

# Shanghai Astronomical Observatory Analysis Center Report

*Jinling Li*

## Abstract

We summarize the activities of the astrometric and geodetic VLBI group of Shanghai Astronomical Observatory for the calendar year 2002. Our activities are involved in the coordination of the VLBI observations for the Asia-Pacific Space Geodynamics (APSG) program and several Chinese national geodetic projects, the data archives and reduction, and the astrometric and geodetic application studies of VLBI. Our plans for the calendar year 2003 will be mainly focused on the application of VLBI to positioning synchronous satellites and spacecraft.

## 1. General Information

As one of the research groups of the Center for Astrodynamics Research, Shanghai Astronomical Observatory, Chinese Academy of Sciences, we focus our activities on Radio Astrometry and Celestial Reference Frames. Facilities for us to analyze the astrometric and geodetic VLBI observations are several sets of personal computers with advanced technical specifications and the HP C180 Workstation. We use the CALC/SOLVE analysis system. The staff members are involved in the IVS activities are Jinling Li, Guangli Wang, Bo Zhang, Ming Zhao and Zhihan Qian.

## 2. Current Activities

### 2.1. Observation Coordination

Our group continues the coordination of the VLBI experiments as well as the observation archives and reduction for the Asia-Pacific Space Geodynamics (APSG) program and several Chinese national geodetic projects, for instance, the Chinese Observation Network of Crustal Movement and the Mechanism and Prediction of Continental Intensive Earthquakes.

### 2.2. The Data Format Transformation from FITS to MKIV

The output data of the Shanghai correlator is in FITS format. We successfully transformed the data format from FITS to MKIV, which is important to the completeness of the Chinese National VLBI Construction program.

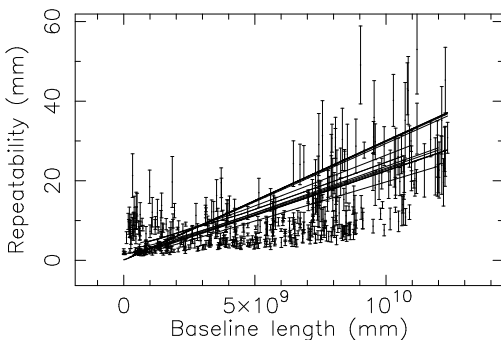
### 2.3. The Extension of ICRF

The current International Celestial Reference Frame (ICRF) is based on the VLBI observations before 1995 and extended in 1998. Till now there has been tremendous progress in the accumulation of observations, the acknowledgement of source structure and the observation and analysis models. The ICRF Working Group decided to extend the ICRF the second time. Our group was involved in the selection of observations and analysis models as well as the settings of various parameters and examination of the final results.

## 2.4. Modeling of Baseline Length Repeatability

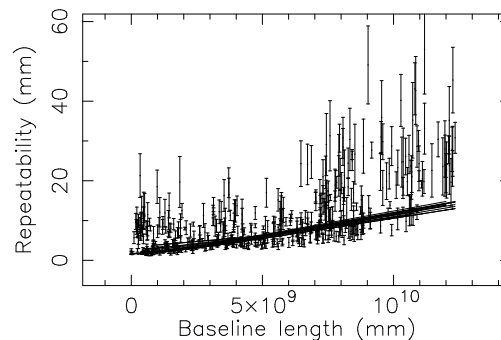
The change of the baseline length with time reflects the mismodeling of various geophysical phenomena such as tides, loading, postglacial rebound and plate motion, as well as non-geophysical factors such as atmosphere refraction, antenna structure and geometry, thermal effects and so on. It is believed that baseline length repeatability is an intrinsic measure of the quality of astrometric and geodetic VLBI global solution. Based on the analysis of the characteristics of *wrms* we proposed a weighted quadratic modeling of baseline length repeatability. We also developed a way to apply the weights based on the uncertainty of *wrms*. By classifying the baseline length determinations from a global VLBI data analysis into various subsets according to numbers of observation sessions and the length of observation time span, we model each subset of data separately with even weights and with weights based on the uncertainty of *wrms*. As shown in Fig.1 and Fig.2, the even weights modeling of subsets of data does not well trace the pattern of data distribution and is obviously much more scattered than the weighted modeling, which indicates that the weighted quadratic modeling is relatively stable compared with the even weights.

Even weights modeling of various subsets of data



**Figure 1.** Comparison of even weights quadratic modeling of various subsets of data

Weighted modeling of various subsets of data



**Figure 2.** Comparison of weighted quadratic modeling of various subsets of data

## 3. Plans for the Calendar Year 2003

We will continue to deliver our efforts on the coordination of the Chinese national geodetic projects and the APSG program as well as on the response to various IERS and IVS campaigns of regional and global VLBI data analysis. We will focus most of our efforts on the determination of the high frequency variation of the Earth Orientation Parameters and the application of VLBI to the positioning of synchronous satellites and spacecraft.

*Acknowledgements* Our research work is financially supported by the Chinese national projects (*G1998040703*), the Chinese National Natural Science Foundation Committee (*No.19833030*, *No.10173019*), the Chinese Academy of Sciences (*No.KJ951-1-304*, *KJCX2-SW-T1*), the Science and Technology Foundation of Shanghai City (*No. JC14012*).