New Procedure of Height Assignment to GMS Satellite Winds*

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1. Introduction

As reviewed at the previous meeting of CGMS, the principal source of differences among all satellite wind sets is the assignment of vector height.

For high level-winds, the climatological tropopause height had been assigned as estimated heights to the Japanese winds since MSC began routine operation in April 1978. But it has been revealed that the climatological tropopause height does not always represent that of the cirrus tracked winds by the staff of MSC.

For low-level winds, only cloud top height had been assigned to the Japanese satellite winds since MSC began routine operation in April 1978. But it has been shown that cumulus tracked winds represent those at the heights of the cloud-base (Hubert *et. al.*, 1971 : Hasler *et. al.*, 1977 and 1979). Similar results on the GMS satellite winds have been got by the staff of MSC also.

So MSC determined to change the height assignment procedure both for low-level winds and for high-level winds on the basis of the results on the comparison of GMS satellite winds with radiosonde winds carried out by the staff of MSC (Obana, 1981 and Hamada, 1981 A).

The new procedure of the height assignment is described in the following section. The results on the comparison as mentioned above will be summerized and published in a little while.

2. New procedure of height assignment to GMS satellite winds

Table. 1 The height limitation of the cumulus cloud top for deriving low-level satellite winds

	WINTER	SUMMER	
50°N	600mb	650mb	50°N
EQ	600	600	EQ
50°S			50°S
	SUMMER	WINTER	

° These values were temporarily determined,and might be changed. MSC started the new procedure with the winter (Northern Hemisphere) value.

Table. 2 Fixed heights to be assigned to high-level satellite winds

SEASON		WINTER	SPRING	SUMMER	AUTUMN	
NORTHERN HEMISPHERE	25°N	400	300	250	300	50°N
		200	200	200	200	25°N
	EQ					EQ
SOUTHERN HEMISPHERE	35°S	200	200	200	200	25°S
		250	300	400	300	
SEASON		SUMMER	AUTUMN	WINTER	SPRING	50°S

° These values were temporarily determined, and might be changed. MSC started the new procedure with the winter (Northern Hemisphere) value.

1) Low-level winds

A fixed height of 850 mb is assigned as an estimated height to all cumulus tracked winds, whose target clouds have the cloud top heights lower than a pressure level between 600 mb and 700 mb as shown in Table 1.

2) High-level winds

Some fixed heights are assigned as estimated heights to the cirrus tracked winds over tropical and extratropical areas. The heights and areas

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* This new procedure was reported by Meteorological Satellite Center at the 11th Coordination Meeting on Geostationary Meteorological Satellite(CGMS-XI) held in Washington, D. C. in February 1982,

**Meteorological Satellite Center.

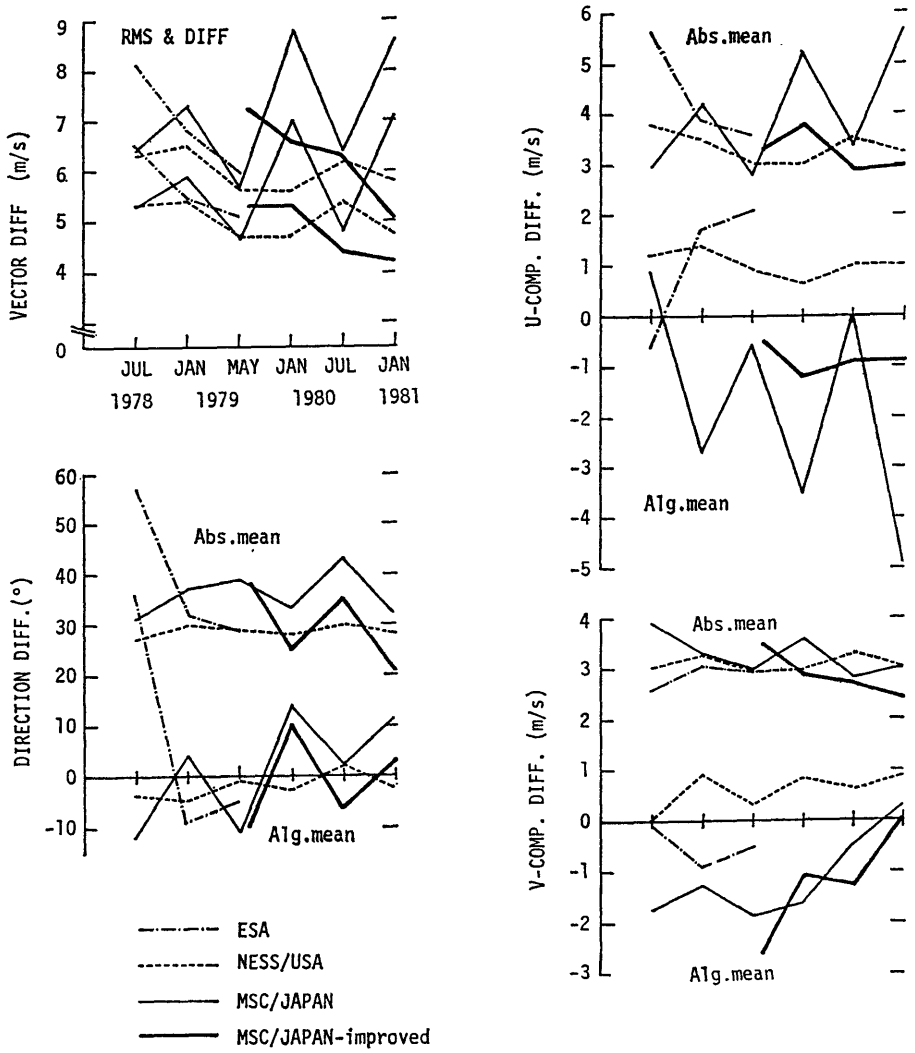

Fig. 1 The results of Type 2 Reports provided by each operating agency for low-level (surface-700mb) winds. Both the root-mean-square and the mean of the magnitude of vector difference are shown in the upper left figure. The algebraic means and absolute means are shown in other figures. The thick lines are the results of the Type 2 Reports reproduced by MSC/JAPAN, after a fixed height (850 mb) has been reassigned to each satellite wind derived from the target cloud with height lower than 650 mb (in July) or 600 mb (in January).

It is shown that the reassignments improve the results of the comparison very much in winter. The level of 850 mb is determined on the basis of the results on the comparison performed by Hamada (1981A). The improved comparison for Japanese satellite winds was carried out in July instead of May in 1979. The improved Type 2 Reports have not been distributed to NESS and other agencies. (After Hamada, 1981B)

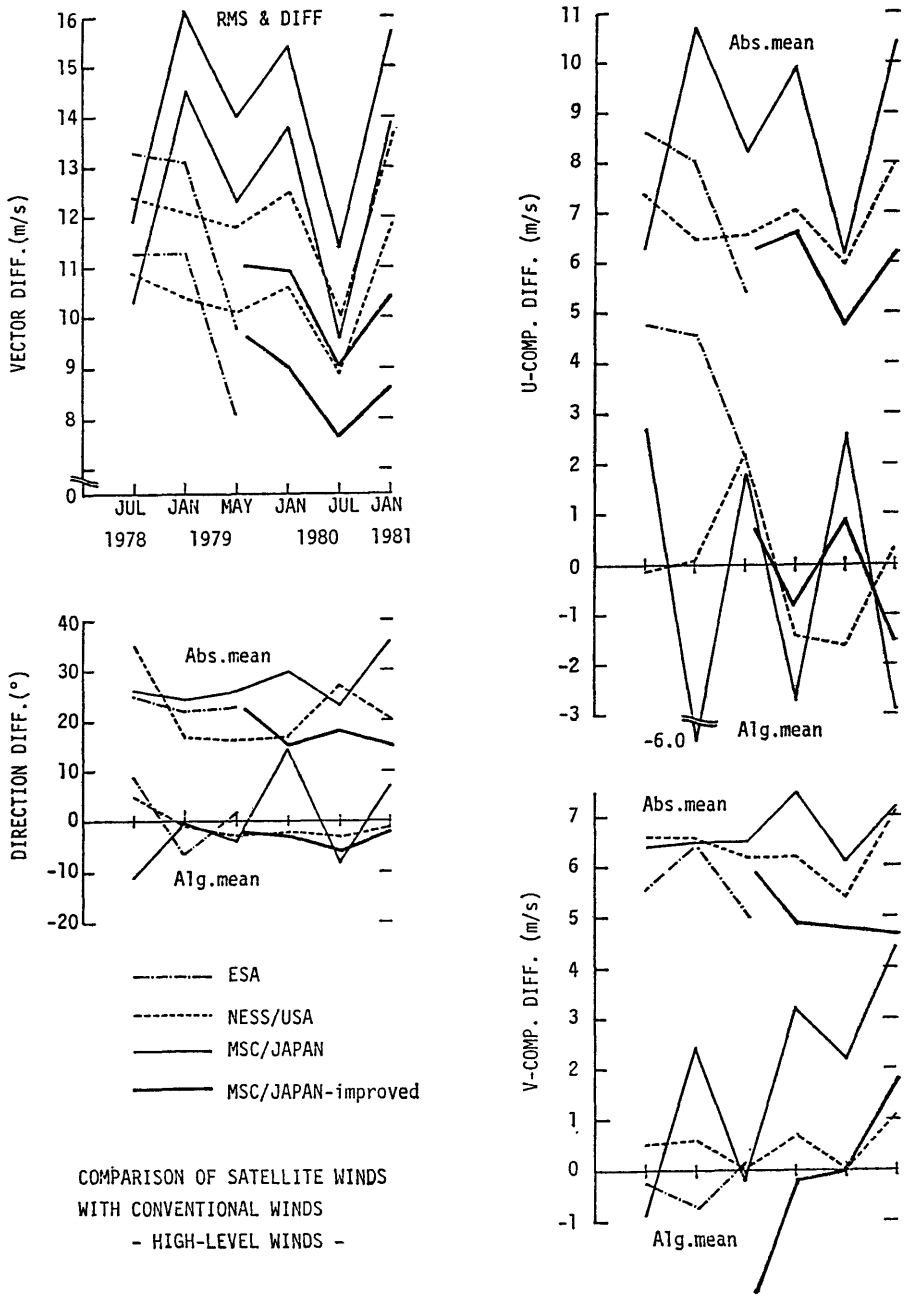

Fig. 2 Same as Fig. 1, but for high-level winds. The reported levels assigned to the satellite winds are less than 400 mb. In this case, the height reassignments are carried out as follows.

July comparison : A 200 mb level is assigned to the satellite winds in the tropical area (Eq-35°N).
A 250 mb level is assigned to the satellite winds in the extratropical area (35-50°N).

Jan/Feb. comparison : A 200 mb level is assigned to the satellite winds in the tropical area(Eq-25°N).
A 400 mb level is assigned to the satellite winds in the extratropical area (25-50°N).

Those levels are determined on the basis of the results on the comparison carried out by Obana (1981) and Hamada (1981A). (After Hamada, 1981B)

are shown in Table 2.

3) Transmission of the wind data

The satellite winds with the estimated heights are transmitted through GTS by the Section 3 of a WMO code, SATOB.

The new procedure of height assignment has been as of 12 Z, 21st December, 1981.

3. The improvement of International Comparison of Satellite Winds

The reassignment of satellite wind level based on the new procedure has been carried out by Hamada (1981B) in order to get the efficiency of changing procedure. The results of International Comparison (SET B of Type 2 Reports*) after the level reassignment are shown in Fig. 1 and Fig. 2. The figures include the results of Intenational Comparison carried out by 3 operating agencies from July 1978 through Jan/Feb. 1981.

For low-level winds (Fig. 1), the thick lines are the results of the reproduced Type 2 Reports after a fixed height (850 mb) has been reassigned to each satellite wind derived from a target cloud with a height lower than 650 mb (in July) or 600 mb (in January).

For high-level winds (Fig. 2), the thick lines are the results of the reproduced Type 2 Reports after some fixed heights have been reassigned to the satellite winds over tropical and extratropical areas.

It is shown that the height reassignment to both high-level and low-level winds improves the results very much, and that the differences are the same as or less than those of NESS winds.

* SET B of Type 2 Reports ; When the magnitude of vector difference between a satellite wind and a radiosonde wind is greater than 30 m/s, the difference is rejected from the statistics.

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GMS 風計算結果における高度設定方法の変更

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気象衛星センターシステム管理課

現在，各国の衛星風間の相違を増大させ，ラジオゾンデ風との差を大きくしている最大の原因は，衛星風に対する高度設定方法の差異によるものであると言われている。

日本（気象衛星センター，MSC）の現業用風計算システム（CWES）では，今まで次の様な高度設定方法がとられてきた。

(1) 上層風（絹雲を追跡して得られる風）については，圏界面高度の月平均値（気候値，緯経度5°毎）を風の推定高度として設定し，通報していた。

(2) 下層風（積雲を追跡して得られる風）については，赤外画像から追跡雲の雲頂高度（T_{BB}を算出した後，鉛直温

度分布データの月平均値により気圧高度に変換）を算出し通報していた。特に風の高度の推定は行なっていなかった。

これらの高度について，上層風の場合は，報じられている高度が季節を通じて高すぎるということが指摘されていた。下層風の場合は，多くの場合追跡雲の雲頂高度ではなく雲底の風を代表していると言われているが，通報されていた雲頂高度がそのまま風の推定高度と見なされるという弊害も見られた。

気象衛星センターでは，過去の観測結果について主としてラジオゾンデ風との比較による分析調査を行ない，それに基づいて1981年12月21日21時より次の様に高度設定方法の変更を行なった。

(1) 下層風について，すべて 850 mb の一定の高度を設定する。追跡雲の高度が Table 1 に示した値より低い場合に下層風と見なす。

(2) 上層風について，熱帯地方においては 200 mb，中緯度地帯では 250 mb から400 mb のある一定の高度（季節により変える）を設定する。領域の分け方と一定高度値は Table 2 に示す。

(3) 上・下層とも設定した高度を衛星風の推定高度として通報する。下層についてＩＲ画像から算出されている雲頂高度は通報しない。衛星センター内に保存されている資料および月報には雲頂高度データも含まれている。

これらの高度設定方法の変更によって，各国間の衛星風の相違などを明らかにする目的で年2回行なわれている衛星風の国際比較（CGMS の取決めによる，浜田，1981参照）のうち，ラジオゾンデ風との差を大幅に小さくすることができた（Fig. 1, Fig. 2）。

なお，第11回静止気象衛星調整会議（CGMS-XI）で報告されたところによれば，米国（NESS）でも，サブトロピカルジェット気流に伴なう絹雲を追跡して得た上層風については 200 mb の一定高度を推定高度として採用するように既に変更して実施している。これ以外の絹雲を追跡した場合は，今まで通り追跡雲の近傍の濃い絹雲の高度をＩＲ画像から算出しそれをそのまま推定高度として報じている。

本稿に記述した日本における高度設定方法の変更の実施は，CGMS-XI（1982年2月，ワシントン）において気象衛星センターから報告された。

参考文献

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