

The POrtable Submillimeter Telescope (POST)

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I. Project Introduction

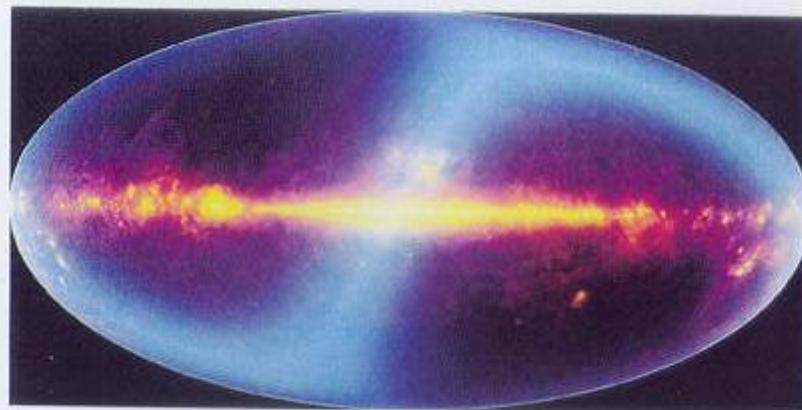
1993 PMO, NRO, TRAO, NCU joint site survey
in the northwest part of China ==> good site?

1994 Start to discuss some small-scale project at NRO

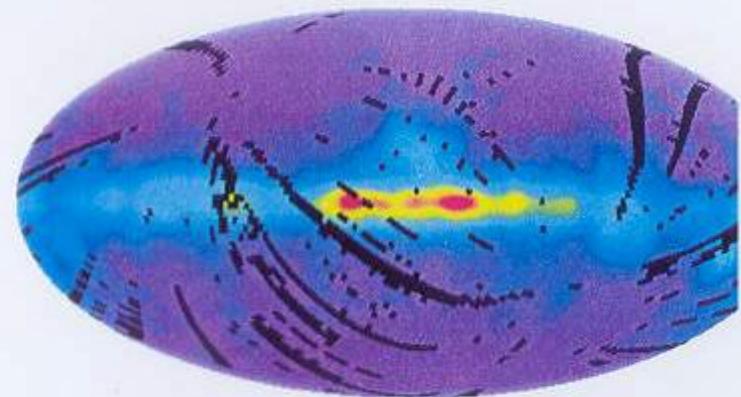
1995 Concept of a mobile telescope
large-scale survey for [CI]@490/809GHz
site survey

1995 NAO director funding for antenna
1996 CAS funding for receiver

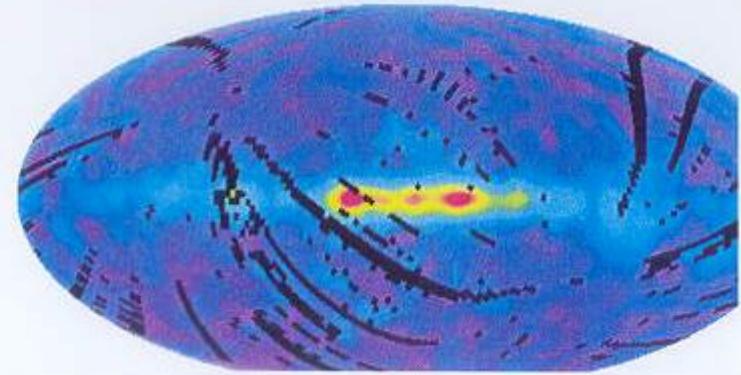
INFRARED & SUBMILLIMETER VIEWS OF OUR GALAXY



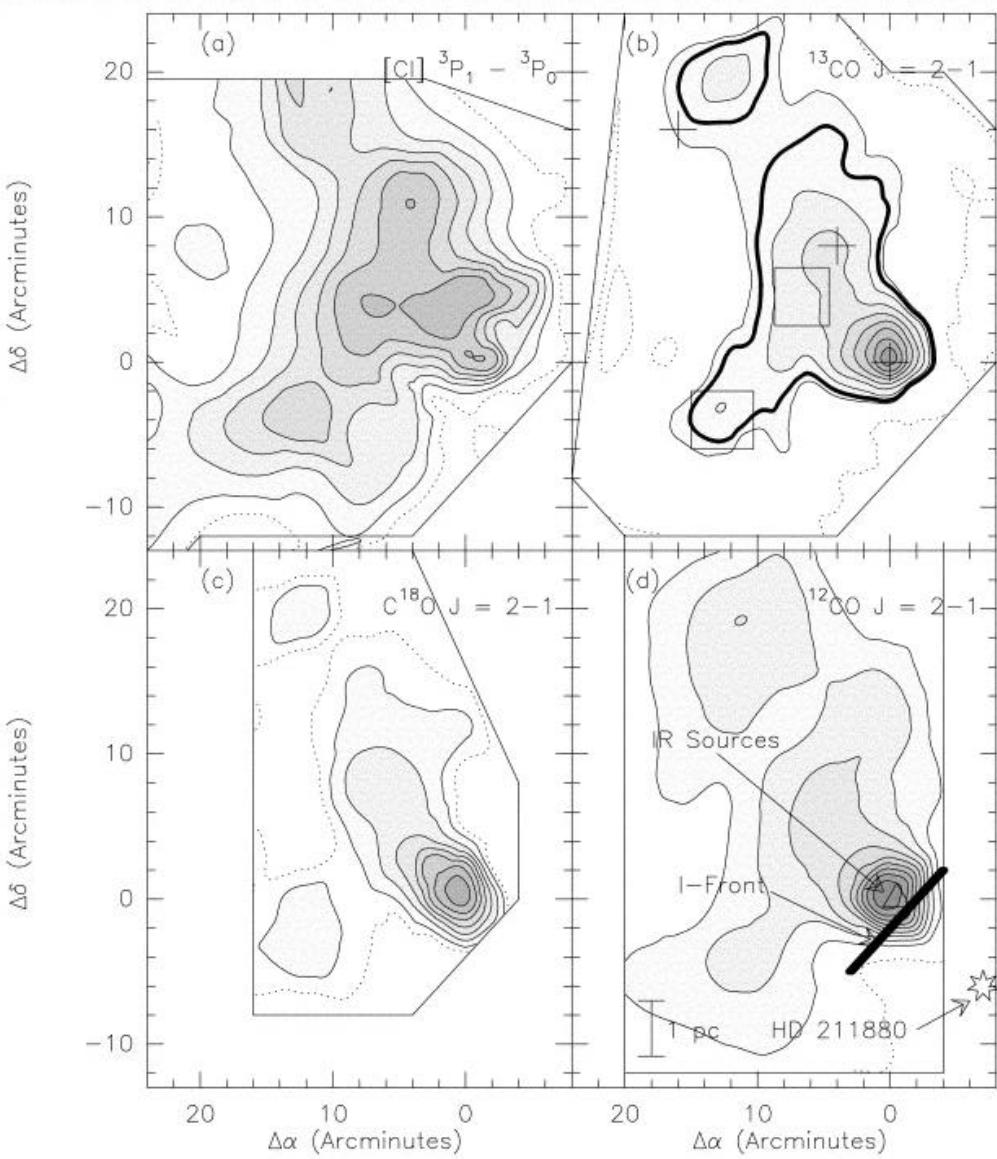
COBE FIRAS [C II] (158 μm) Line



COBE FIRAS [N II] (205 μm) Line



How does our Galaxy appear in CI ?



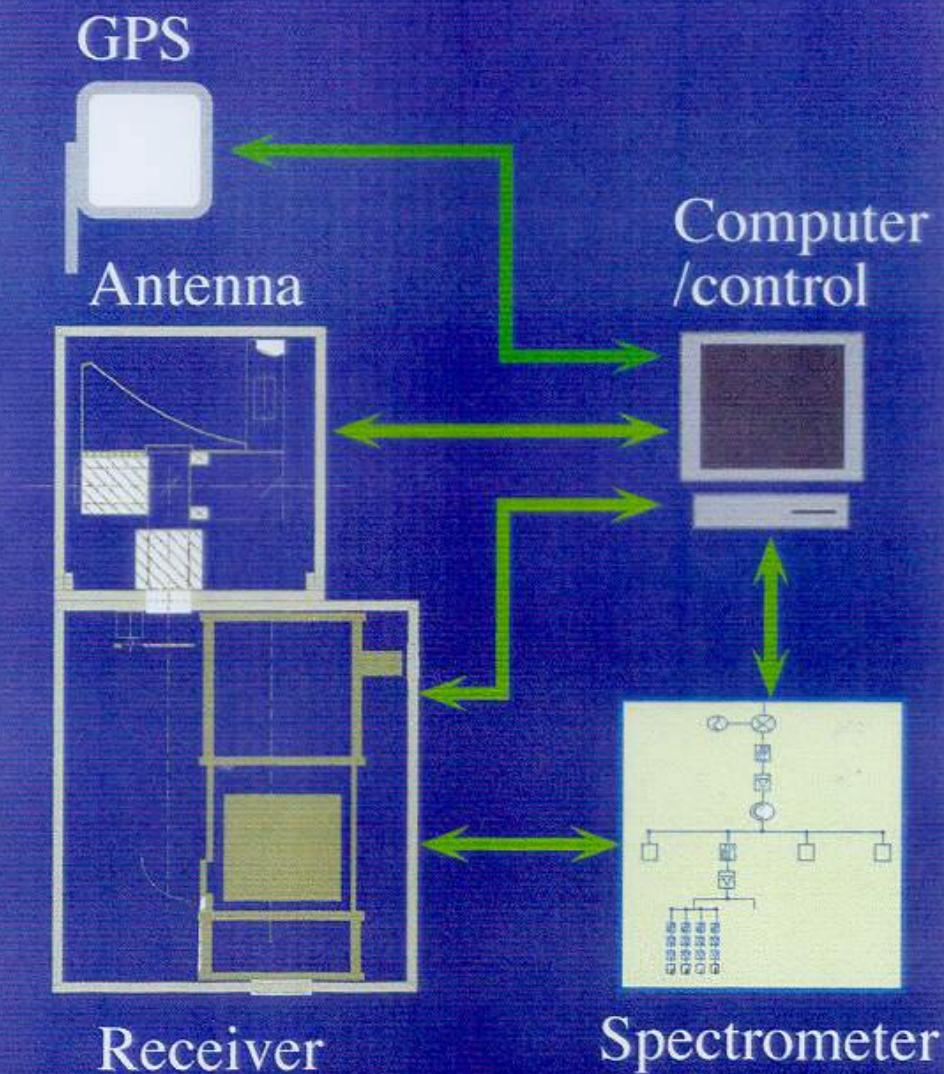
[CI] distribution in S140

Plume, R. et al. (1999), ApJ, 512

II. The POrtable Submillimeter Telescope (POST) Concept

- ? High-efficiency antenna
- ? Compact structure
- ? Automatic, remote controllable

POST SYSTEM CONFIGURATION



III. Antenna of POST

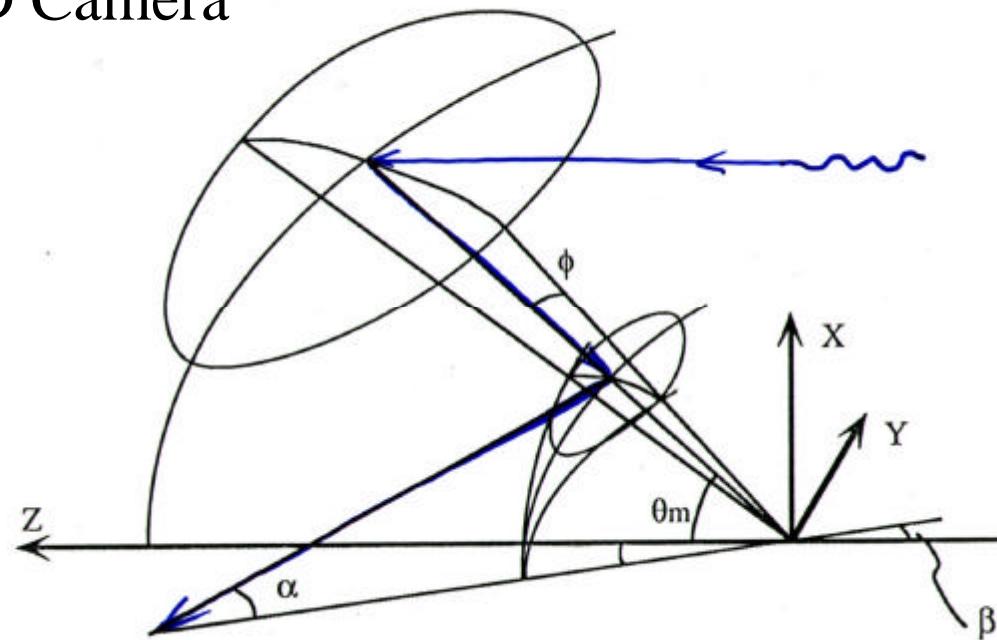
Dual-offset Cassegrain Type

$D = 30 \text{ cm}$

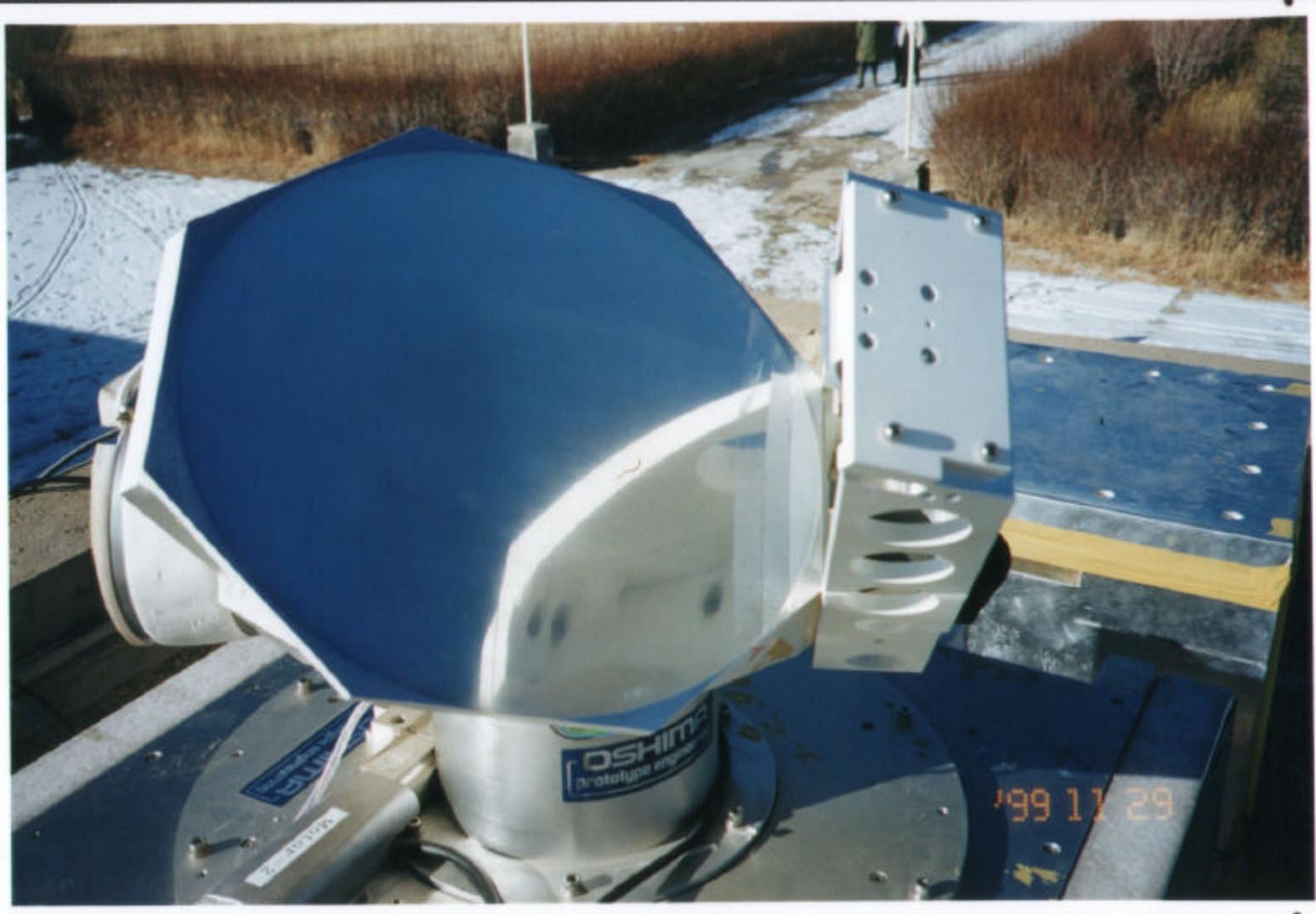
$? = 7 ? \text{ m}$

AZ/EL Mount

CCD Camera



POST at Delingha



IV. Receiver

Schottky Diode Mixer

Gunn Diode Oscillator 82GHz ?2 ? 3

IF amplifier & filters

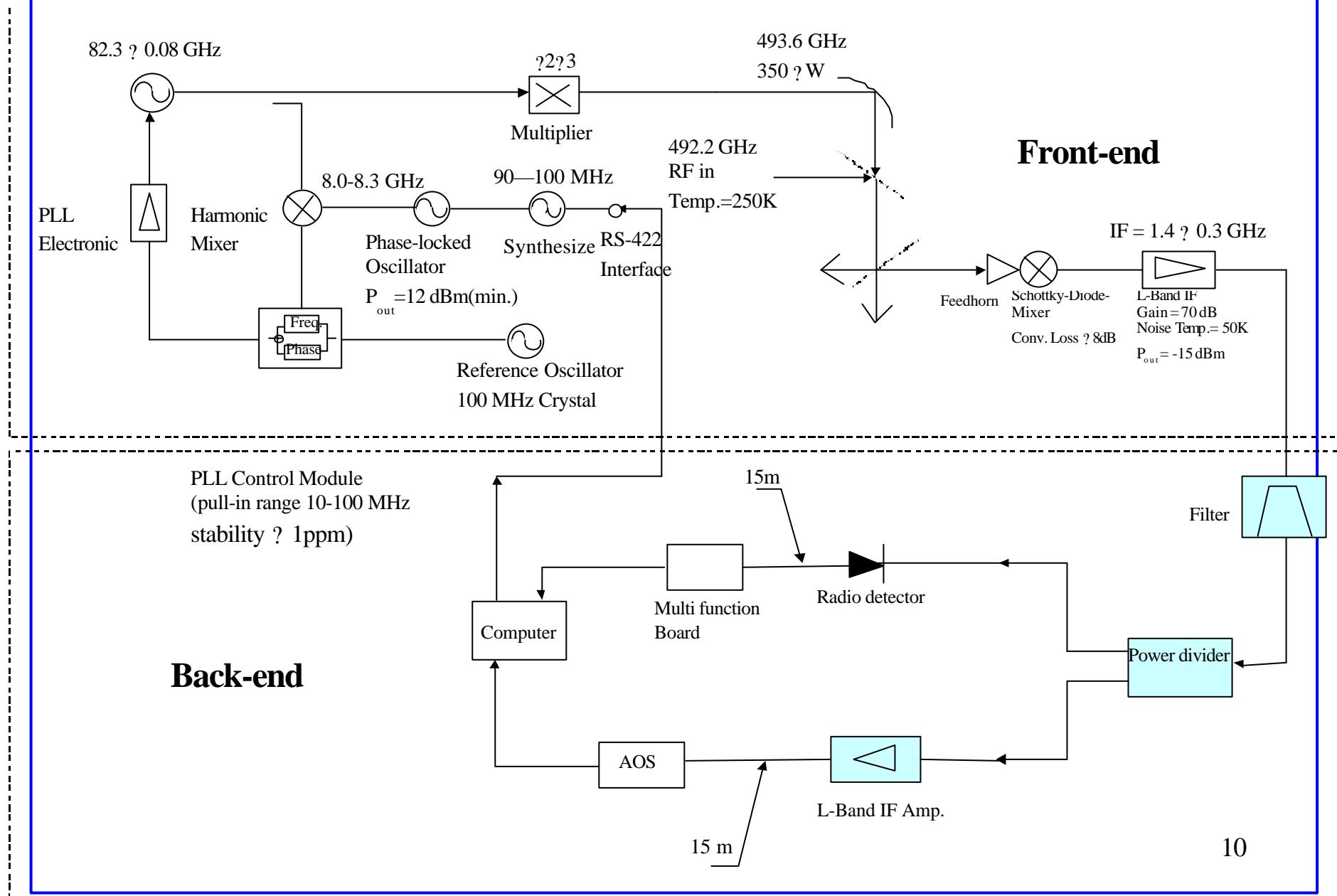
The quasi-optical system

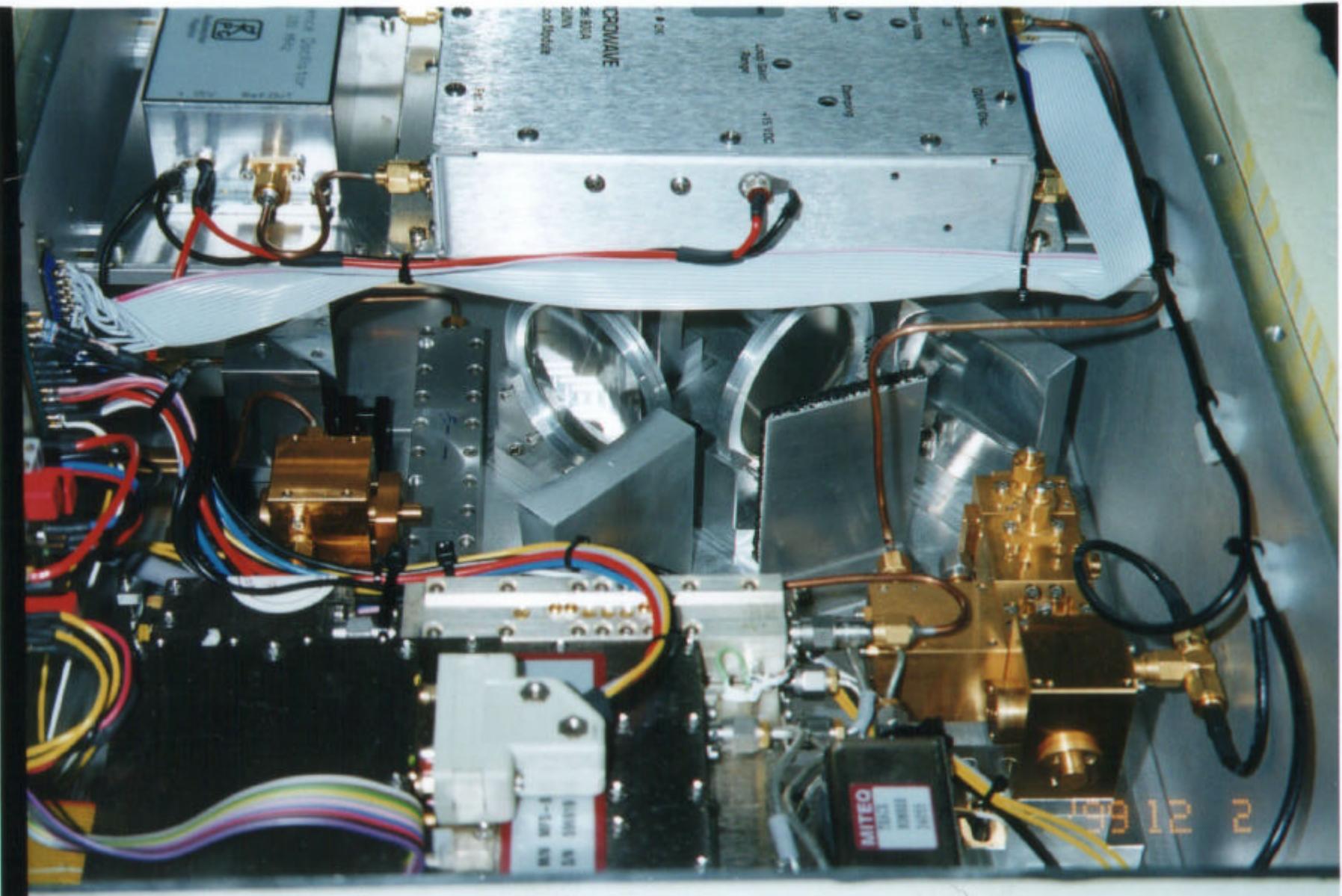
Trx = 1200 K at Ambient Temperature in Lab

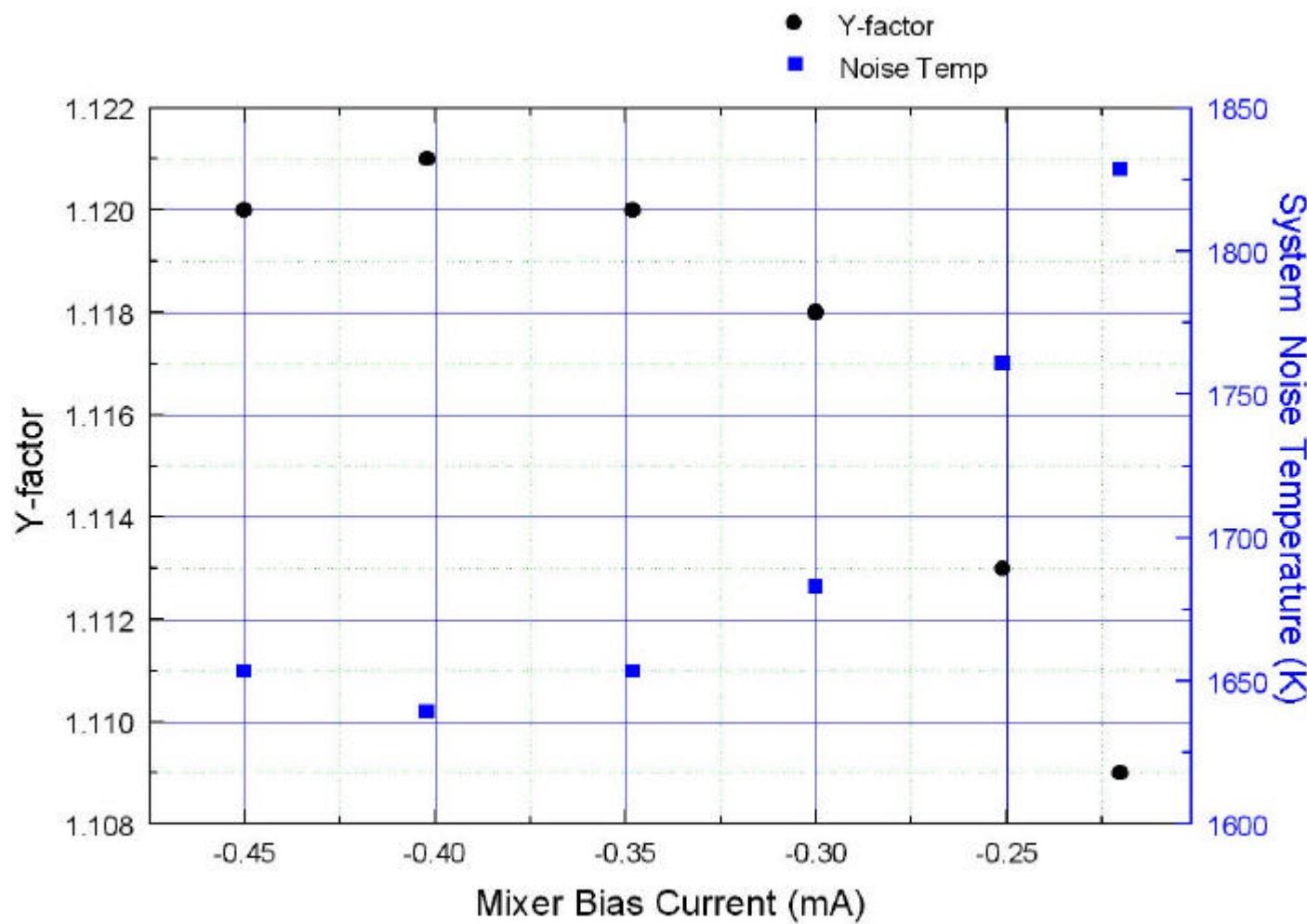
Size=360mm * 280mm * 500mm (W*H*D)

Fabricated by RPG, Germany

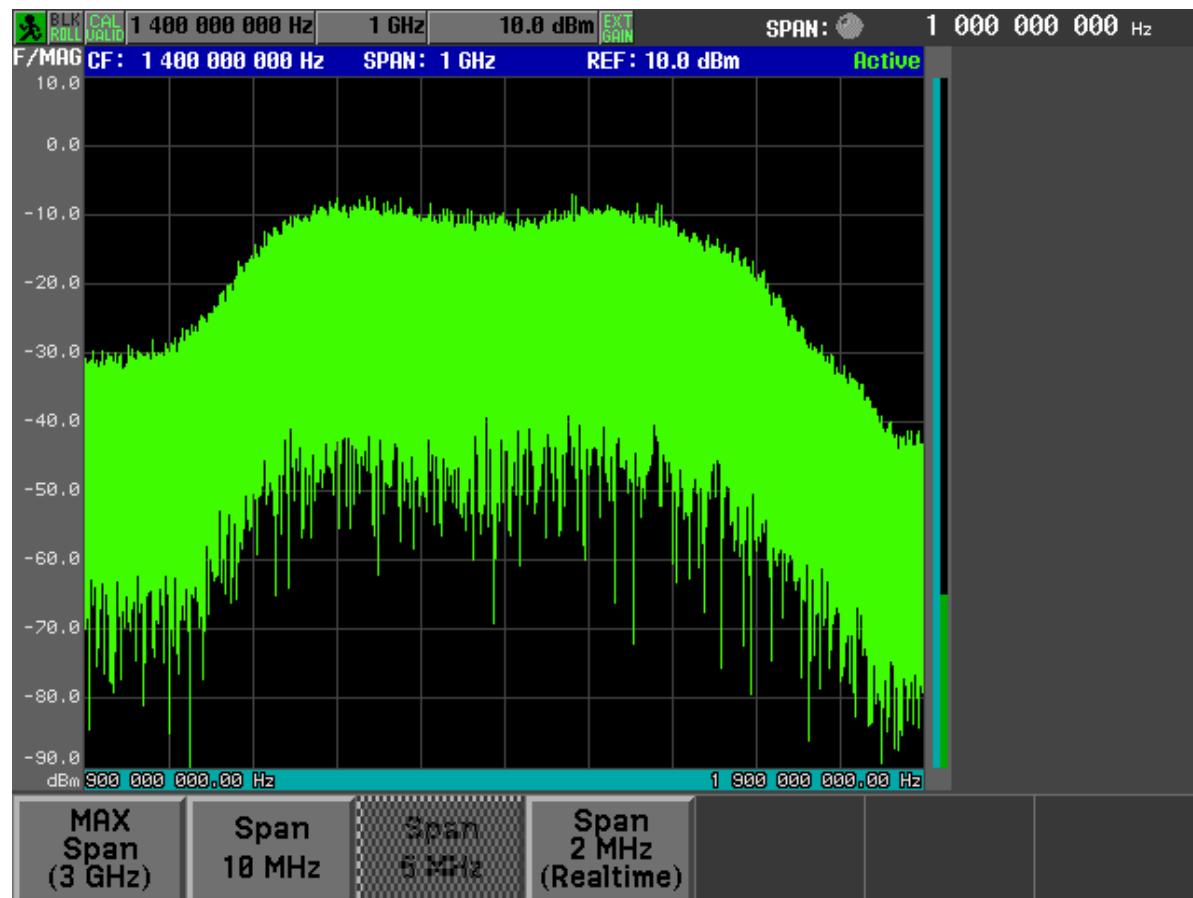
A 492 GHz submillimeter Receiver







IF Power Distribution: $f_0 = 1.4$ GHz; $\Delta f = 300$ MHz

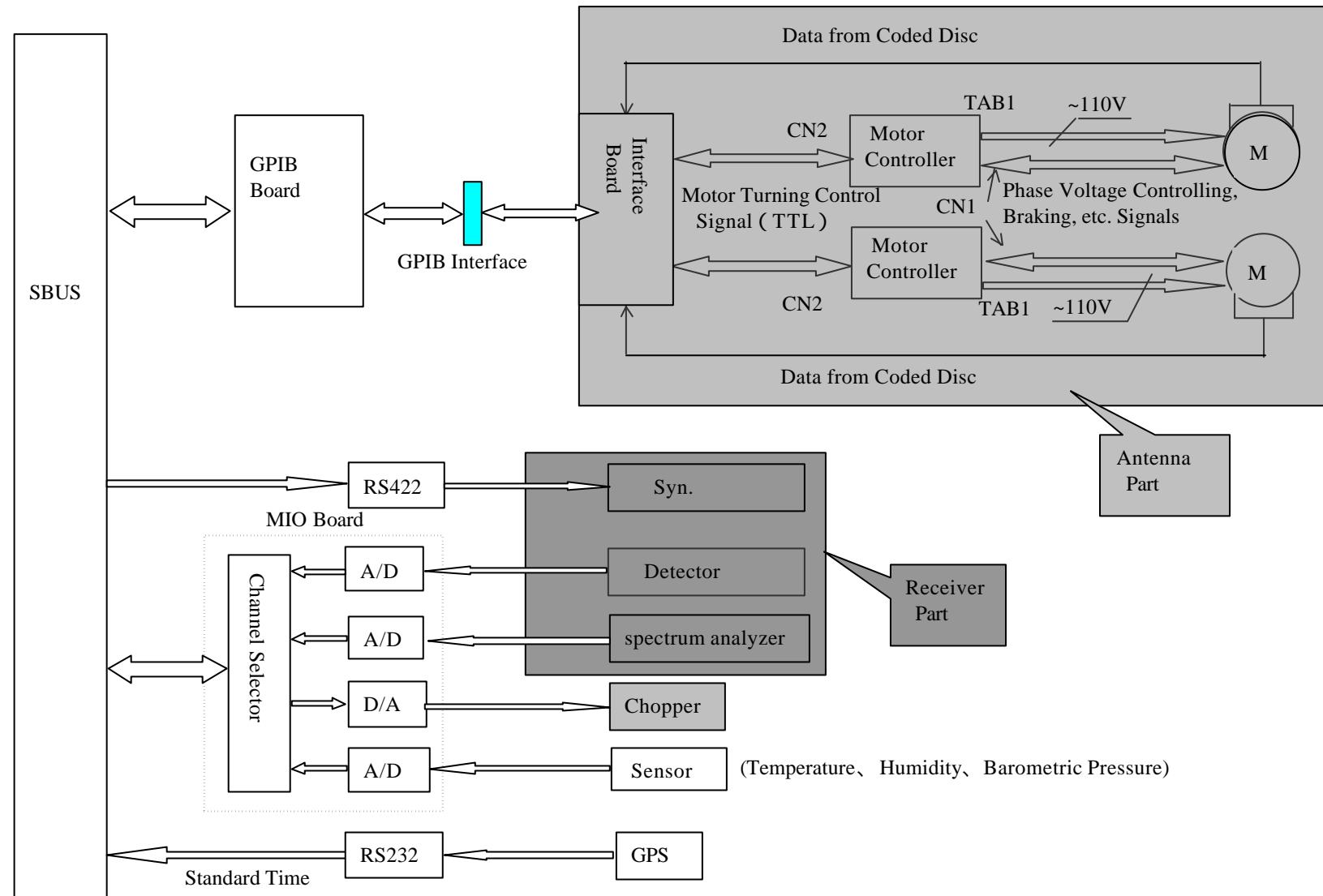


Yang, J., Huang, S., Ohishi, M., & Miyazawa, K. et al. (2001),
Int. J. IR & Mm Waves, Vol.22, No.2, 217

V. Control - Hardware

- S-Bus based on a SUN workstation
- Industrial standard I/O interfaces(GPIB etc.)
- pulse width modulation (PWM) controller
- harmonic drivers

Hardware Structure of POST Control System



VI. Control - Software

? Unix Platform (Solaris 1.3; BSD4.3)

? Real-time, Multi-task

? Fore-ground Processes

 Command-Line Interpreter Process
 (CLIP);

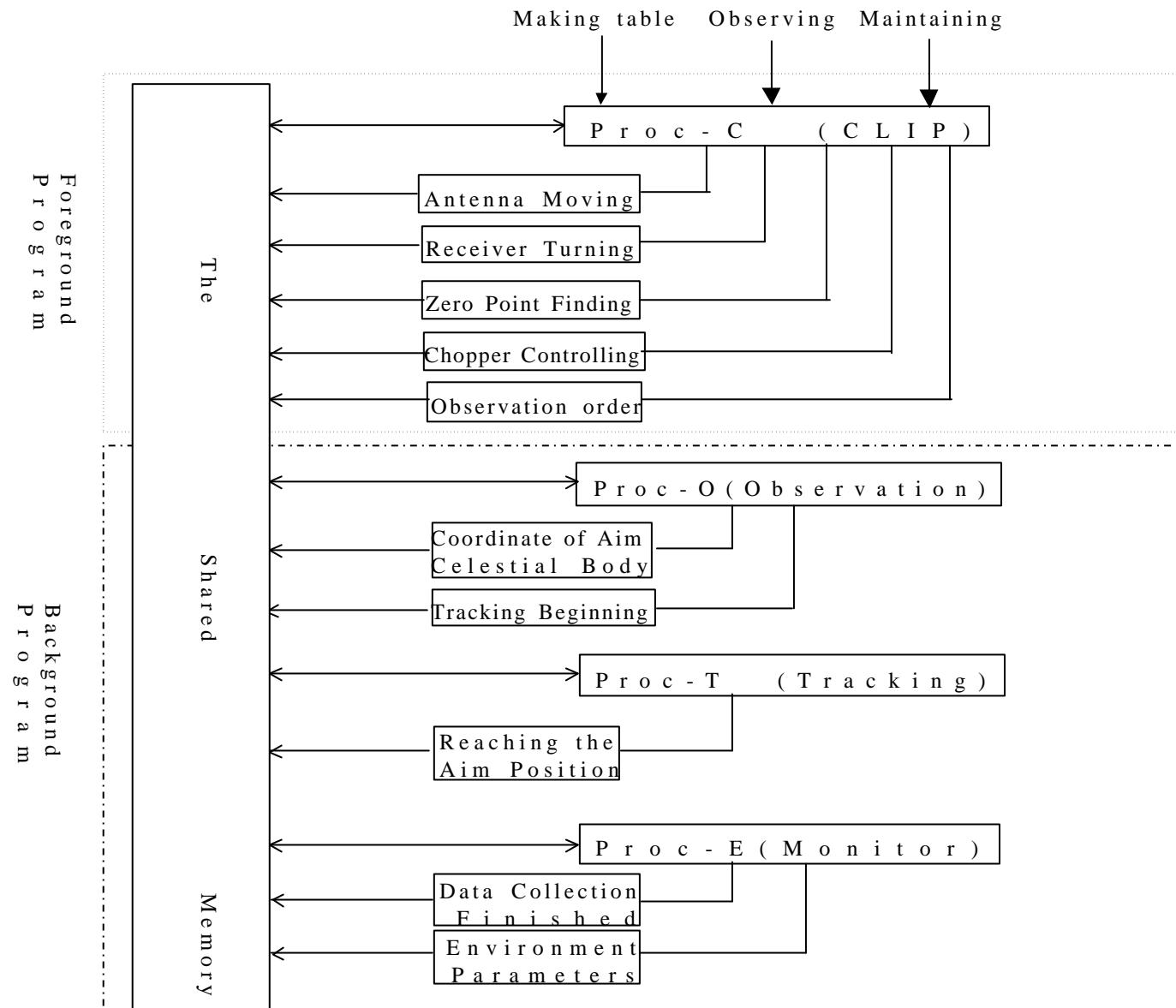
? Back-ground Processes

 Tracking, Motoring;

? Inter-process Communication:

 Shared Memory & Signal

Software Structure of POST Control system



VII Observation at Delingha mm-wave observatory

- Time: two winter seasons

1999-2000 (Observation data about
8100 points, 270 hours)

2000-2001(Observation data about
17600 points, 600 hours)

Site: Delingha mm-wave observatory
3200m above sea level



In Site System Assembly - 1999 November at Delingha



Control Part



VIII. Measurement of Atmospheric Opacity at 492 GHz

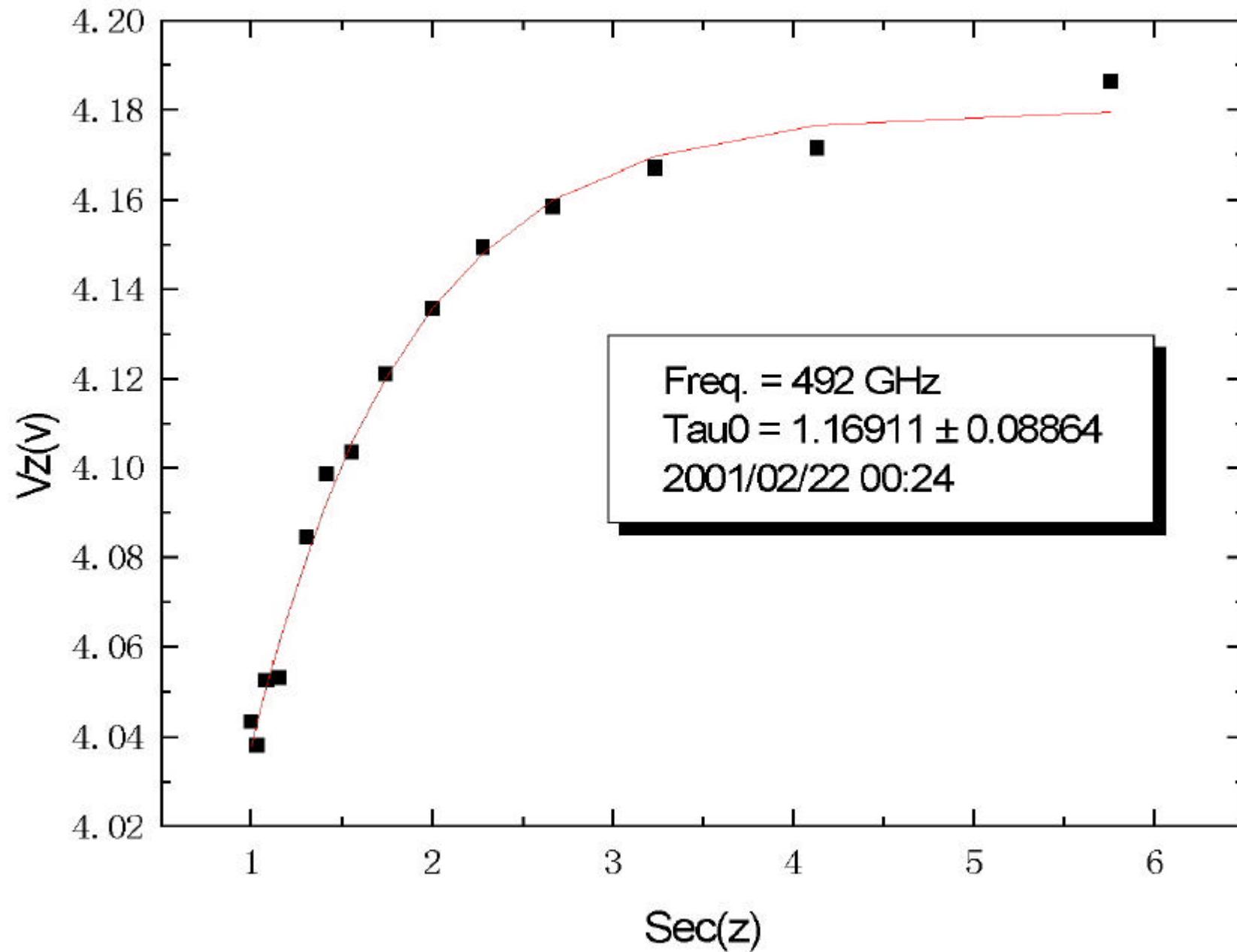
? Method: Sky-dip mode

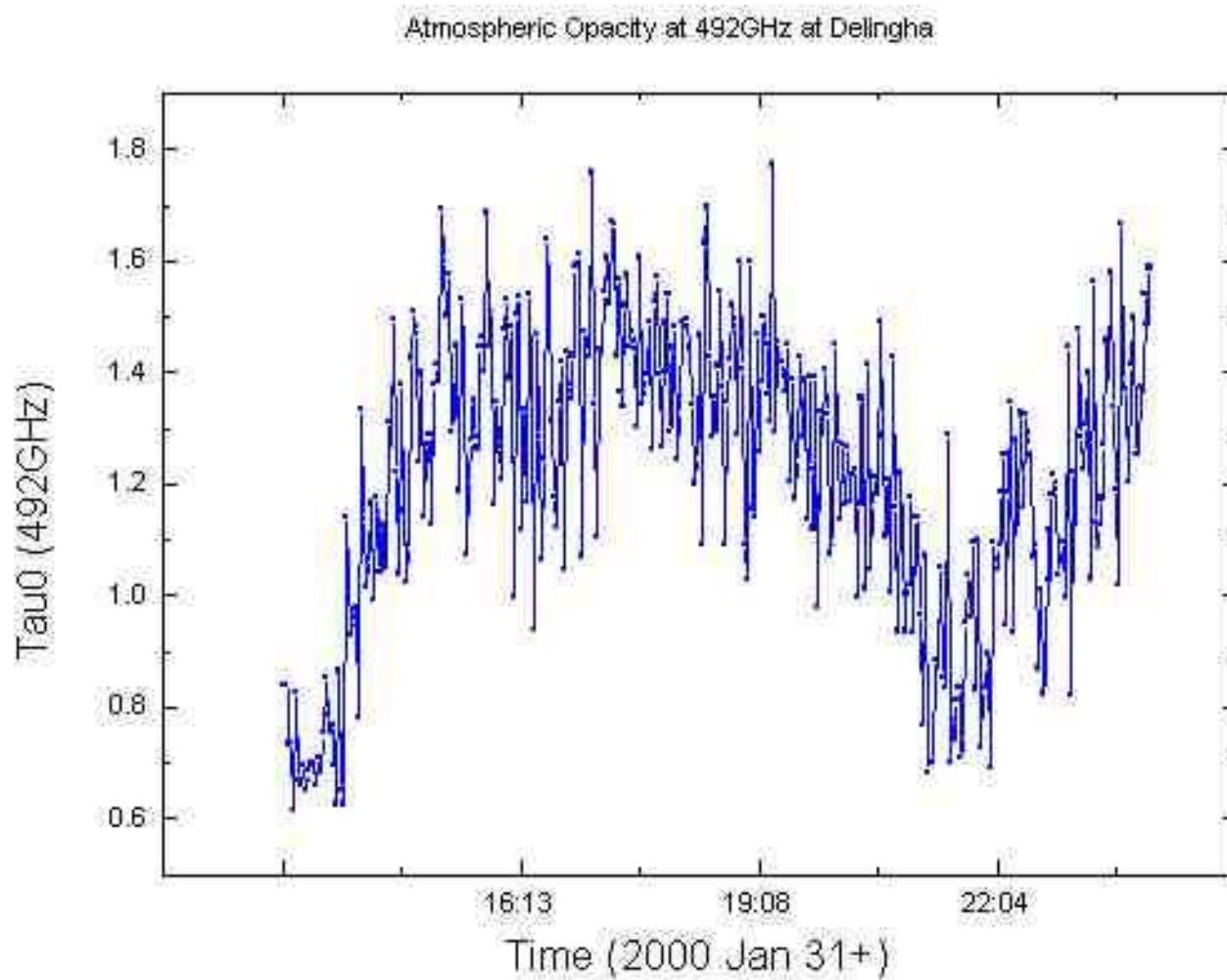
? Results during 1999 November - 2000 February

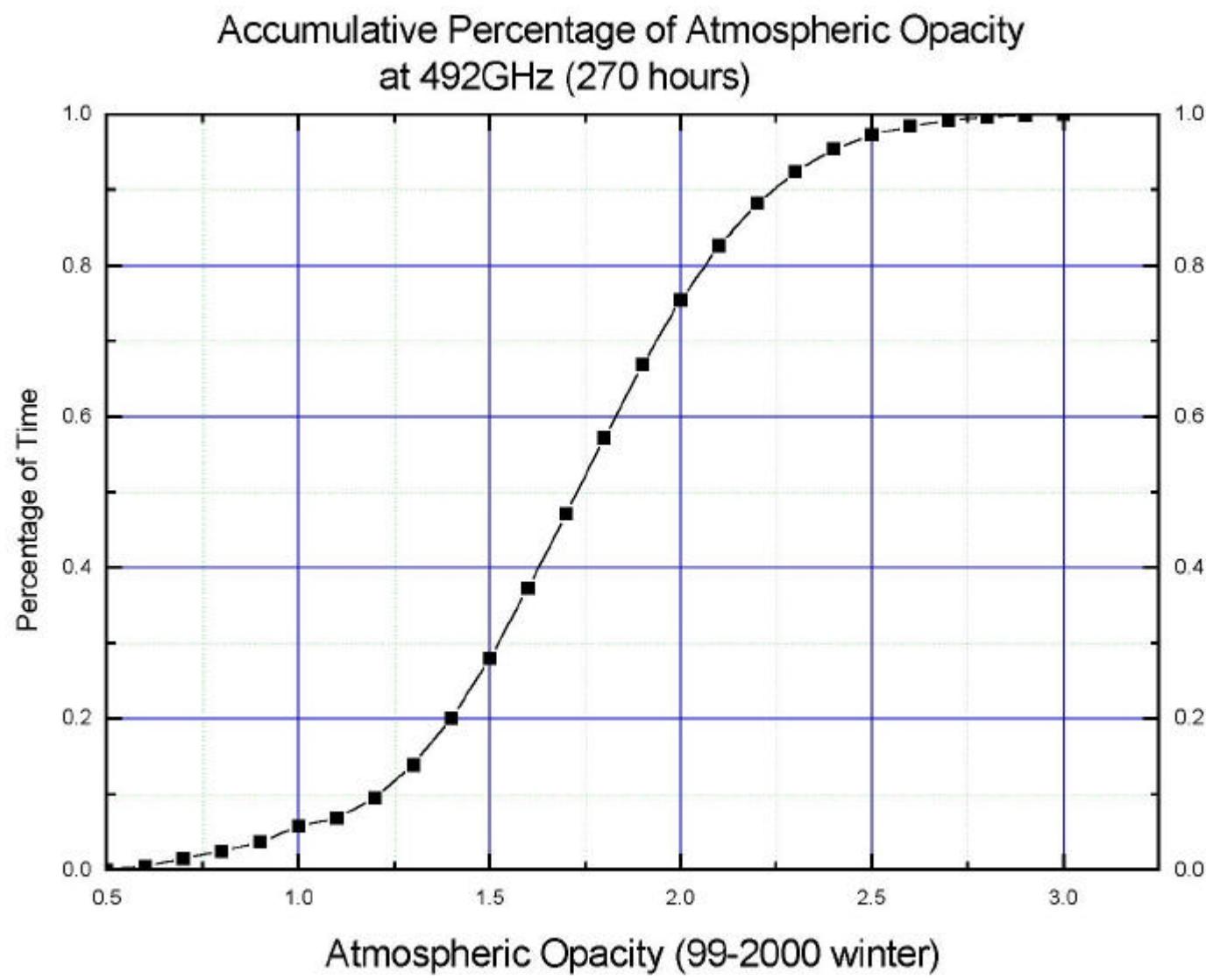
? Results during 2000 December - 2001 March

0
at Delingha.

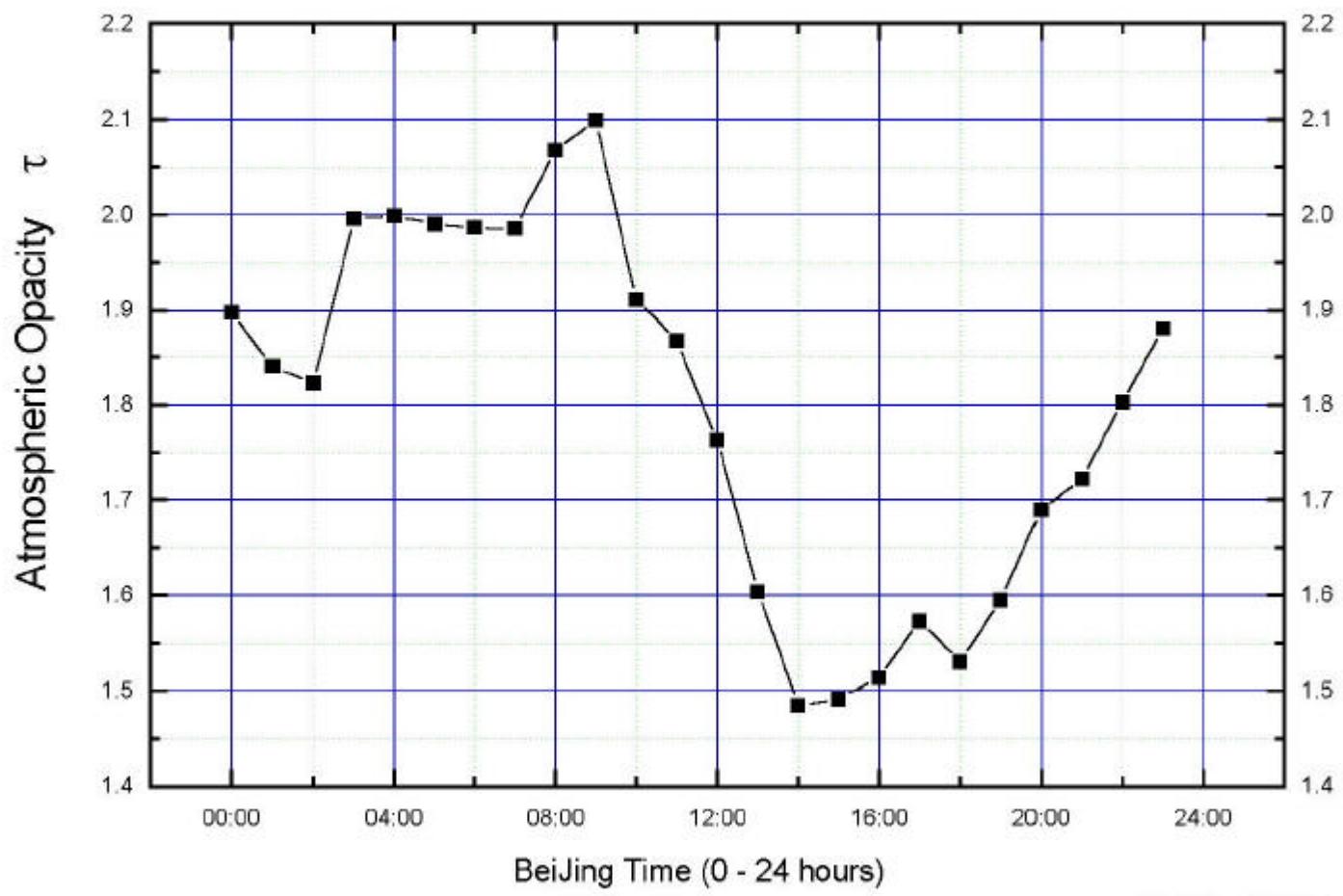
The Sample Data of Atmospheric Opacity at Delingha



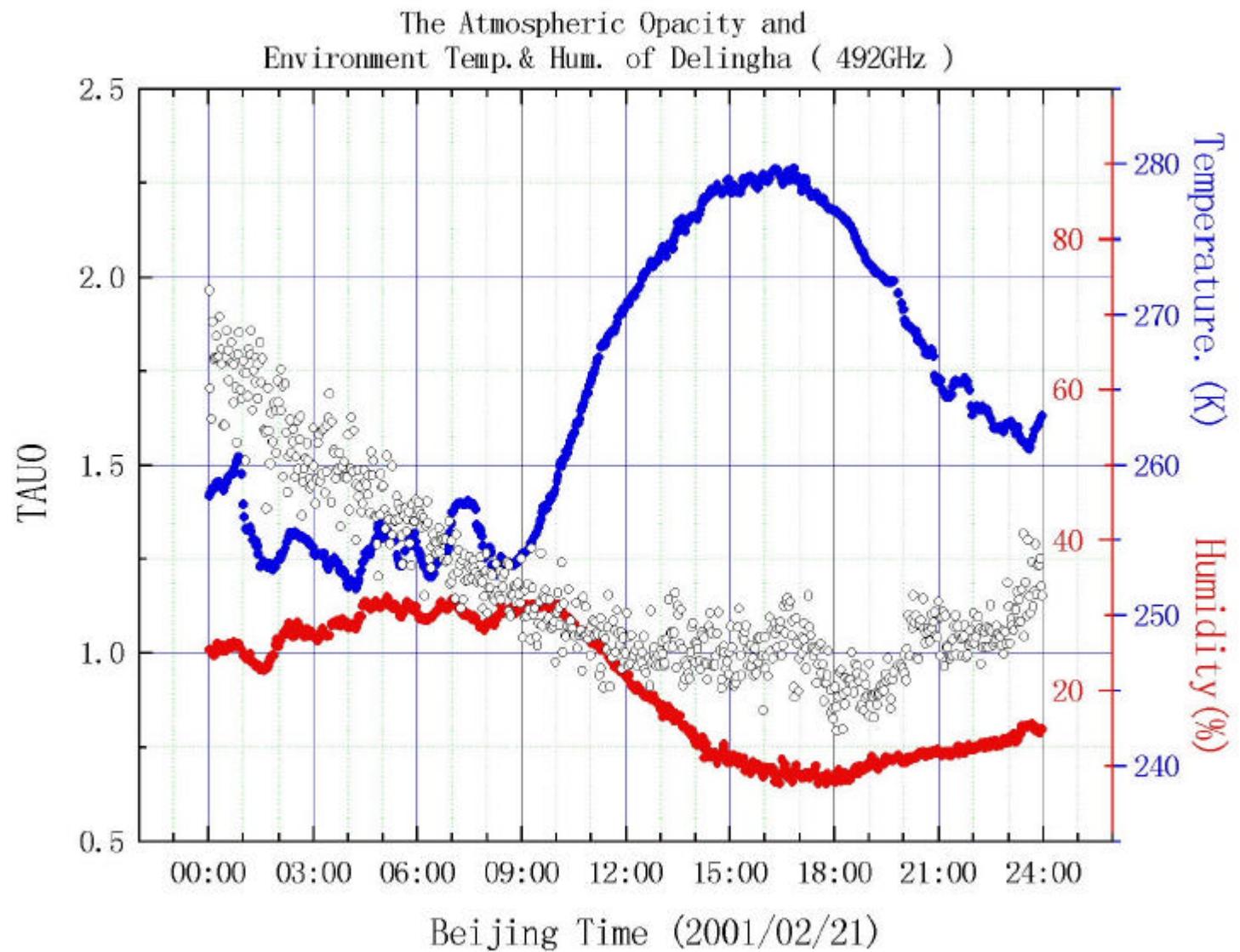




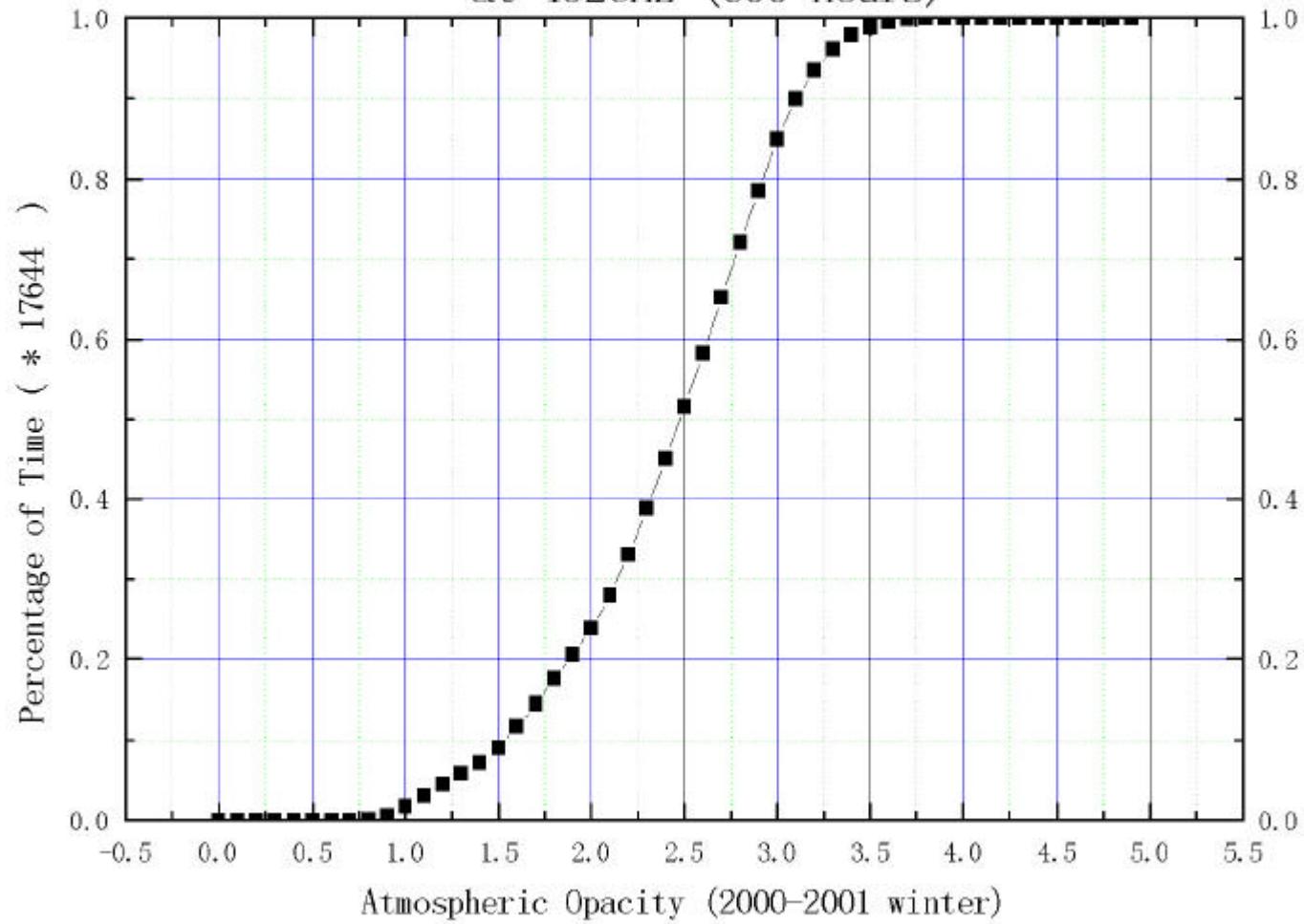
The Average Distribution of Opacity in 24 Hours



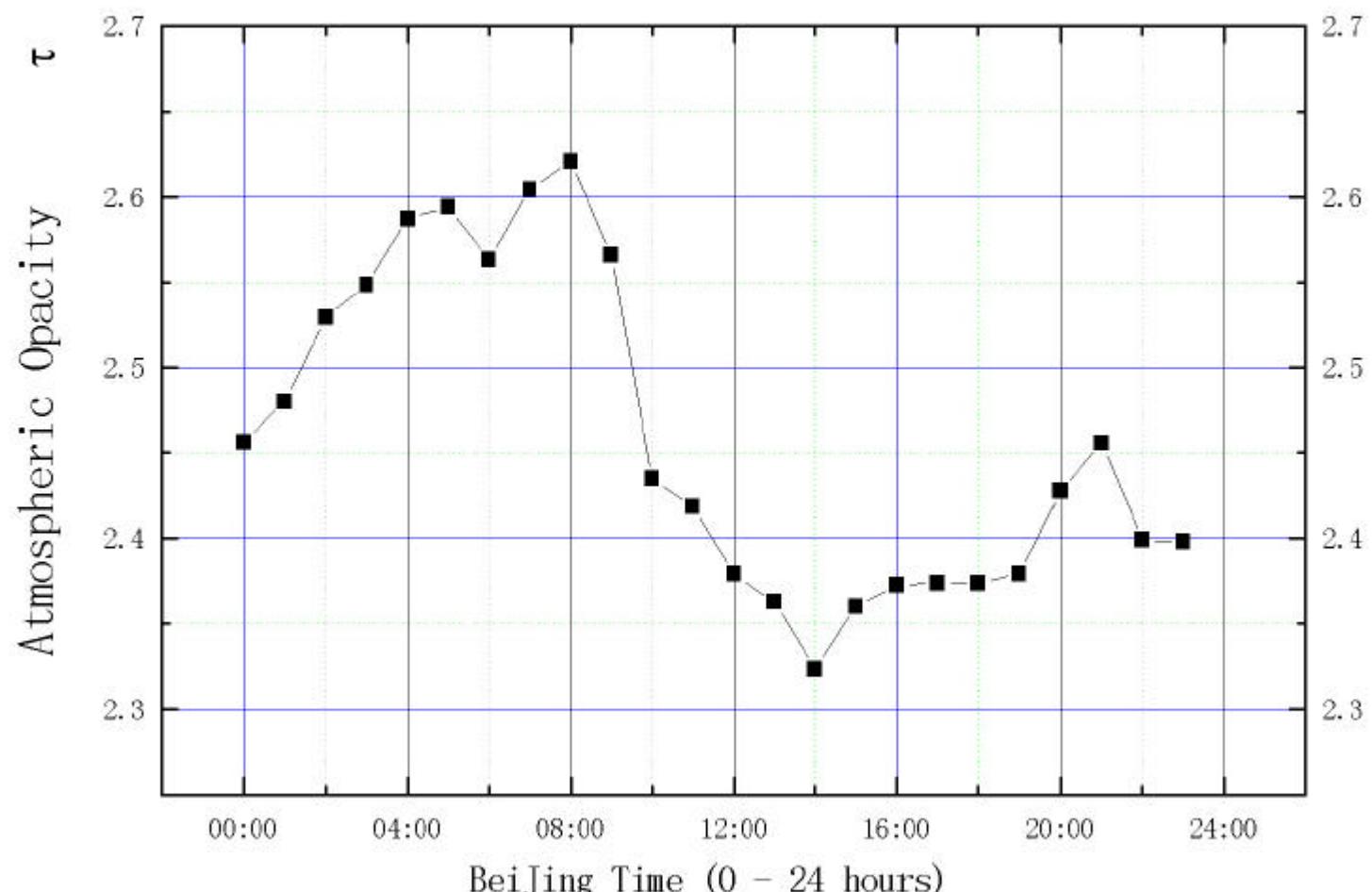
1999/12---2000/02



Accumulative Percentage of Atmospheric Opacity
at 492GHz (600 hours)



The Average Distribution of Atmospheric Opacity in 24 Hours



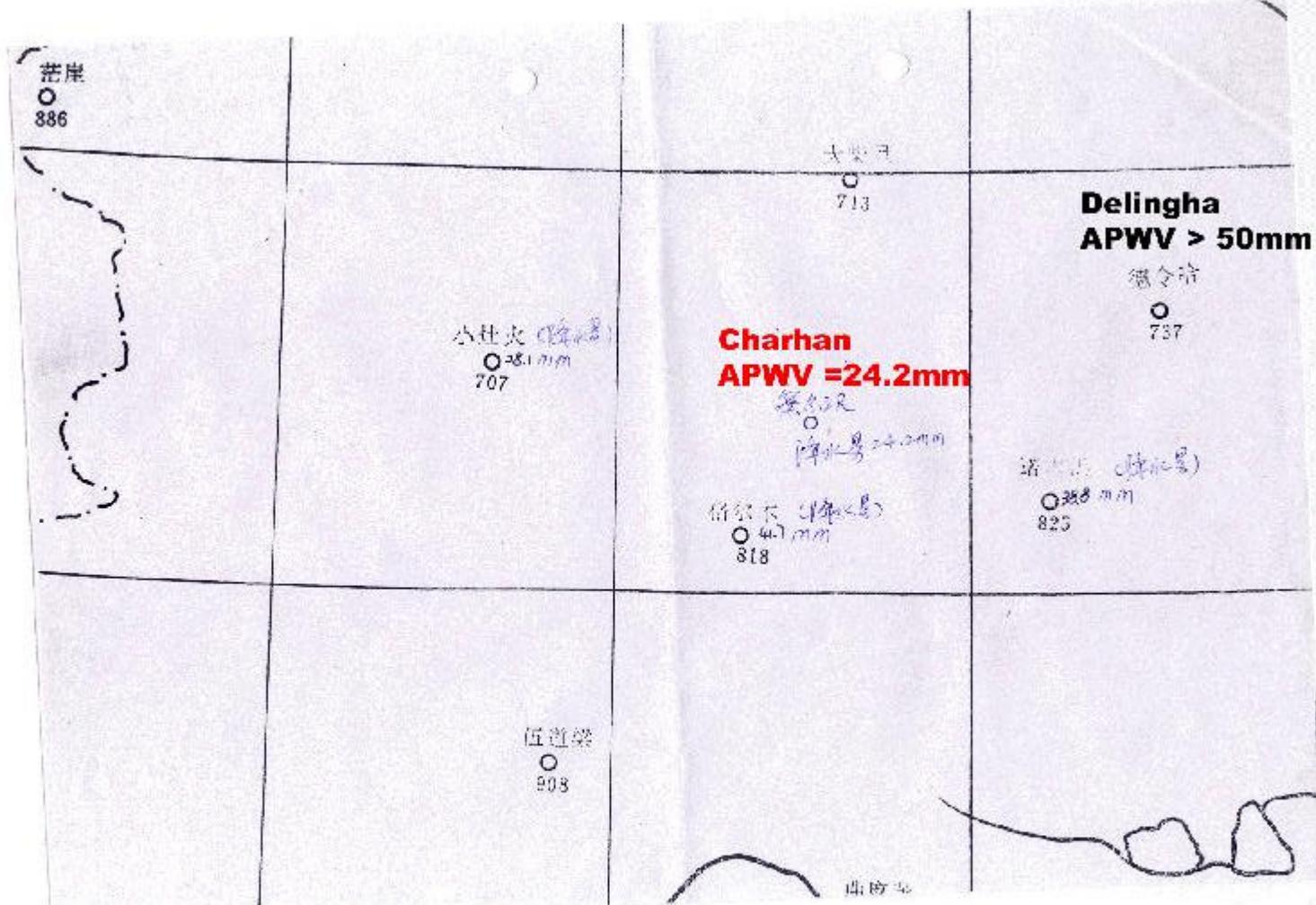
2000/12—2001/03

IX. Future Plans

- Measure the 492 GHz atmospheric opacity
at another site during 2001-2002 winter season

- Portable Submillimeter SIS Receiver
Funded by CAS for Year 2002

Neighborhood of Delingha



Seeking Collaboration

- Backend
 - 500-1000 MHz
 - Portable
- Site
 - $\leq 1\text{mm PWV}$
 - Coordinated Site Survey Program in Tibet?
 - Sites in Chile, Hawaii?