COORDINATES OF THE POLE FOR THE PERIOD 1968 - 1974 COMPUTED IN THE SYSTEM OF 10 STATIONS WITH SMALL VARIATIONS OF MEAN LATITUDES

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ABSTRACT

The polar orbit was computed in a system of ten stations with small variations of mean latitudes and compared with the polar orbit based on ten stations with large variations of mean latitudes.

INTRODUCTION

Mean latitudes of stations computed by Orlov's filters or others are changeable. These variations are mainly irregular and secular. The biggest irregular variations are of the order of 0".1, but may sometimes reach 0".2 and last one to three years (Fedorov et al., 1972; Kolaczek, 1977). The largest secular variations of mean latitudes reach several thousandths of seconds of arc per year such as in the case of Mizusawa (Fedorov et al., 1972). Mean latitude variations can be caused by changes of instruments or observational programs as well as by geophysical phenomena. Mean latitude variations influence polar coordinates and the results of spectral analyses of latitude variations and polar coordinates. They can not be neglected in the study of polar motion with the presently achieved accuracy.

RESULTS AND CONCLUSIONS

In order to show the influence of mean latitude variations the coordinates of the pole for the period 1968 - 1974 were computed according to the IPMS,L formula for the set of stations shown in Table 1. The first set includes the ten stations which have small variations of mean latitudes and mostly high weights in the IPMS and BIH solutions. The second set includes ten stations with large mean latitude variations (on the order of 0".1 or larger).

Graphically smoothed IPMS monthly mean latitude data were used for the computations. The results are shown in Figures 1 and 2. In the first

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case (Figure 1) the polar orbit is similar to the IPMS,L polar orbit and the accuracy of polar coordinate determinations is of the order of 0."001 to 0."002. In the second case (Figure 2) the polar orbit is very deformed and the accuracy of the polar coordinate determinations is ten times lower. This means that variations of the mean latitude of stations have an important influence on the determination of polar coordinates. In this situation it would be worthwile to create a new system, for

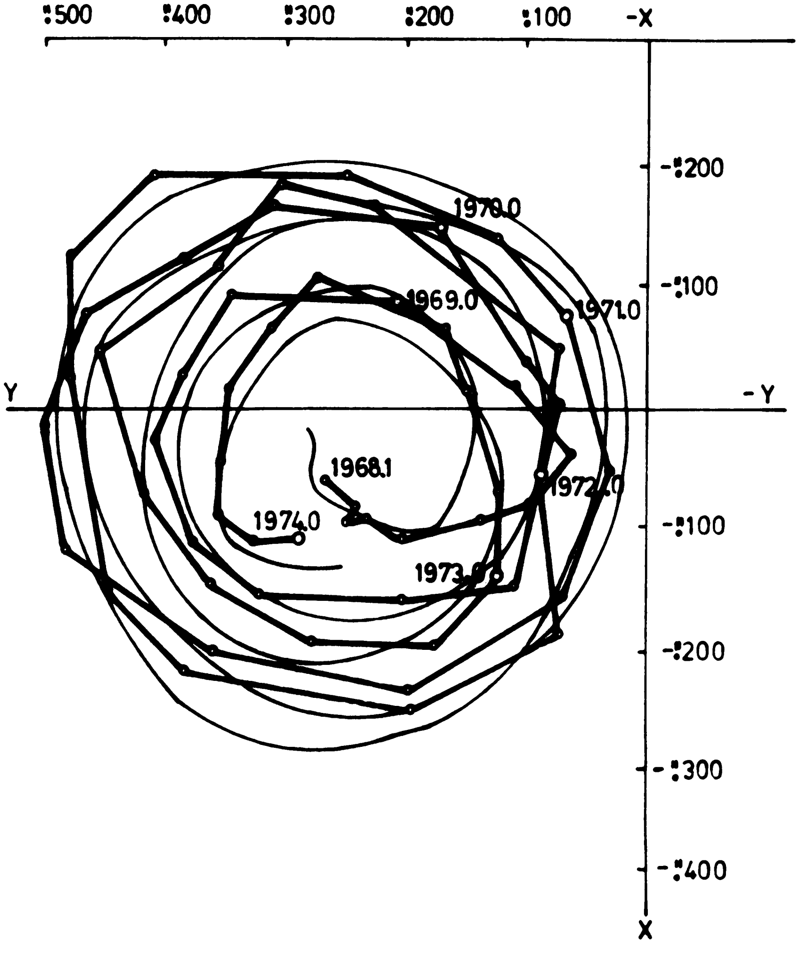

Figure 1. Polar orbit for the first set of observing stations (heavy line). The light line is the IPMS,L polar orbit.

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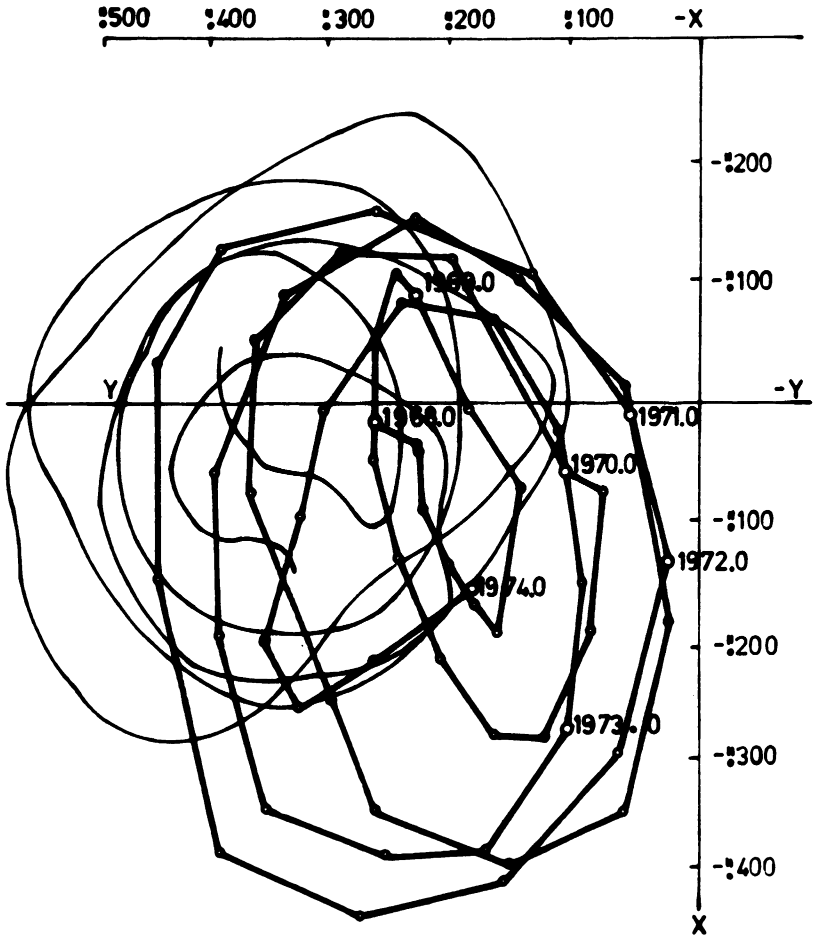

Figure 2. Polar orbit for the second set of observing stations (heavy line). The light line is the ILS polar orbit.

instance IPMS 2, based on some chosen stations having stable instruments and locations in order to study the character of the astronomical systems and the long-period terms of polar motions.

In the case of the ILS stations the Earth's crustal motion has a larger influence on the determined polar coordinates than the star proper motions. Some organization of the observations of all or some of the latitude stations ought to be taken into account to omit too many interruptions of observations due to changes of instruments or observational programs. Nowadays it is difficult to find a period of several years of uninterrupted, homogeneous data for a few stations.

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Table 1. Stations used in the study of the effect of large variations of mean latitude on derived polar coordinates.

I		II	
STATION	IPMS WEIGHT	STATION	IPMS WEIGHT
Mt. Stromlo	16	Richmond	5
Blagovestchensk	21	Washington	5
Irkoutsk	16	Gaithersburg	11
Warsaw	11	Mizusawa	3
Pecny	13	Belgrade	31
Greenwich	13	Turku	19
Paris	5	Neuchatel	9
Pulkovo	15	Hamburg	9
Poltava	8	Uccle	8
Tokyo	11	Kitab	9

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