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# ON THE STRUCTURE OF THE SOLAR WIND SPEED IN MARCH 1986

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## Abstract

We present the maps of solar wind speed in heliographic longitude and latitude, based on multi-spacecraft observations from late 1985 to early 1986. The high-speed streams were extended across the solar equator from high latitudes in late 1985, whereas the extension of these high-speed regions was diminished after March 1986. This change in the solar wind structure was just in progress in February and March 1986.

## 1. Introduction

Heliographic structure of the solar wind speed near the solar minimum is characterized by a narrow low-speed region distributed around the solar equator (e.g., Kojima and Kakinuma, 1987). This makes it possible to discern the low-speed belt by means of the spacecraft observations, which are restricted near the ecliptic plane. Based on the observations made by Sakigake, Suisei, IMP-8, and Giotto, Miyake et al. (1988) concluded that the high-speed regions were extended across the equator from high-latitudes in late 1985 and were rarely found on the equator after March 1986. It was suggested that the change

in the solar wind structure took place around February 1986. In this brief report we use the ICE solar wind data in addition to the data set of Miyake et al. (1988), and concentrate on the change process of the solar wind structure in early 1986.

## 2. Mapping of the solar wind velocities

The solar wind measurement made by ICE (Bame et al., 1986) provides us with the velocity data between March 1 and 15 in 1986. In this period ICE was located at 0.92 AU from the sun and at about $-6^\circ$ solar latitude. The observations made by Sakigake, Suisei, IMP–8 and Giotto are described elsewhere (Miyake et al., 1988, and references therein), so we will not repeat them here.

We map the solar wind velocities on to the sphere of 1AU, assuming a constant radial velocity, in order to make the solar wind data obtained at different radial distances comparable. Velocities observed by five spacecraft are averaged according to the longitude and the latitude of the resulting positions on the sphere of 1 AU. Figure 1 shows a series of maps of solar wind velocities from late 1985 to early 1986. The resolution of the grid is $3^\circ \times 15^\circ$ in latitude and longitude. The darkness of each grid represents the averaged velocities as indicated in the figure.

## 3. Discussion

The top panel of Figure 1 shows the structure of the solar wind speed from September 1985 to January 1986, where the high-speed streams were extended across the solar equator from high latitudes. The process of the structure variation occurring in early 1986 is presented from the second to the bottom panels. Most of the spacecraft which provide the data for this study are Halley explore mission, and encountered comet Halley in early March. Therefore, they were concentrated in the southern hemisphere around January–March period of 1986.

It is confirmed that the low-speed region was approximately aligned to the solar equator in March–April period of 1986. A high-speed stream extending from the north was located around $0^\circ - 165^\circ$ longitude. This longitude range changed into a low-speed region after March–April period. Since the spacecraft were concentrated in the southern hemisphere in January–March period, we cannot examine this change process in detail.

Another high-speed stream, extending from the south, in longitude range of $135^\circ - 270^\circ$ in the top panel, seems to have been contracted below the equator after March 1986. The high-speed stream also changed its longitude range. In March- April period, it was located around $90^\circ - 210^\circ$ longitude. From the comparison of the panels in Figure 1, it is concluded that this longitude shift was continuous. The change in velocity structure was just in progress in February–March period. Although we demonstrate only the continuity of the shift of the high-speed stream extending from the south because of the interval in which we

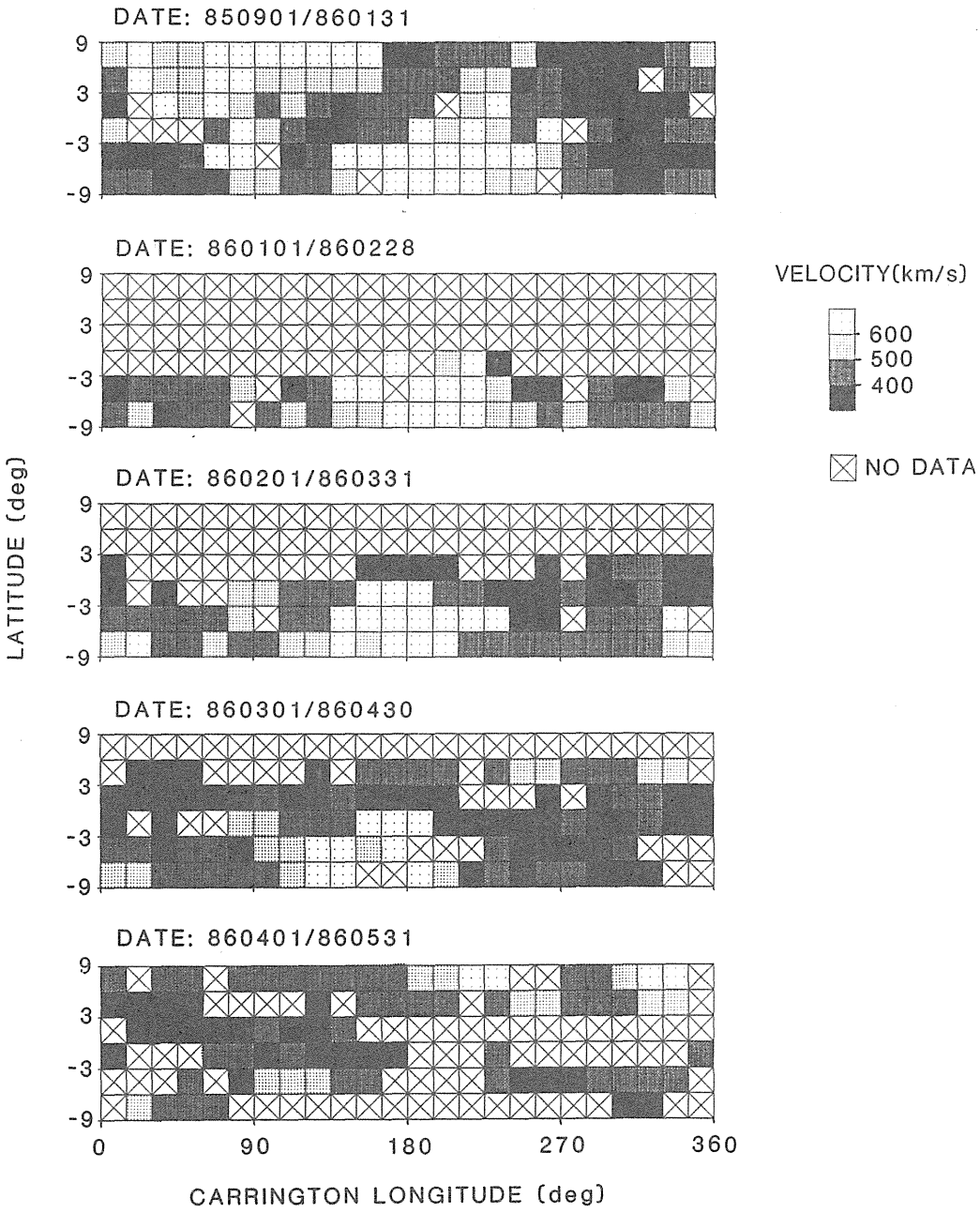


Fig. 1 Maps of the solar wind velocities on the sphere of 1 AU from September 1985 to May 1986. The top panel shows the solar wind structure until January 1986, where the high-speed streams extended across the solar equator from high latitudes. The change process of the structure in early 1986 is presented from the second to the bottom panels. The low-speed belt was almost aligned with the solar equator in the March–April period.

had no data in the northern hemisphere, it suggests the possibility that the change of the entire structure was not so abrupt but rather continuous.

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