millimeter/submillimeter Array (ALMA), an international astronomy facility, is a partnership among Europe, North America and East Asia in cooperation with the Republic of Chile. ALMA is funded in Europe by the European Organization for Astronomical Research in the Southern Hemisphere (ESO), in North America by the U.S. National Science Foundation (NSF) in cooperation with the National Research Council of Canada (NRC) and the National Science Council of Taiwan (NSC) and in Japan by the National Institutes of Natural Sciences (NINS) in cooperation with the Academia Sinica (AS) in Taiwan. ALMA construction and operations are led on behalf of Europe by ESO, on behalf of North America by the National Radio Astronomy Observatory (NRAO), which is managed by Associated Universities, Inc. (AUI) and on behalf of East Asia by the National Astronomical Observatory of Japan (NAOJ). The Joint ALMA Observatory (JAO) provides the unified leadership and management of the construction, commissioning and operation of ALMA..



EA Development Plan '09



- 2009 EASAC
 - Next Digital System
 - Upgrade of A/D and Correlator
 - More spectral line observing capability
 - Sensitivity improvement multi-bit AD (~10% increase)
 - Band 1: SZ
 - Band 11 (THz band)
 - New submm window ([NII], SED peak, High-J CO)

Development Plan '09

- JSAC meeting with experts
 - High Spatial resolution SZ at band 1,2, and 3
 - Importance of Sensitivity and FOV
 - Band 1 is essential for fainter targets and QSO remnants
 - Sun: Band 1, 2, and 3
 - Large FOV for flares: ~ 5 arcmins
 - $\Delta t \sim 16$ ms
 - Circular polarization at lower frequency bands
 - Sun is far brighter than the other sources:
Observational constraints?