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NOAA Technical Memorandum ERL PMEL-94



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WESTERN AND CENTRAL TROPICAL PACIFIC SURFACE WESTERLY WINDS,  
JULY 09, 1987 - JUNE 30, 1988,  
FROM THE R. ATLAS et al. ANALYSIS OF SSM/I RESULTS

D. E. Harrison  
S. Hankin  
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Pacific Marine Environmental Laboratory  
Seattle, Washington  
December 1991

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Environmental Research  
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J. Davison  
K. O'Brien  
Joint Institute for the Study of Atmosphere and Ocean  
University of Washington  
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**Western and Central Tropical Pacific Surface Westerly Winds,  
July 09, 1987 – June 30, 1988,  
from the R. Atlas *et al.* Analysis of SSM/I Results**

D.E. Harrison<sup>1</sup>, S. Hankin<sup>1</sup>, J. Davison<sup>2</sup>, and K. O'Brien<sup>2</sup>

## **1. INTRODUCTION**

The NASA SSM/I (Special Sensor Microwave Imager) instrument has been used to produce a special 6-hourly research surface wind field (see: Atlas *et al.*, 1991). Basically the vector field represents a filtered combination of SSM/I wind speeds (derived via the Wentz algorithm), conventional surface wind observations and the ECMWF surface wind operational analysis as described in Atlas *et al.* (1991). The data are available for the period 09 July 1987–30 June 1988 (with some data gaps) from the NODS archive at JPL.

Although the data set is global, the geographical focus of the material presented here is the western and central tropical Pacific ocean. The objective of this survey of the SSM/I results is to gain a better knowledge of the space and time characteristics of westerly surface wind variability in this part of the world ocean.

Keen (1982) noted that tropical cyclone pairs occasionally form on either side of the equator and create a brief period of strong equatorial westerly surface wind. Luther, Harrison and Knox (1983) noted that brief episodes of westerly winds were a prominent aspect of daily mean time series from a number of multi-decadal records from islands north and south of the equator near the Dateline. A connection between ENSO periods and particularly strong westerlies was noted by Luther *et al.* (1983). Luther and Harrison (1984) showed that there was a significant peak in zonal wind in a frequency band of perhaps 3 to 15 days at Beru Is. near the equator, and noted that the westerly wind episodes would appear primarily in this frequency band despite the fact that no corresponding easterly events were evident in the records. Harrison (1987) considered the characteristics of monthly mean wind anomalies during ENSO periods from 1955 to 1980 at the near-Dateline islands, and found that westerly anomalies tended to be centered about the equator in late-summer/autumn months, to die away and then to reappear shifted several degrees south of the equator in winter months; although each ENSO period has its own characteristics, these shifts of westerly wind anomaly were found in almost every ENSO period. Later work suggests that much of the monthly mean anomaly at these islands results from the frequency and intensity of westerly wind events. Harrison and Luther (1990) presented detailed spectral statistics for these, and other, tropical island wind records and found strong zonal wind zonal coherence in most energetic period bands across 15 degrees of longitude, but

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<sup>1</sup> NOAA/Pacific Environmental Laboratory, 7600 Sand Point Way N.E., Seattle, WA 98115-0070

<sup>2</sup> Joint Institute for the Study of Atmosphere and Ocean, University of Washington, Seattle, WA 98195

meridional coherence for the high frequency band was found only for small meridional separations and near the equator.

Harrison and Giese (1991) presented selected daily average vector results, intended specifically to explore the space and time characteristics of westerly events; they proposed that four distinct types of near-Dateline westerly behavior exist, and suggested a classification of these events according to the location of the latitude of maximum westerly wind. Accordingly, they spoke of Type N, C, S, and FS events according to whether the westerly maximum was a few degrees north of the equator, centered about the equator, a few degrees south of the equator or "far south", relative to the oceanic equatorial waveguide, (center 7°S to 10°S) of the equator. Figures 1 and 2 present the time evolution of the wind composite events and the wind anomaly composite events. Type N and C events tend to occur in Boreal Summer and Fall; Type S and FS events tend to occur in Boreal Winter and Spring. They also presented frequency of occurrence statistics, and attempted to explore the apparent connection between westerlies and tropical depressions. The qualitative appearance of a strong connection between westerlies and tropical depressions and westerlies could only be examined in terms of named tropical cyclones; the connection is not one-to-one, but this should be no surprise as many tropical depressions never attain named storm status. Much work remains to be done on the latter topic. The results shown here further buttress the notion that there is very often a strong connection between the two types of tropical synoptic variability.

Apart from their interest as one aspect of the special behavior of the coupled atmosphere-ocean system in the western Pacific, near-equatorial westerly wind events can also drive substantial oceanic response well away from their location. The existence of rapidly propagating oceanic Kelvin motions (eastward phase speed of about 3 m/s, 1.5 m/s and 1 m/s for the first baroclinic vertical modes over a range of different ocean stratifications), and Rossby motions (westward phase propagation at one-third the Kelvin phase speed for the corresponding vertical mode) means that wind events of at least one week duration can force non-trivial response, particularly to the east of the forcing region. Harrison and Giese (1988) showed some preliminary ocean circulation model results that suggested the eastern Pacific amplitude of response that might be expected from an idealized westerly event. Giese and Harrison (1990) presented a more thorough analysis of the expected remote linear response to various idealized westerly events, and contrasted these expectations with the behavior found in several fully-nonlinear ocean model experiments. For the wind events and stratification used, typically second and higher vertical mode Kelvin response is more strongly forced than first mode response, although the first mode response can dominate in sea level (one of the most easily observed quantities). The magnitude and pattern of sea surface temperature response depend very much on the conditions prevailing in the ocean at the time of the wind event (e.g., Schopf and Harrison, 1983; Harrison and Schopf, 1984). Efforts to observe the remote response to westerly events has produced a rather unclear result; the sea level response in the first baroclinic mode



has been observed on a number of occasions (e.g., Eriksen *et al.*, 1983; Miller *et al.*, 1988), but the sea level signal of the higher baroclinic modes is typically at or below the noise level of the measurement or of other natural oceanic variability; the zonal current fluctuations observed have shown a rather complicated vertical structure (McPhaden *et al.*, 1988), but the near-surface flow is not inconsistent with linear results (Harrison and Giese, 1989); sea surface temperature changes are not inconsistent with simple ideas but are typically small enough from a single event to be easily obscured by other oceanic variability (Harrison and Giese, 1988; McPhaden *et al.*, 1988). Because the oceanic circulation in the equatorial waveguide is driven by wind stress changes all across the Pacific, responds quickly to changes in local forcing, and has considerable natural variability of its own (e.g., the instability waves of the cold tongue), observing the response to westerly wind events is proving to be a considerable observational challenge. If simple ideas and model results are correct, as few as three or four vigorous westerly events properly spaced throughout the year can produce near-equatorial sea surface temperature changes and patterns very much like those described from observations by Rasmusson and Carpenter (1982). Despite this, and other work on westerly wind events, no fully three dimensional (x,y,t) phenomenology of this type of variability has yet been available. The TOGA-COARE field program has among its objectives to observe the characteristics of westerly events that occur during its intensive observing period, Nov. 1992–Feb. 1993. The TOGA-TAO array of near-equatorial moorings that is under deployment at present will greatly increase the number and quality of surface meteorological observations, as well as subsurface ocean thermal data.

The only existing data sets able to address the atmospheric structure of westerly wind events are the operational 6-hourly fields produced by various meteorological agencies. With support from NASA, the author has undertaken an examination of recent (post-1986) analyses. The characteristics of surface westerly wind variability in the U.S. Navy's FNOG A-29 and A-30 surface marine wind data set and the European Center for Medium-Range Weather Forecasting (ECMWF) data sets will be reported in future technical memos. The first effort is the present survey of winds from the research SSM/I data set developed by NASA.

Figures 3 through 8 present the climatological monthly mean wind field, over the period 1946–1989, from the trimmed COADS data set of surface marine observations. The format and region are identical to that which will be used later to display the SSM/I observations; data are presented over the region 130°E to 150°W by 20°S to 20°N, vectors are plotted every 2 degrees, and the zonal wind is contoured every 2 m/s over the area in which there is westerly flow within 10 degrees of the equator. There is no smoothing of the monthly mean fields. Note that there are significant regions of westerly wind even in the monthly mean climatology; from December through April there are westerlies (with  $U_{\max} > 2 \text{ m s}^{-1}$ ) from (0°, 130°E) eastward and southward over an area that varies with the month, while from May through November there are westerlies north of the equator somewhere west of 155°E, with the maximum strength and eastward extent occurring in August. In November, December, and January, westerlies typically exist on both

sides of the equator for at least 15 degrees of longitude. These climatological patterns of westerlies are typically quite clear even during the ENSO and near-ENSO period covered by the SSM/I data set.

Because TOGA-COARE is fundamentally about trying to understand the air-sea interaction processes that control the evolution of the western Pacific warm pool, it seems of interest to examine briefly the climatological sea surface temperature (SST) patterns over the same time period and region (data also from COADS). The monthly mean climatological SST fields are shown in Figures 9 to 14; SST has been smoothed with a ten-degree zonal running average in order to make the contours a little smoother. The climatological vector mean winds are superimposed on the SST field of the same month. Two well-known aspects of the seasonal cycle are clearly evident: the warmest waters are about 29.5°C, and appear in the southern hemisphere between December and April and in the northern hemisphere between July and September. No clear pattern between SST and monthly mean wind speed or direction emerges from examination month to month; sometimes the warmest water is in regions of very light mean wind, and sometimes where the mean wind is substantial. As noted in the program planning documents of the TOGA-COARE field program, the processes that jointly determine the mean winds and mean SST patterns in this part of the world are not obvious. But let's return to the issue at hand; westerly wind variability in this region.

Before moving on to the SSM/I winds, it may be useful to recall the patterns of the composite Type N, S, C, and FS westerly events. The reader will see in the SSM/I figures that follow counterparts of each type of behavior. Much of the time the characteristic behavior will be seen further west than the Dateline; in this rather modest ENSO event the typical western Pacific atmospheric deep convection did not move very far east and, as the westerly variability seems frequently to be associated with the region of deep convection, the westerlies shown here are not located as far east as they seem to be in more intense ENSO events. The detailed connections between surface near-equatorial westerlies, convection, and tropical depressions deserve far more work than they have been given to date. As the amount of data from this area increases due to the TOGA-TAO array and improved reporting of conventional surface marine observations, and the quality of the operational analyses consequently improves in this region, undoubtedly further study will take place.

Daily snapshots of the 6-hourly surface wind field produced by Atlas *et al.* (1991) are presented here (Figures 15 on). In each figure the areas between 10°S and 10°N, where zonal wind is westerly, are contoured with a 2 m/s contour interval. Plots are presented over the region 20°S to 20°N by 130°E to 150°W, and the larger islands are superimposed on each plot. Note that this analysis produces winds over land as well as sea; the land masking will typically obscure the vectors over land, but they will occasionally "peek" out from behind the land contour. No catalog of westerly wind events is offered here. Over much of the one-year duration of this data set there is near-equatorial westerly wind somewhere within this region. Periods of

moderate ( $U_{\max}$  about 5–7 m/s) to strong ( $U_{\max} >10$  m/s) westerly winds are found throughout the period June 1987 to April 1988; except for the data gap between Dec 1987 and Jan 1988, it is unusual to find a period longer than a week in which near-equatorial westerlies are less than 3 m/s. The prevalence of westerlies is expected, given the climatological results presented previously.

The feasibility of presenting zonal wind anomaly plots was explored, but there are bias differences between the SSM/I and COADS climatological fields, and there is noise in the climatology. Together, these make the anomaly fields difficult to look at except in periods of very strong anomaly. Thus no anomaly fields are shown here. A useful general rule of thumb for viewing the daily fields is that localized features with westerly wind in excess of 4 m/s are always anomalous, relative to this climatology. The time period presented, July 1987–June 1988 spans the end of an ENSO period and the beginning of a tropical Pacific cold phase. Thus it is unlikely that the variability shown here is "typical" of a randomly selected one-year interval of time.

The space and time scales of the westerly flow will be presented from the perspective of cross spectral analysis when a longer SSM/I data set has been prepared. At the time of writing, the NASA group is preparing a second year of SSM/I vectors; it is hoped that these will be available for analysis early in 1992. With a two year time series, with one full year outside of an ENSO period, a much better perspective on the westerly variability will be available.

How much should the characteristics of these SSM/I fields be believed? The best approach would seem to be direct comparison with the TOGA-TAO buoy data. However, no clear answer is possible at this time, because the TOGA-TAO array was only partially deployed during this time period. Over this time period there were some buoys at 165°E at 2°N, 0°, 2°S and 5°S, but none of the planned moorings at higher latitudes at 165°E or any of the planned moorings at 155°E or at 147°E were deployed. Thus only very limited comparison is possible in this region. Evaluation of the quantitative skill of this analysis will have to be carried out post-1991, when most of the TAO array should have been deployed in the western Pacific. A secondary question concerns the "value added" of the SSM/I wind speeds to the ECMWF 6-hourly analyses; this can be easily assessed once both analyses are available, and will be examined once the ECMWF analyses are decoded at PMEL; preliminary examination indicates that patterns and pattern evolution are very similar but that wind speed differences of 1 to 2 m/s are common.

## **2. ACKNOWLEDGMENTS**

This work was supported by NASA project UPN-578-22-13-02 to PMEL.

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## FIGURES

# COMPOSITE 1955-1980 WESTERLY WIND EVENTS FROM NEAR-DATELINE ISLANDS

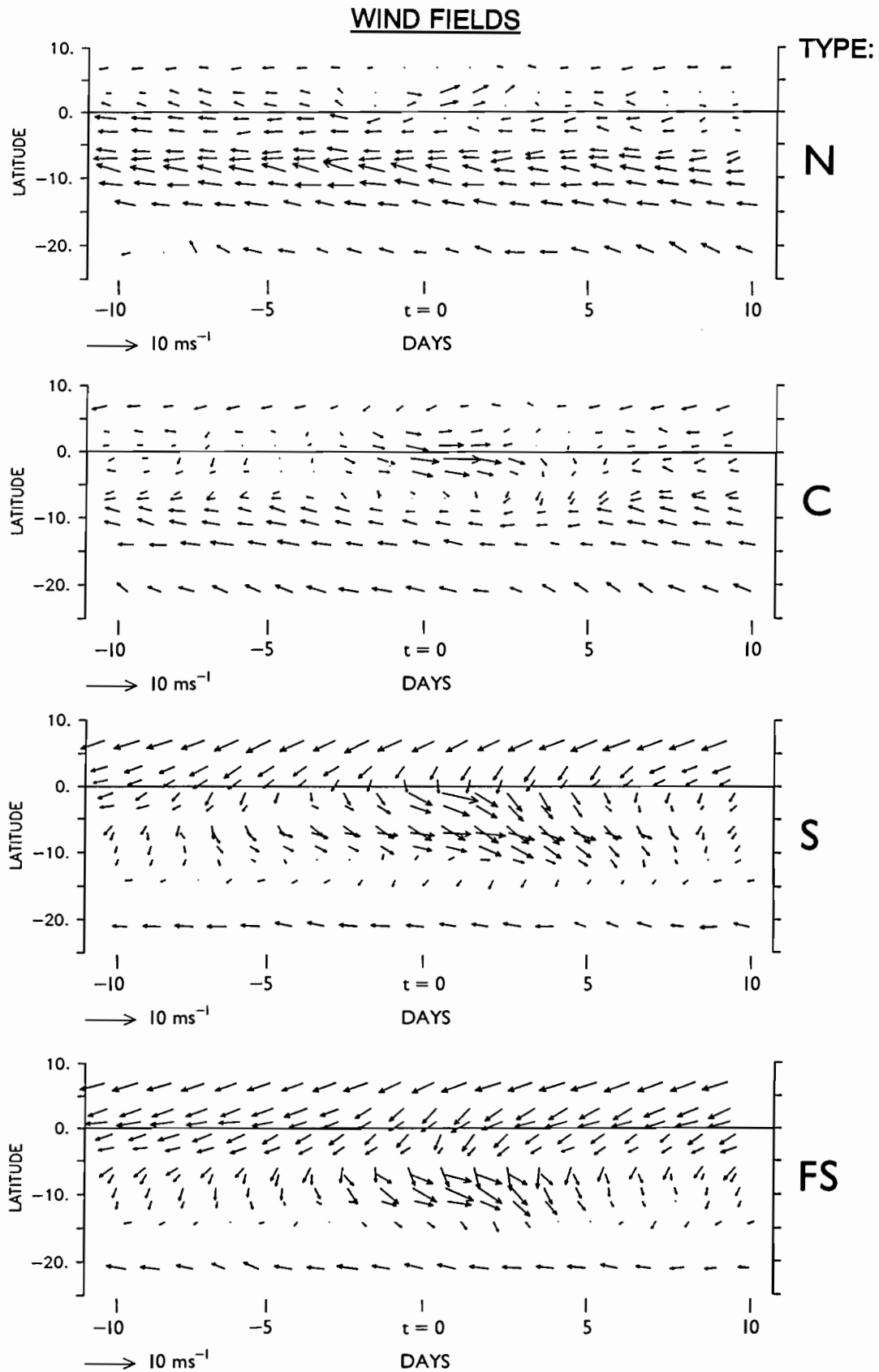


Fig. 1. Composite westerly wind events from multi-decadal records of surface wind from near-Dateline islands (Harrison and Giese, 1991). Four types of wind events were described, according to the latitude of the maximum westerly wind: Type N, C, S or FS.

COMPOSITE 1955-1980 WESTERLY WIND EVENTS  
FROM NEAR-DATELINE ISLANDS

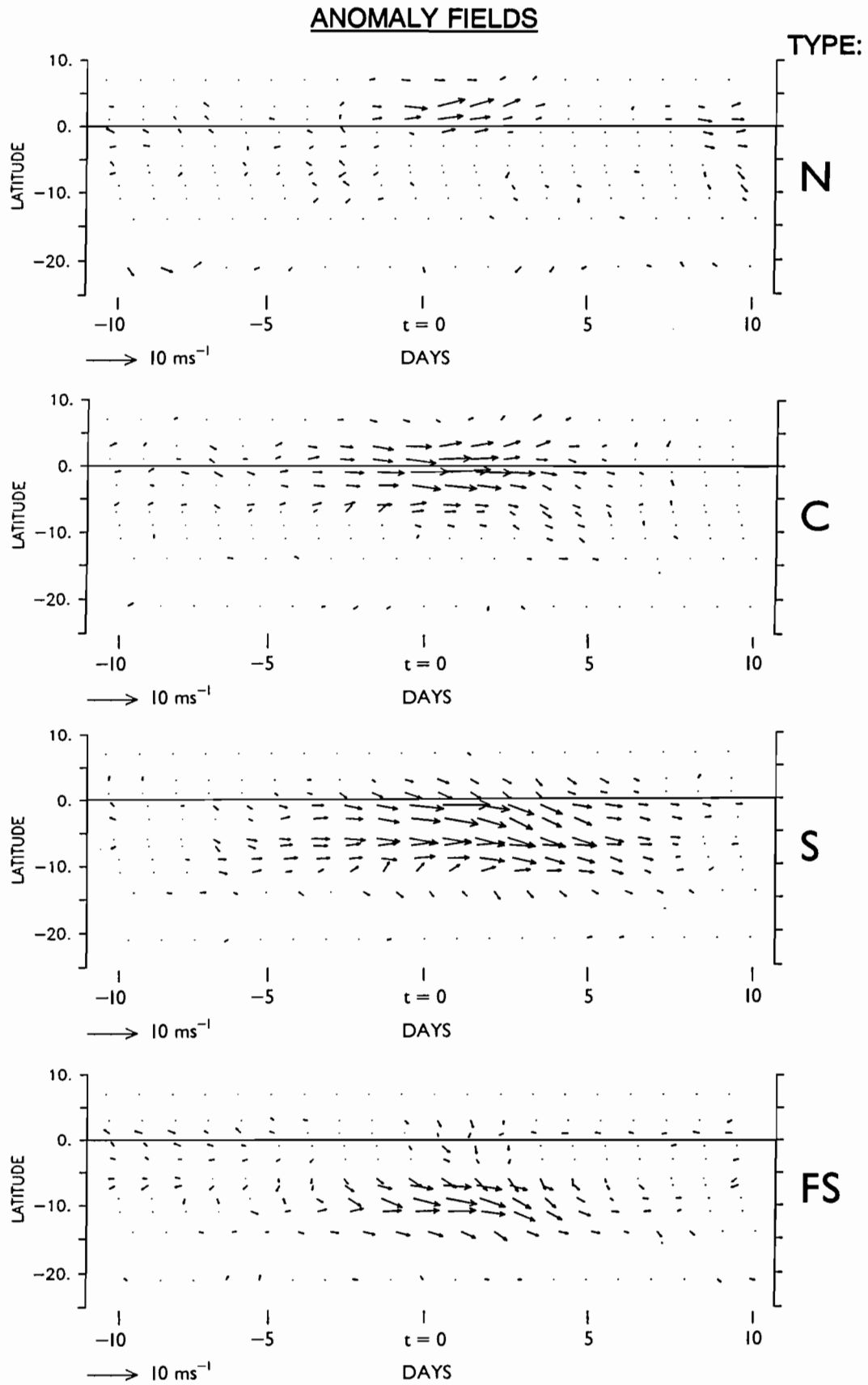


Fig. 2. Composite westerly wind events, with the climatological monthly mean wind removed (Harrison and Giese, 1991).

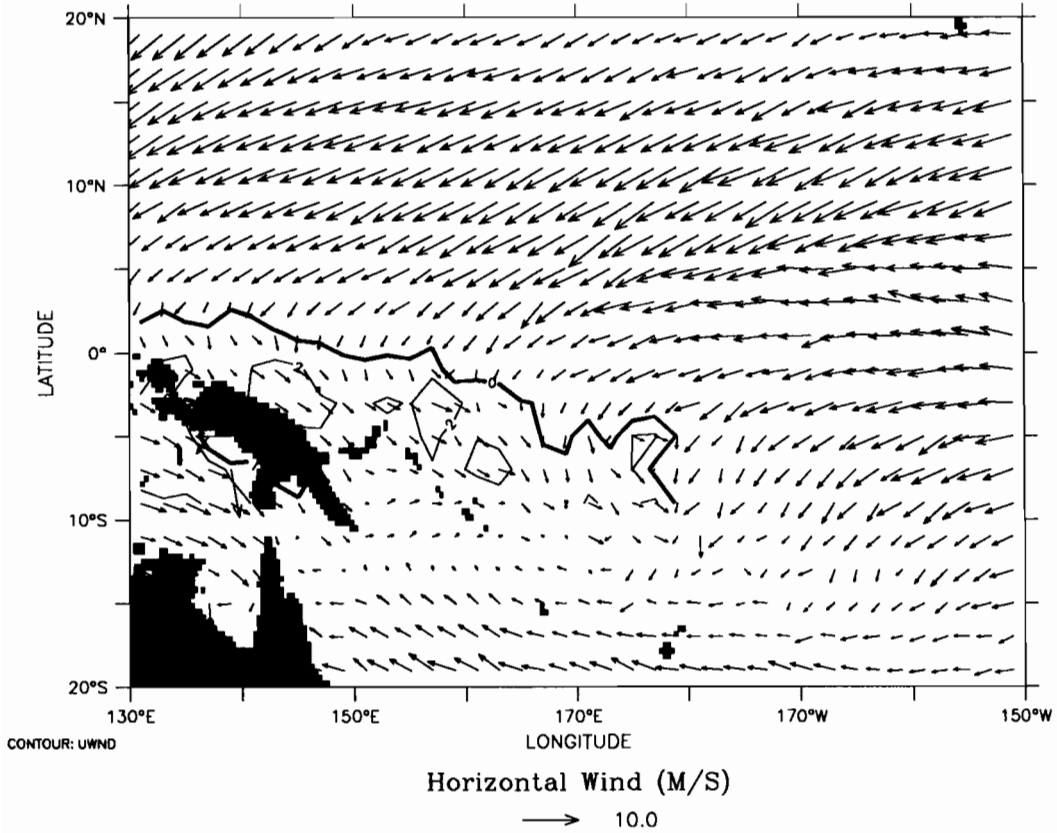




**Figs. 3–8.** Climatological monthly mean surface wind vectors, 1946–1989, from the trimmed COADS data set, over the region 20°S–20°N by 130°E–150°W. Between 10°N and 10°S the area in which zonal wind is westerly is contoured. Major islands are shown as well.

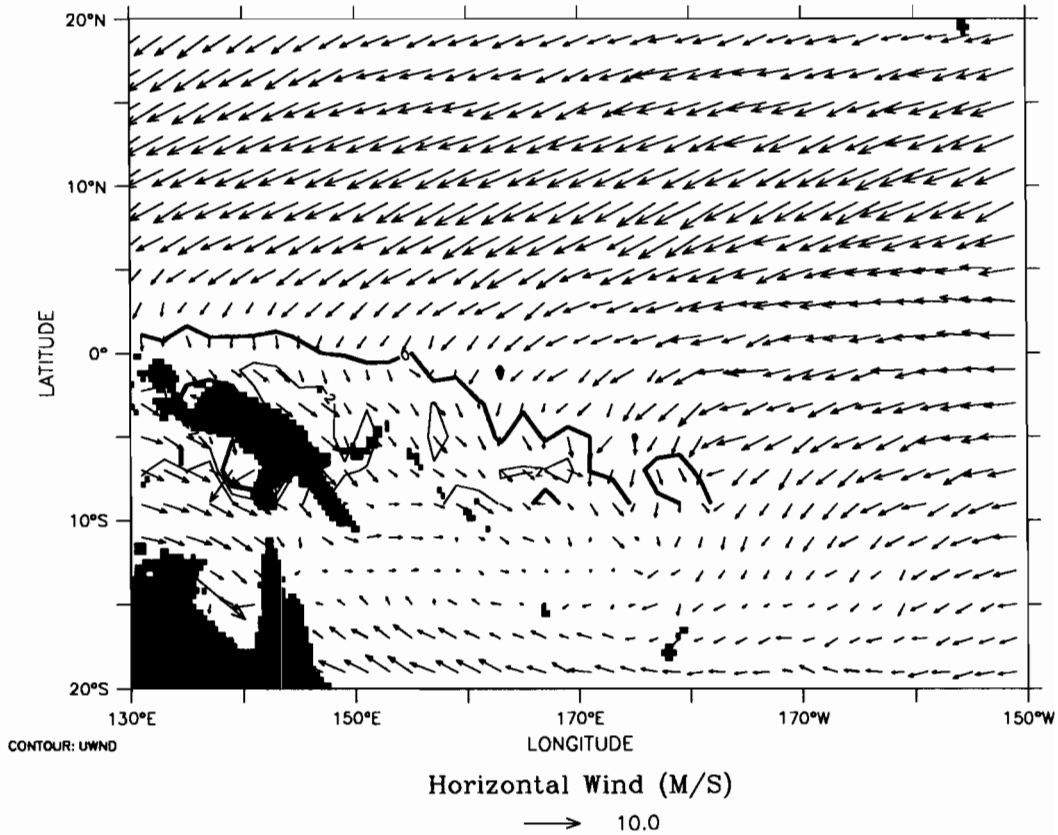
TIME : JAN

COADS Monthly Climatology (1946-1989)



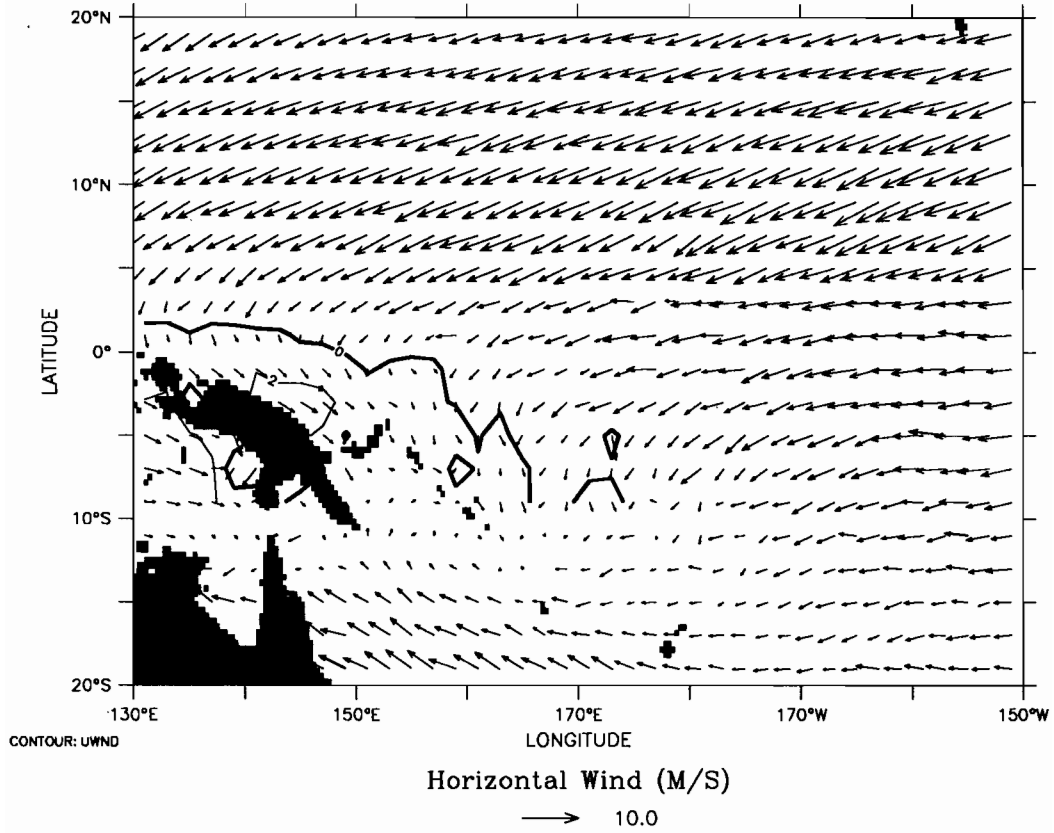
TIME : FEB

COADS Monthly Climatology (1946-1989)



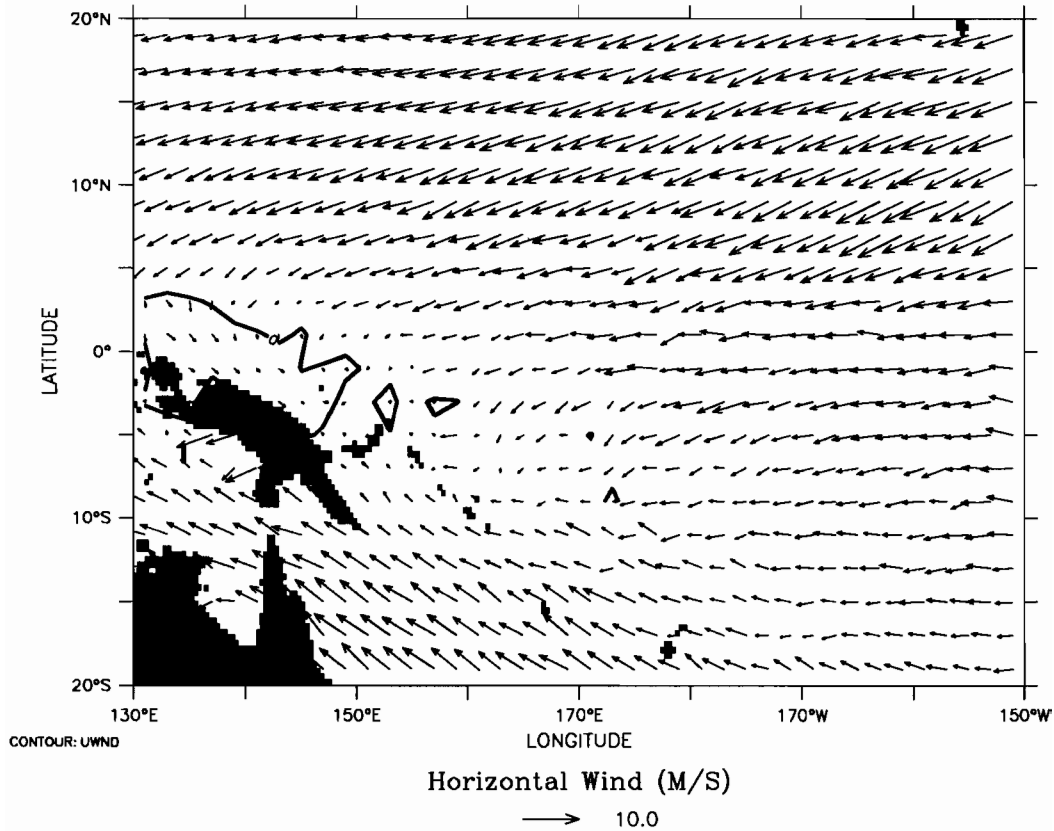
TIME : MAR

COADS Monthly Climatology (1946-1989)



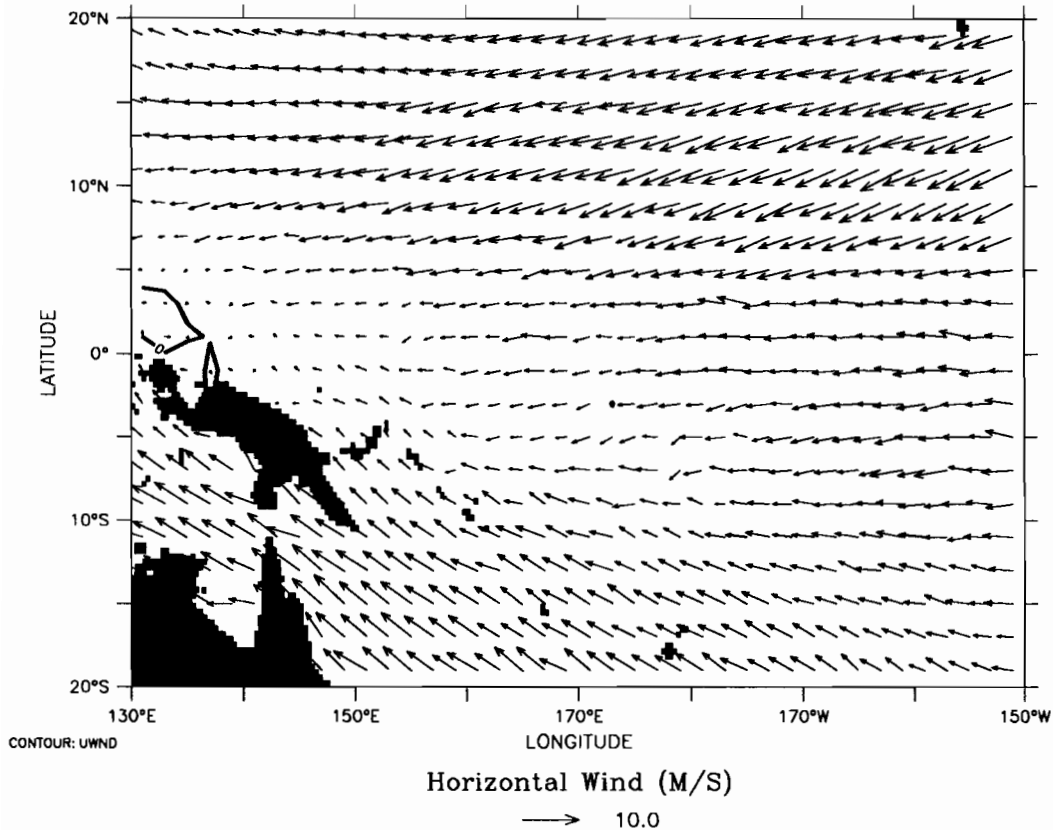
TIME : APR

COADS Monthly Climatology (1946-1989)



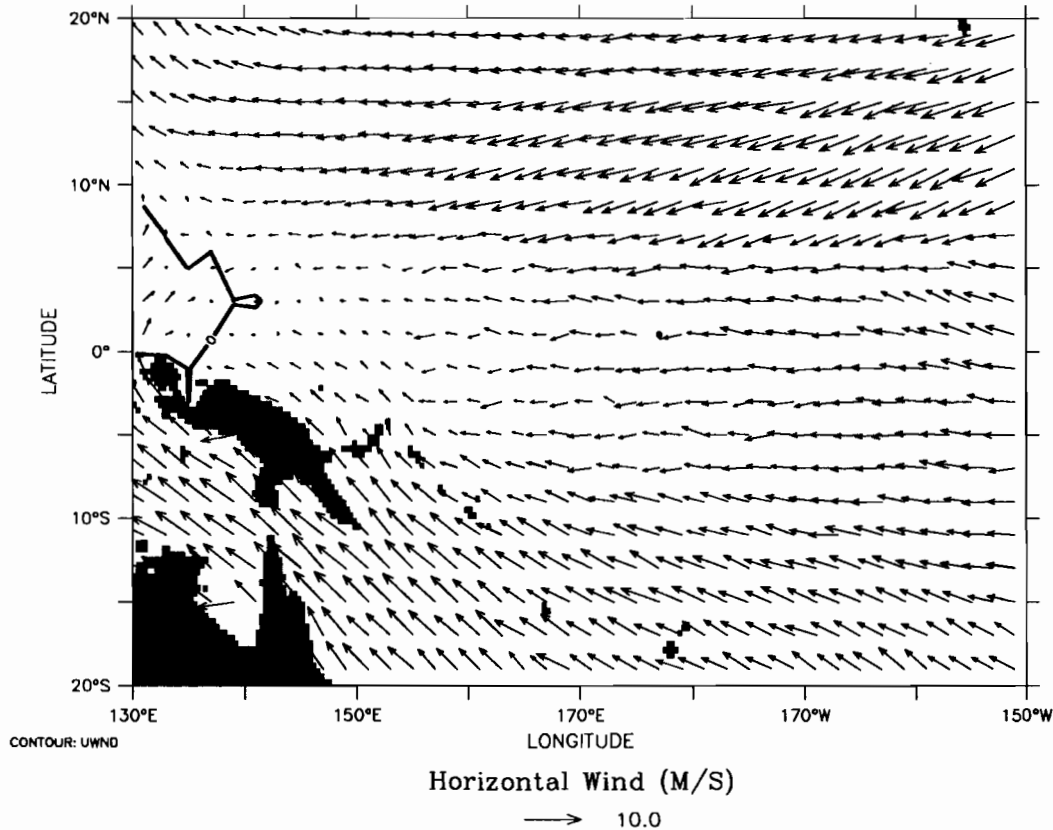
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COADS Monthly Climatology (1946-1989)



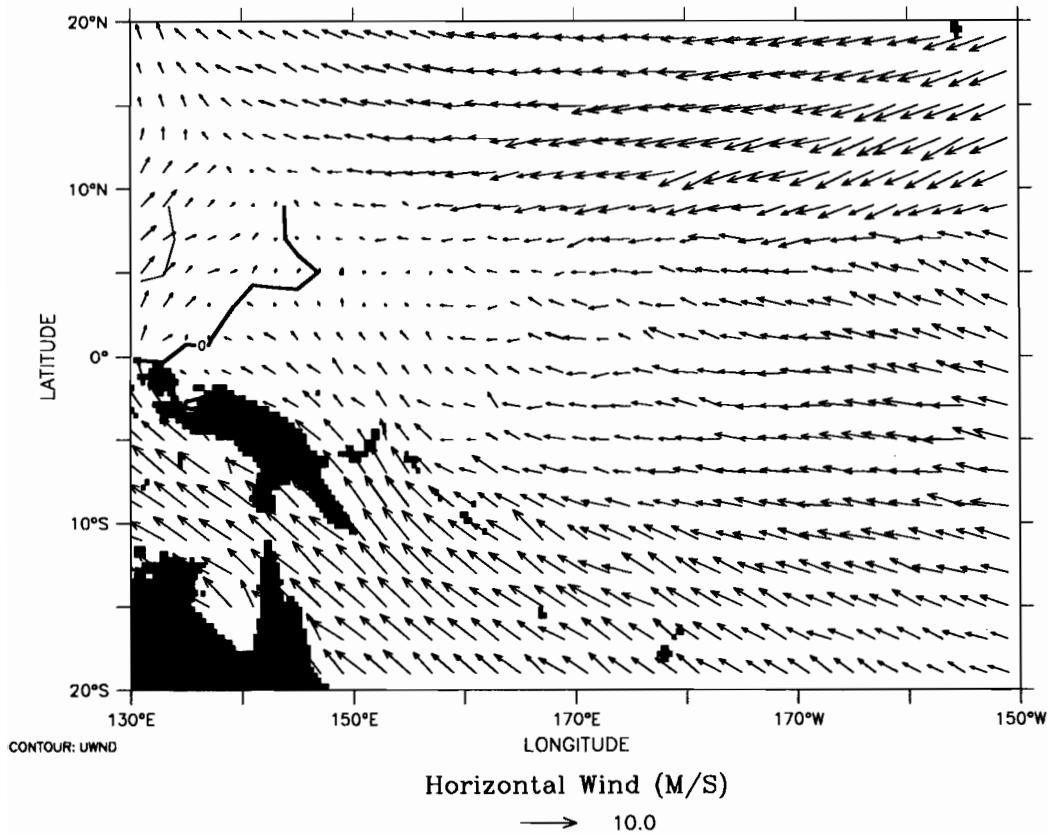
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COADS Monthly Climatology (1946-1989)



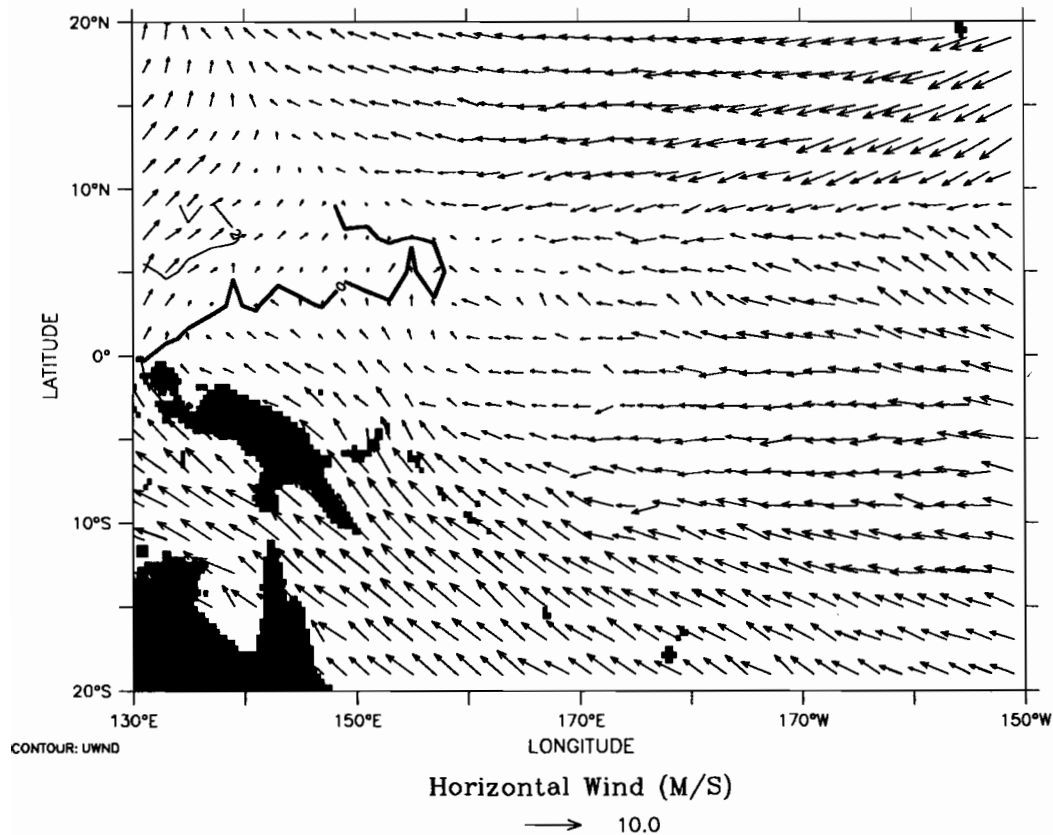
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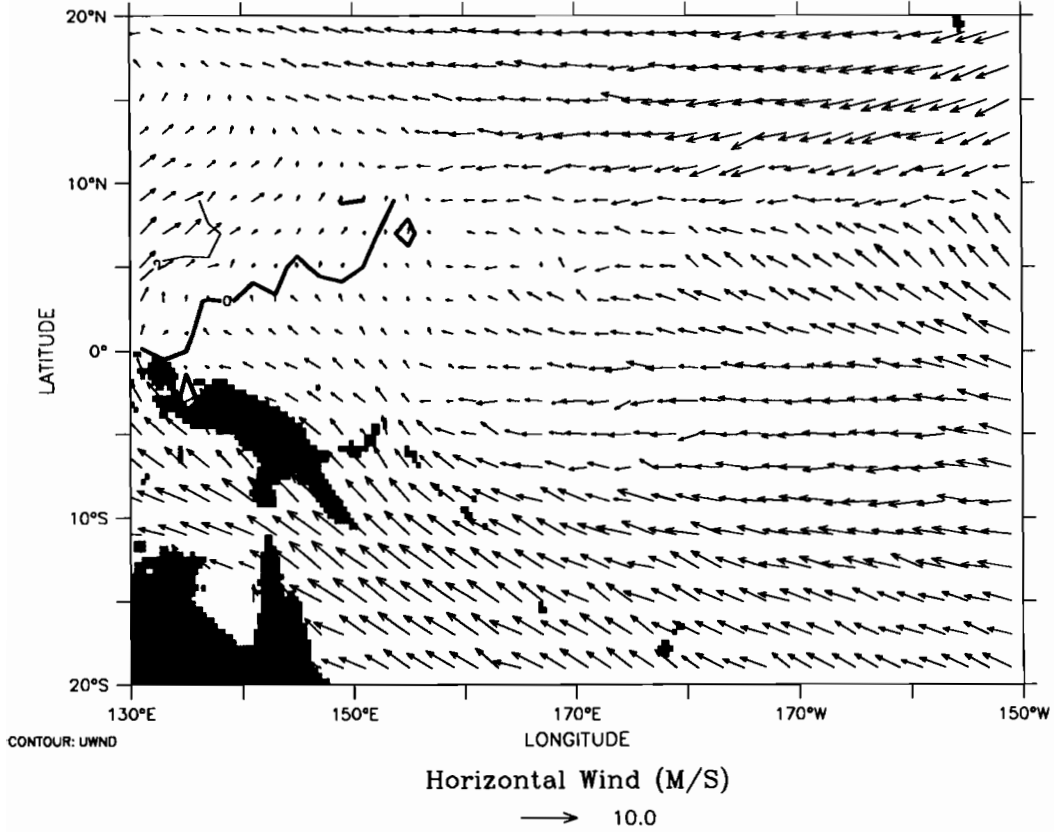
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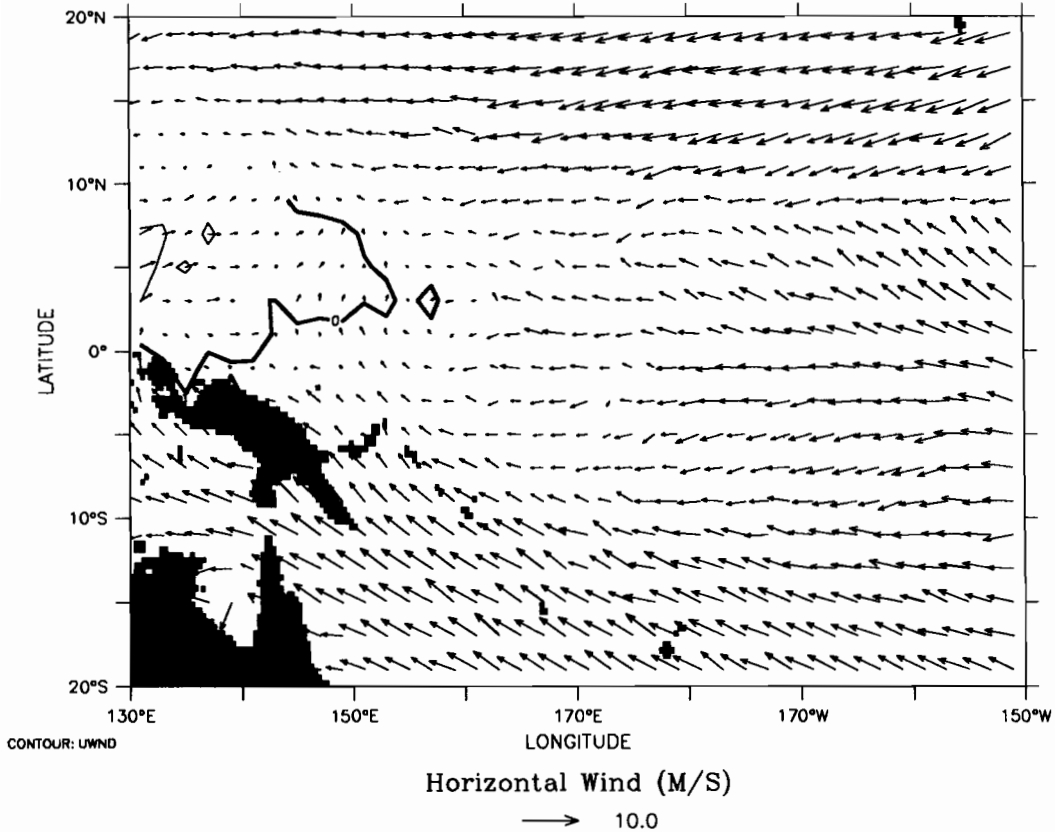
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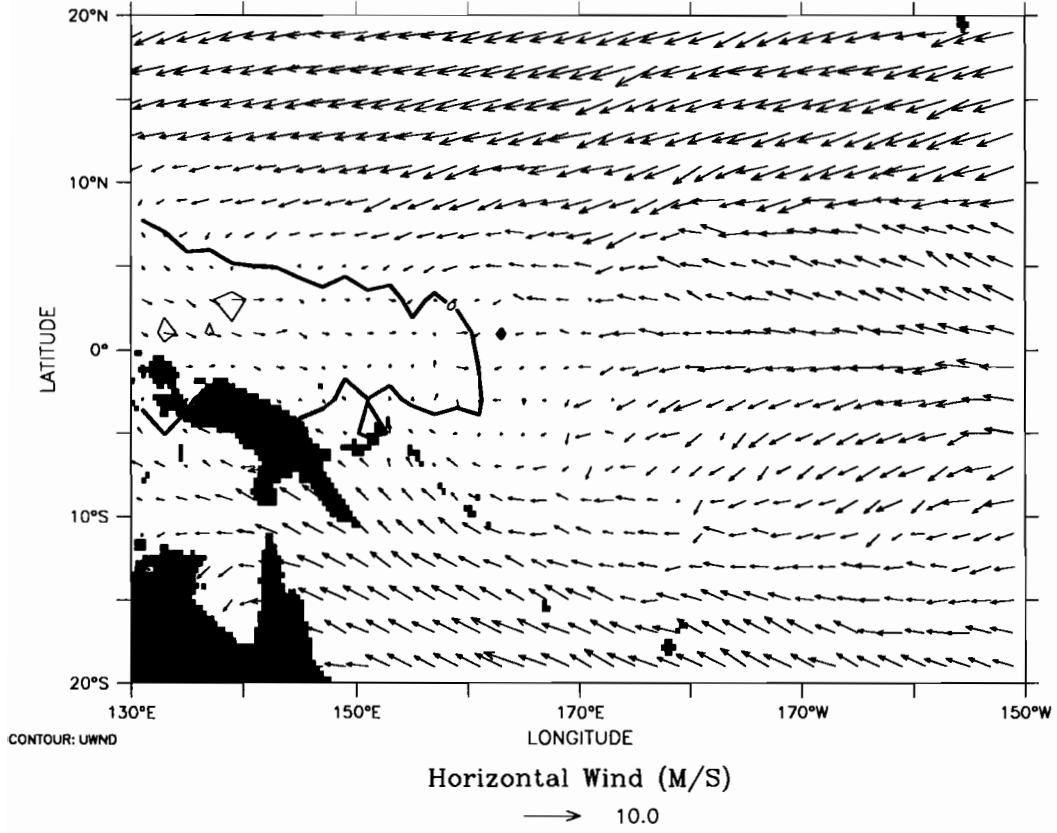
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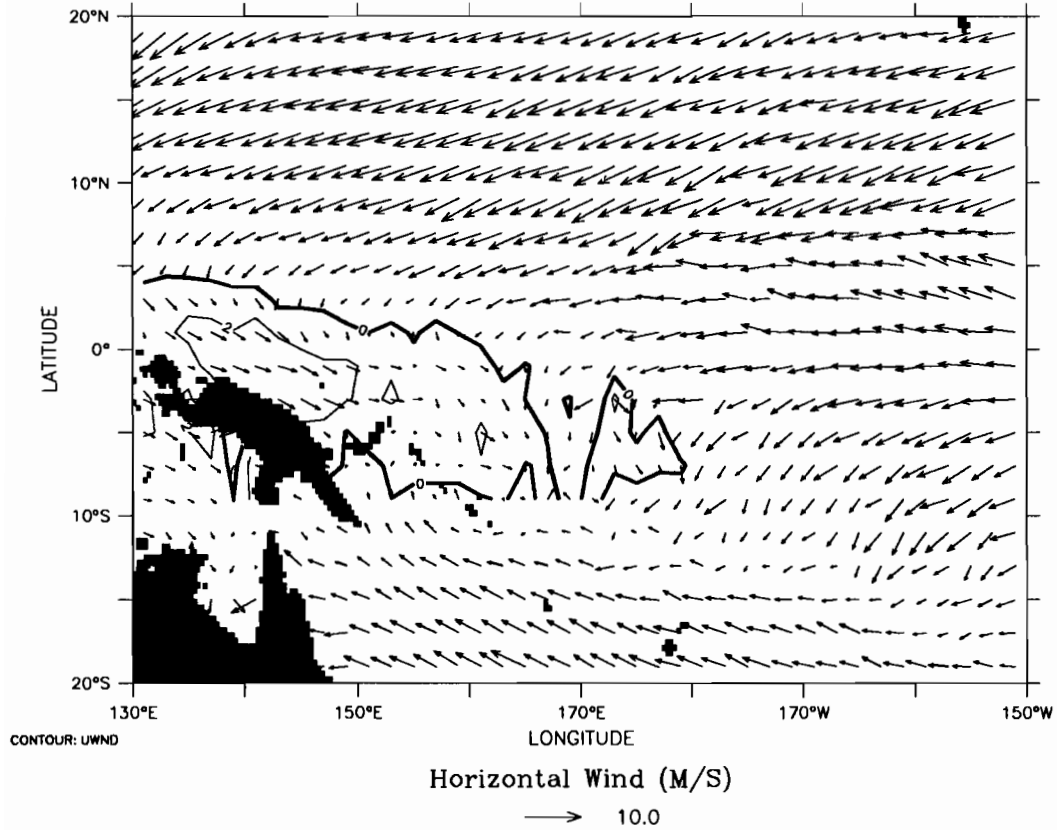
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COADS Monthly Climatology (1946-1989)



TIME : DEC

COADS Monthly Climatology (1946-1989)



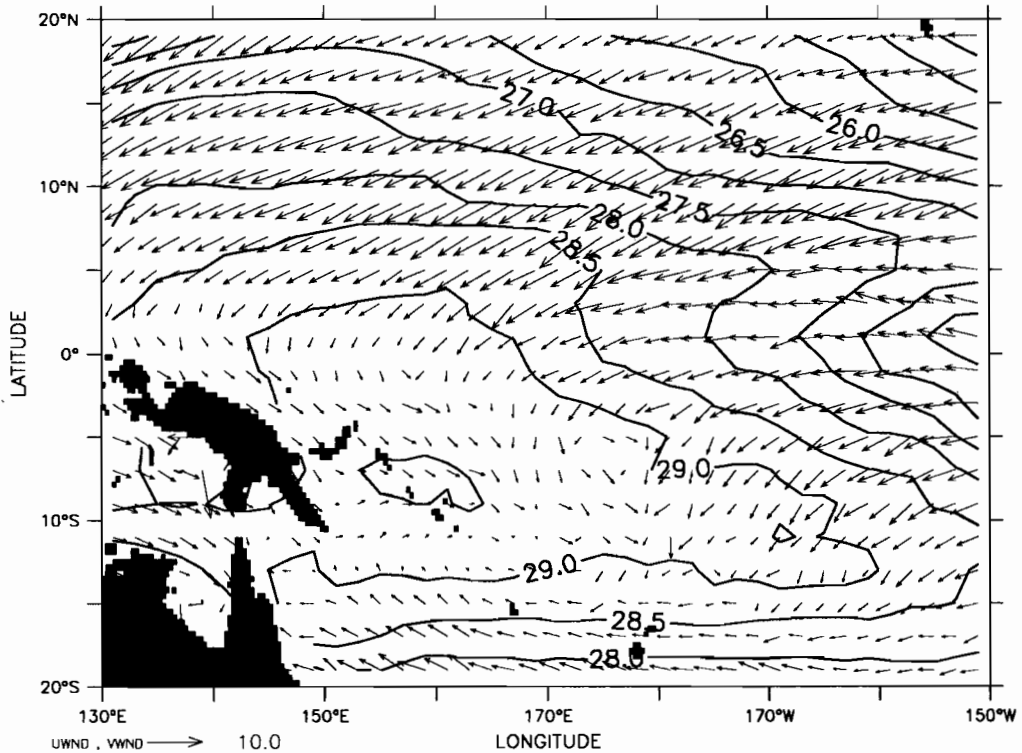




**Figs. 9–14. Climatological monthly mean surface wind vectors and sea surface temperature, 1946–1989, from the trimmed COADS data set.**

TIME : JAN

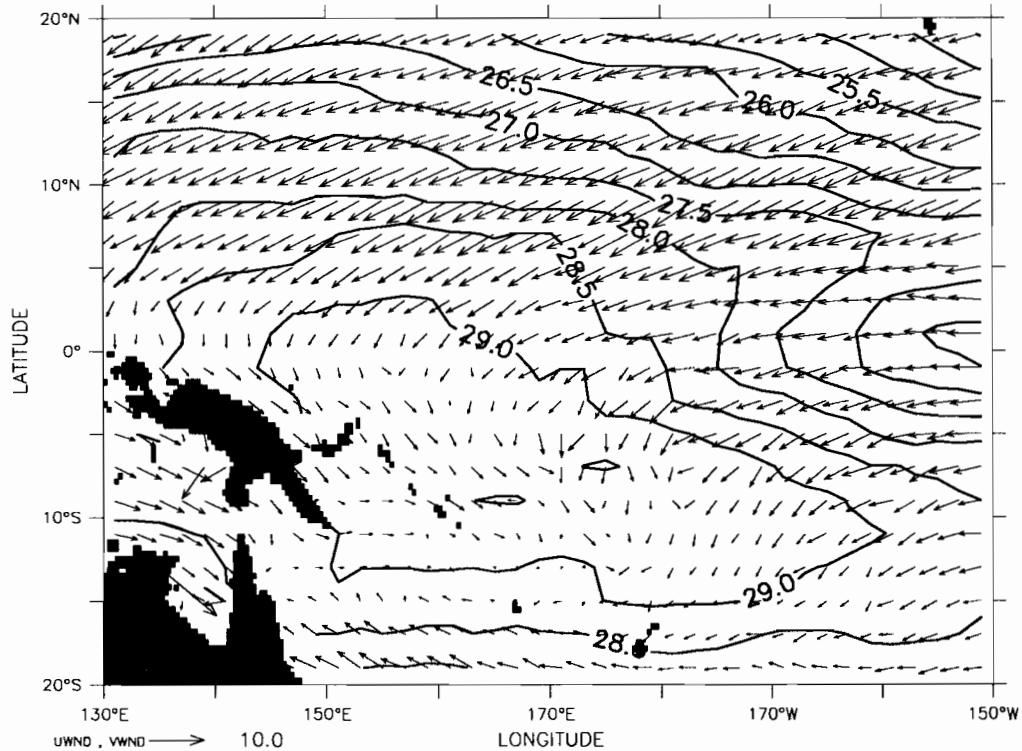
COADS Monthly Climatology (1946-1989)



Sea Surface Temperature (deg C)

TIME : FEB

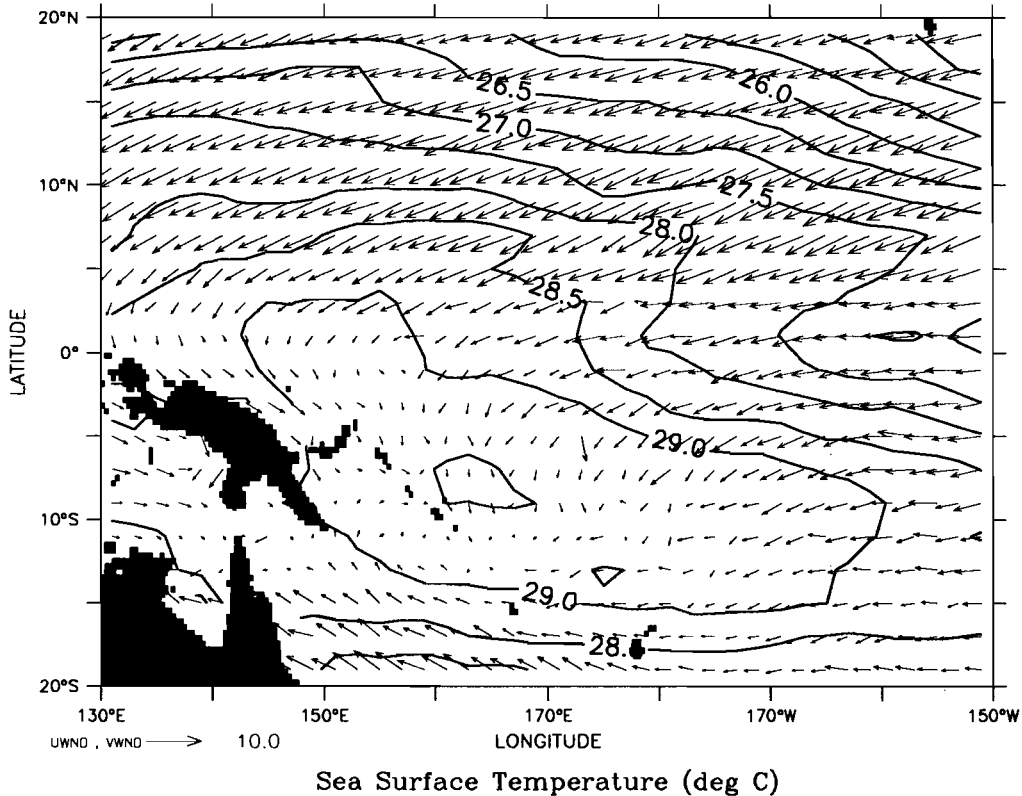
COADS Monthly Climatology (1946-1989)



Sea Surface Temperature (deg C)

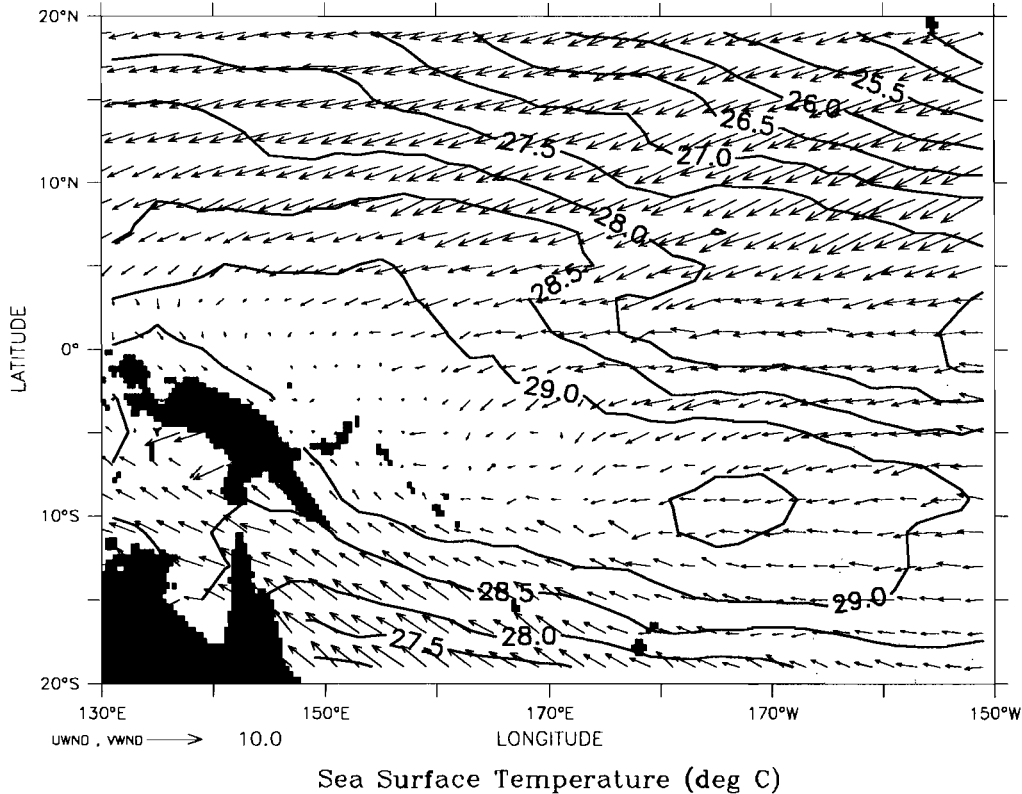
TIME : MAR

COADS Monthly Climatology (1946-1989)



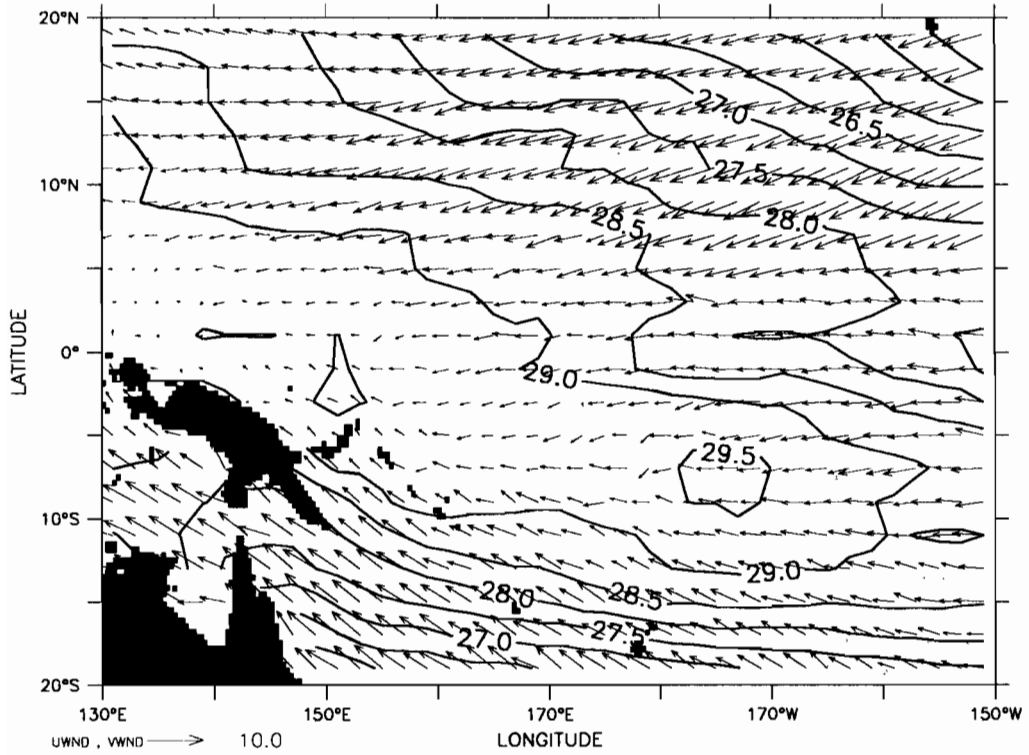
TIME : APR

COADS Monthly Climatology (1946-1989)



TIME : MAY

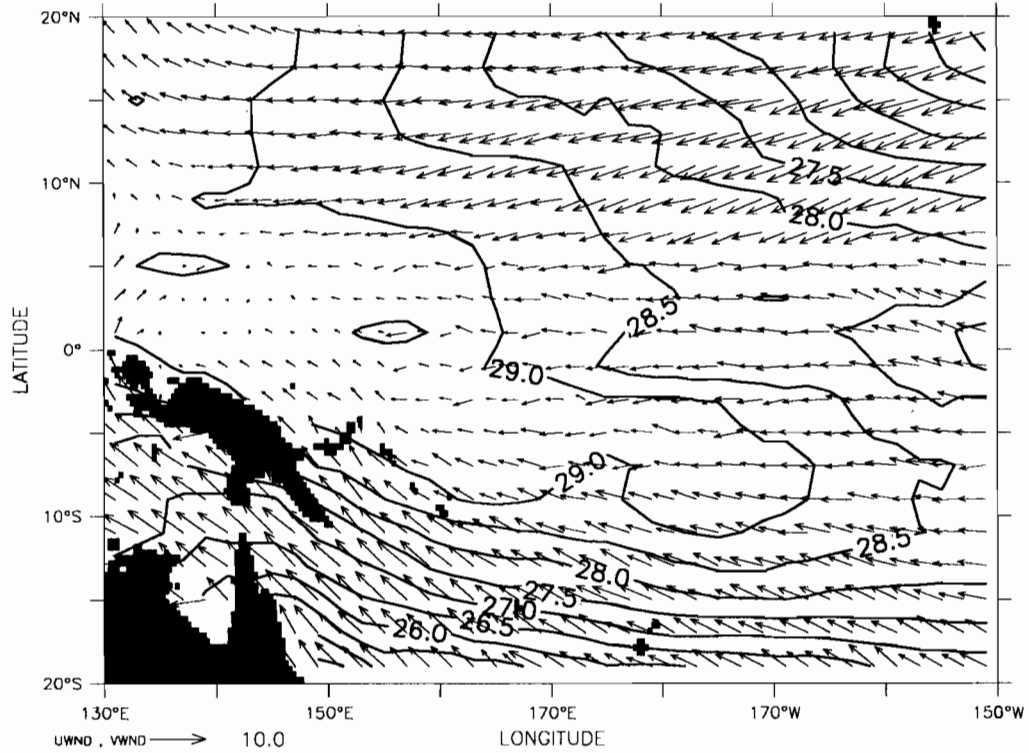
COADS Monthly Climatology (1946-1989)



Sea Surface Temperature (deg C)

TIME : JUN

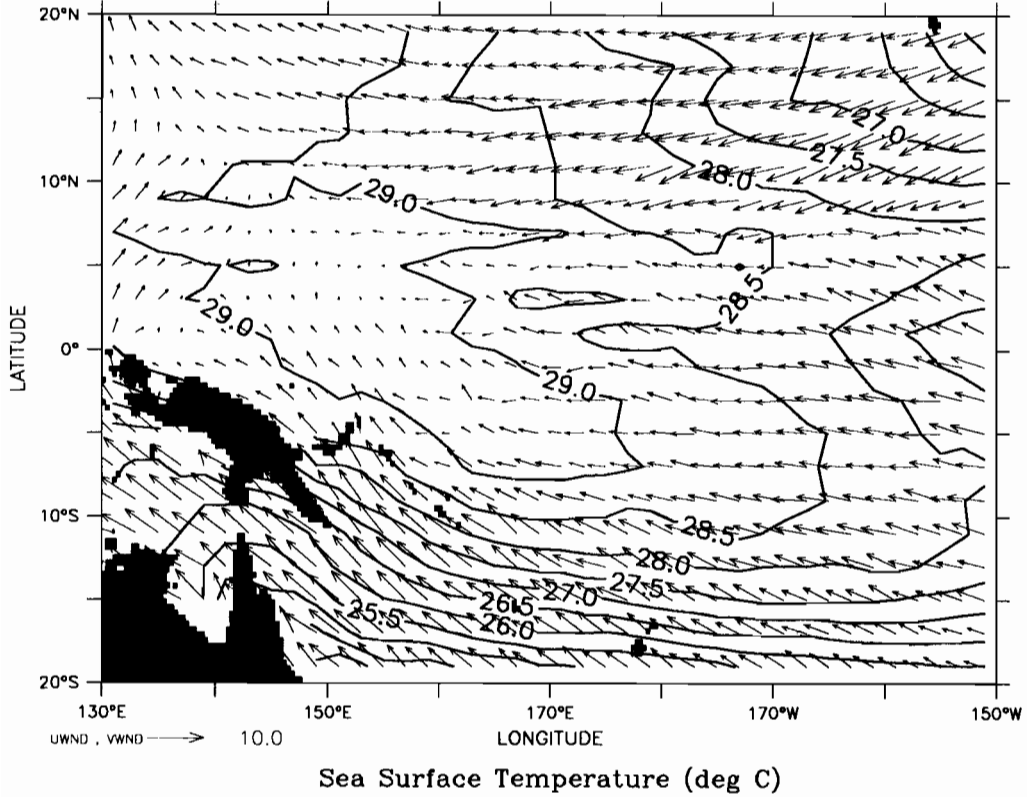
COADS Monthly Climatology (1946-1989)



Sea Surface Temperature (deg C)

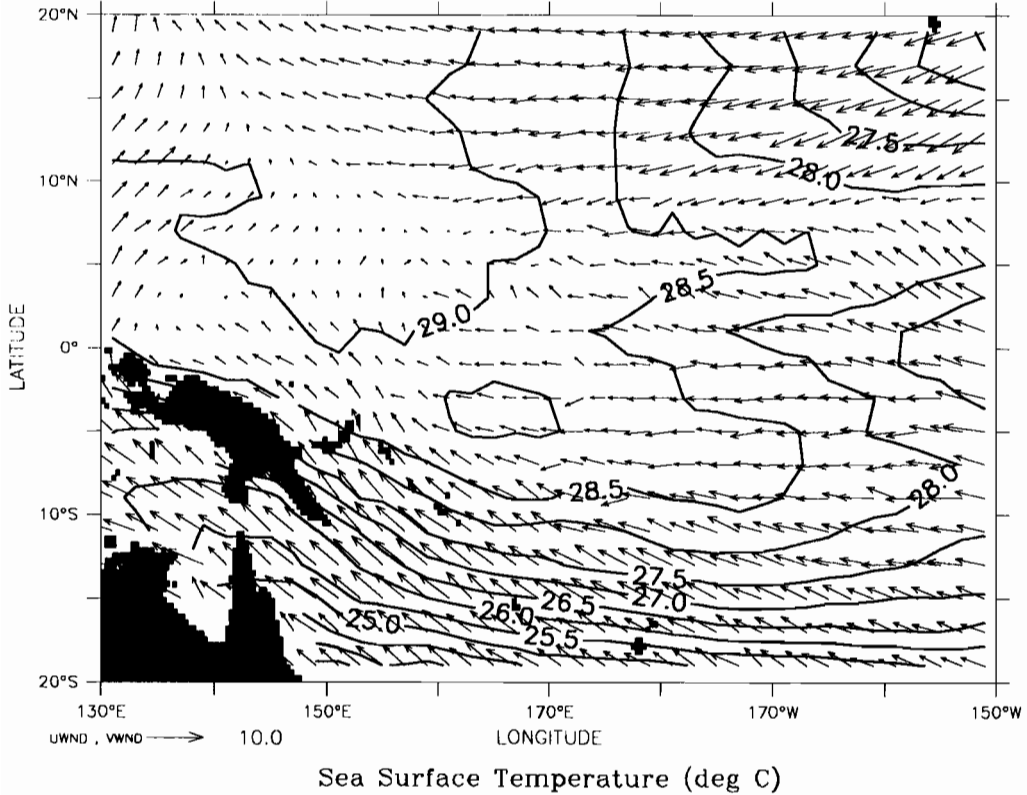
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COADS Monthly Climatology (1946-1989)



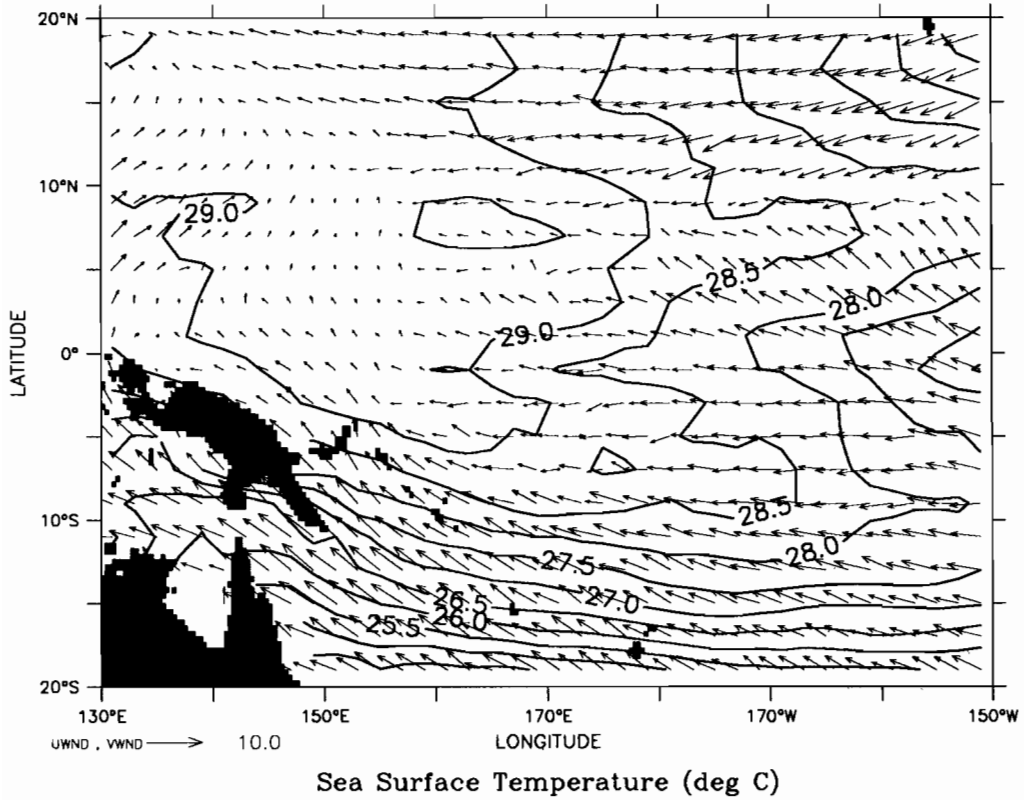
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COADS Monthly Climatology (1946-1989)



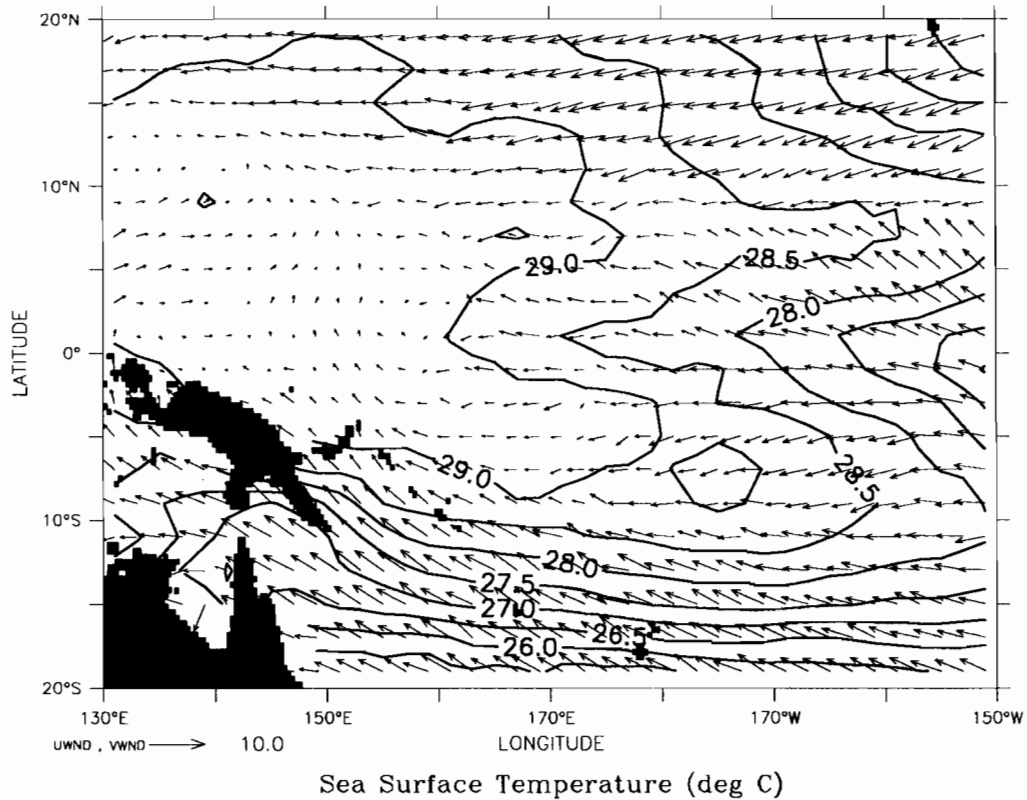
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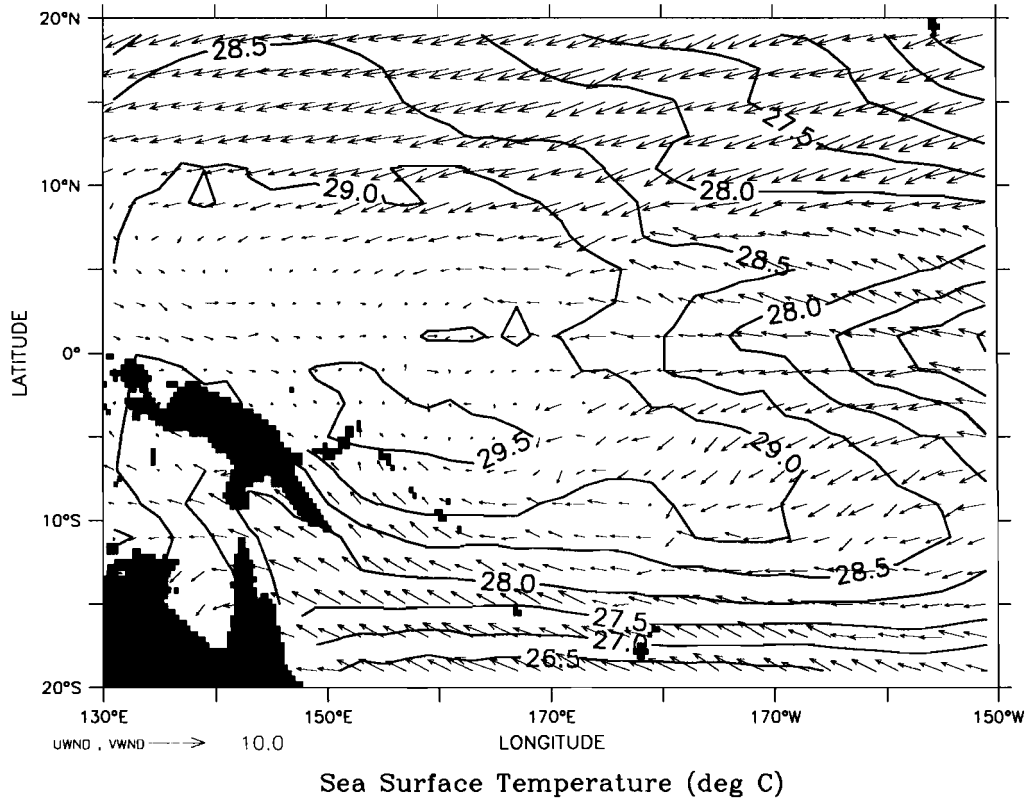
TIME : OCT

COADS Monthly Climatology (1946-1989)



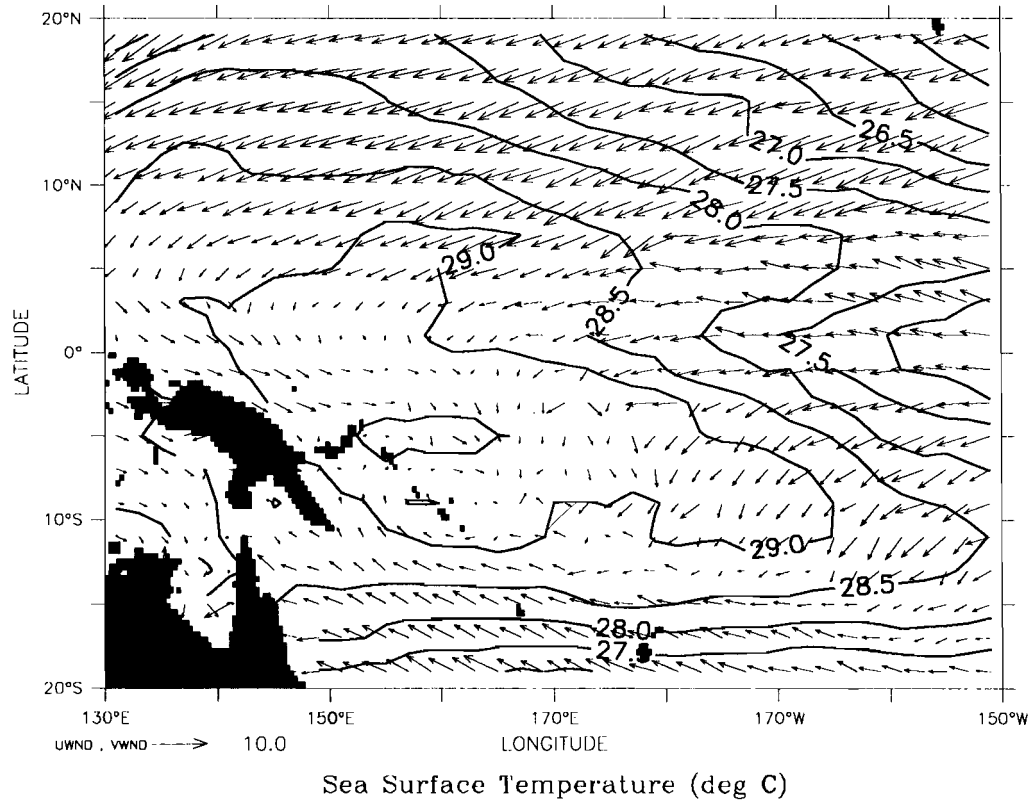
TIME : NOV

COADS Monthly Climatology (1946-1989)



TIME : DEC

COADS Monthly Climatology (1946-1989)



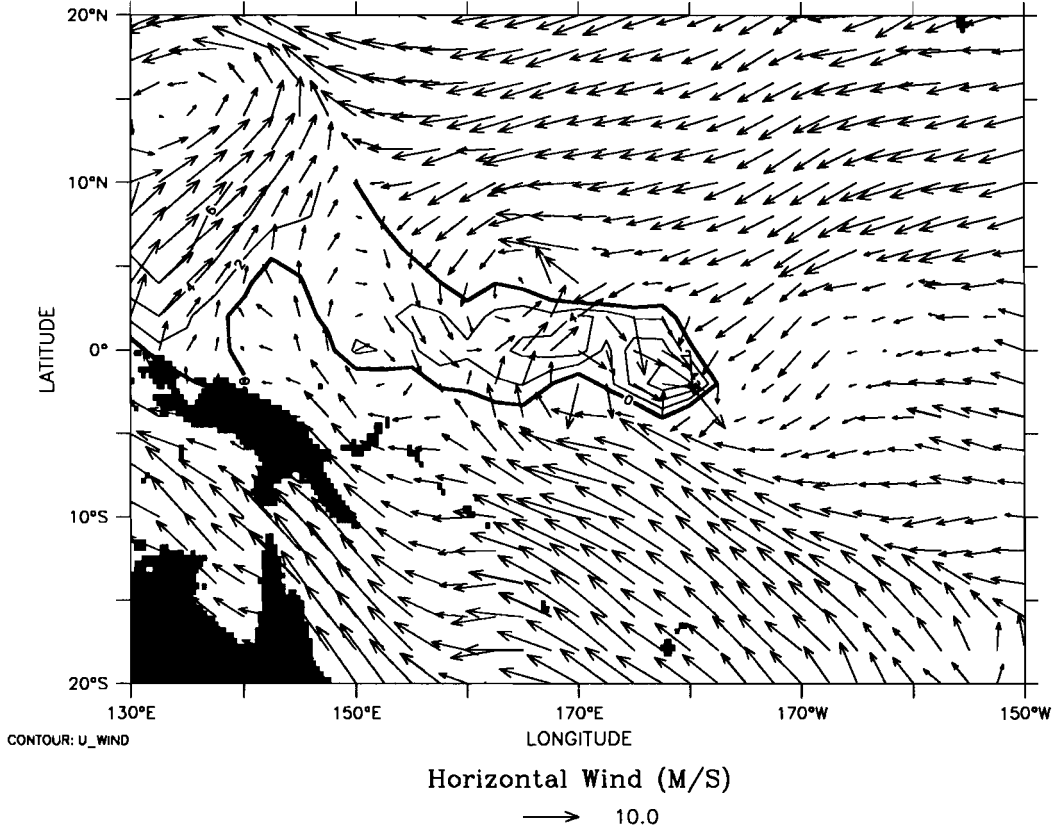




Figs. 15- . Snapshots of the 6-hourly wind analysis from a blending of the ECMWF surface wind analysis and the SSM/I wind speed data set, based on the work of Atlas *et al.* (1991). One snapshot is shown from each day. Data gaps exist in the record; no figure is shown for times from data gaps. The major gap is between 3 December 1987 and 13 January 1988. Westerly surface zonal wind, in the area between 10°N and 10°S is contoured.

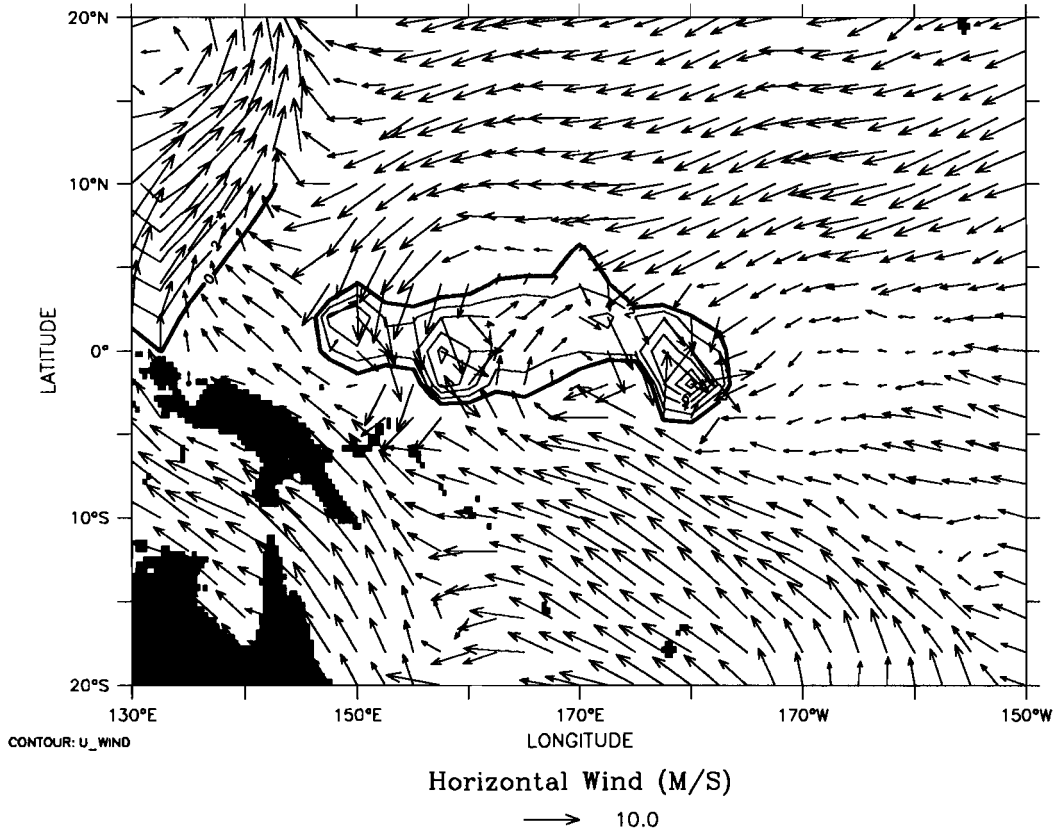
TIME : 09-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



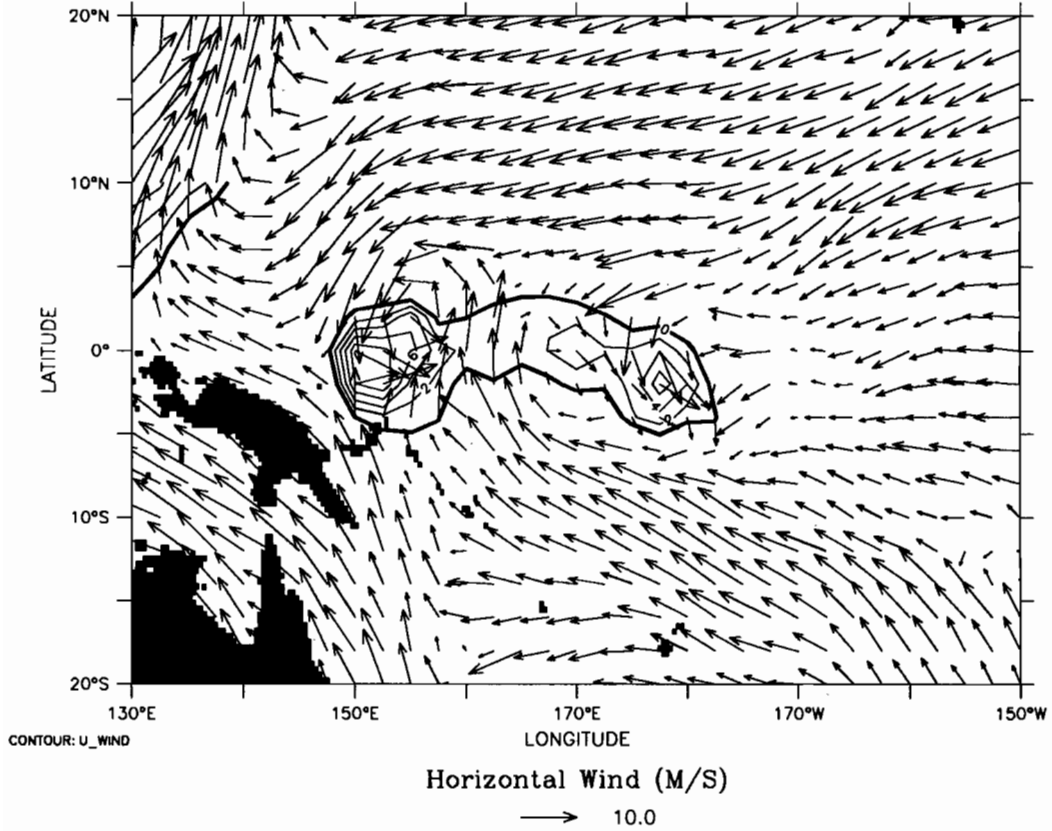
TIME : 10-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



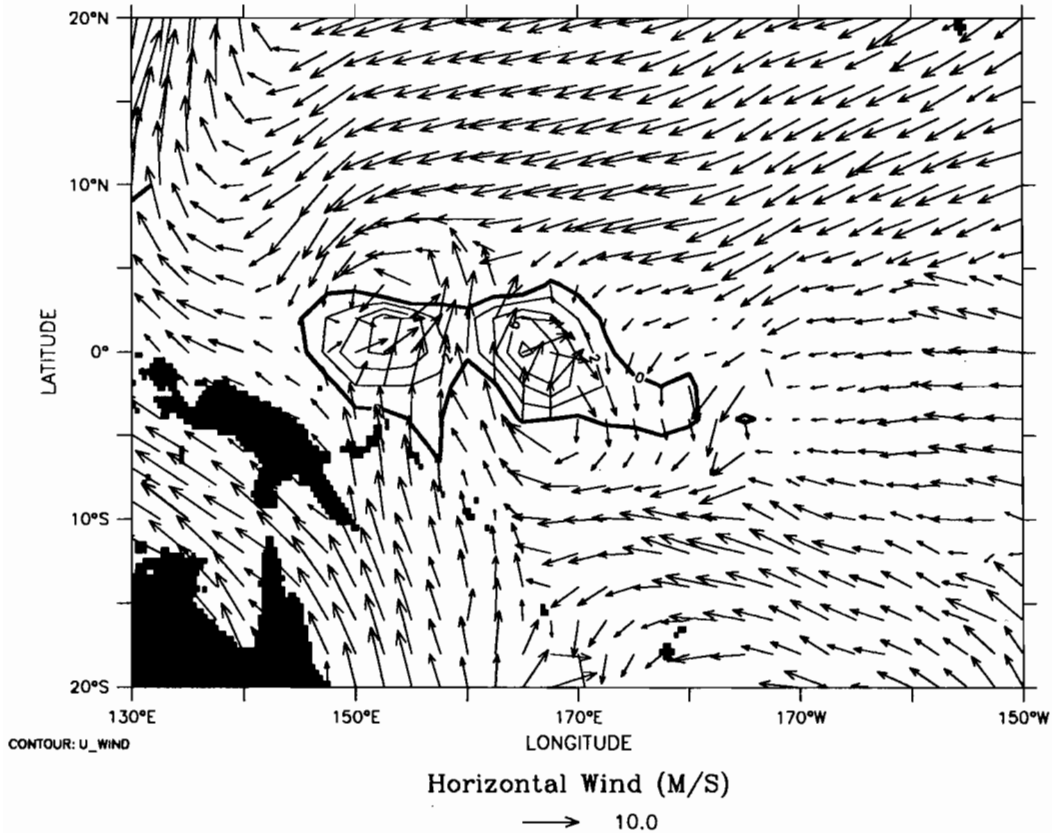
TIME : 11-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



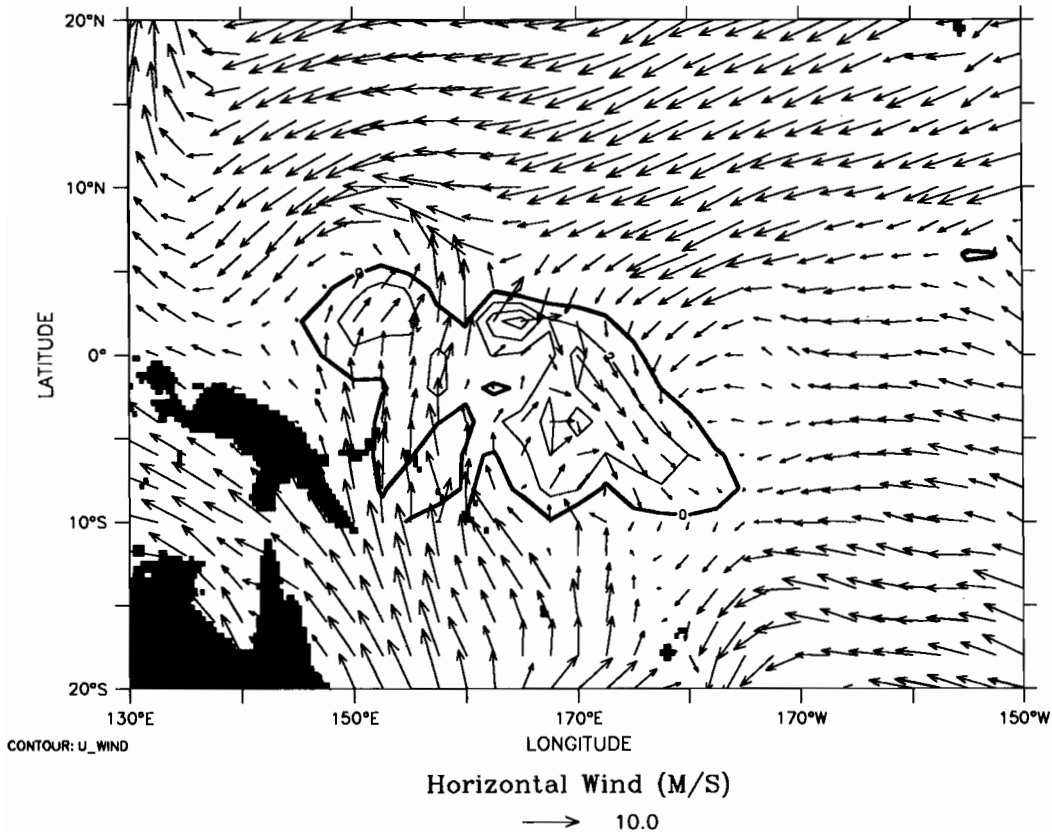
TIME : 12-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



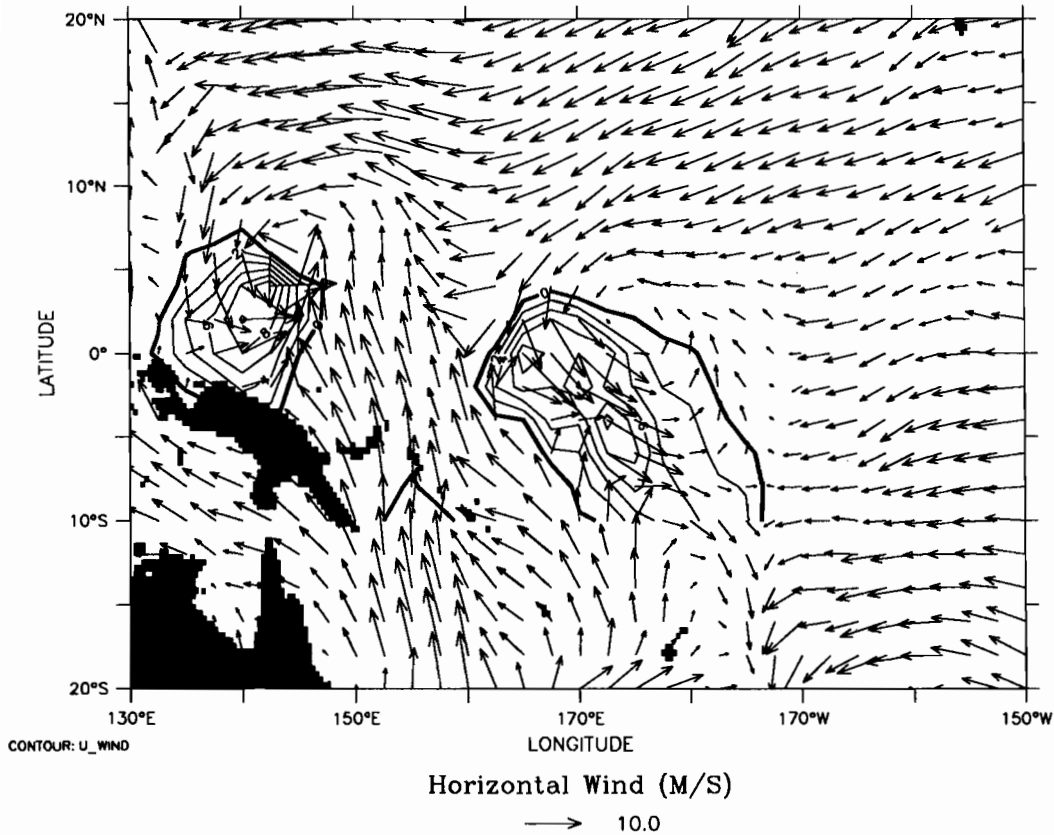
TIME : 13-JUL-1987 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



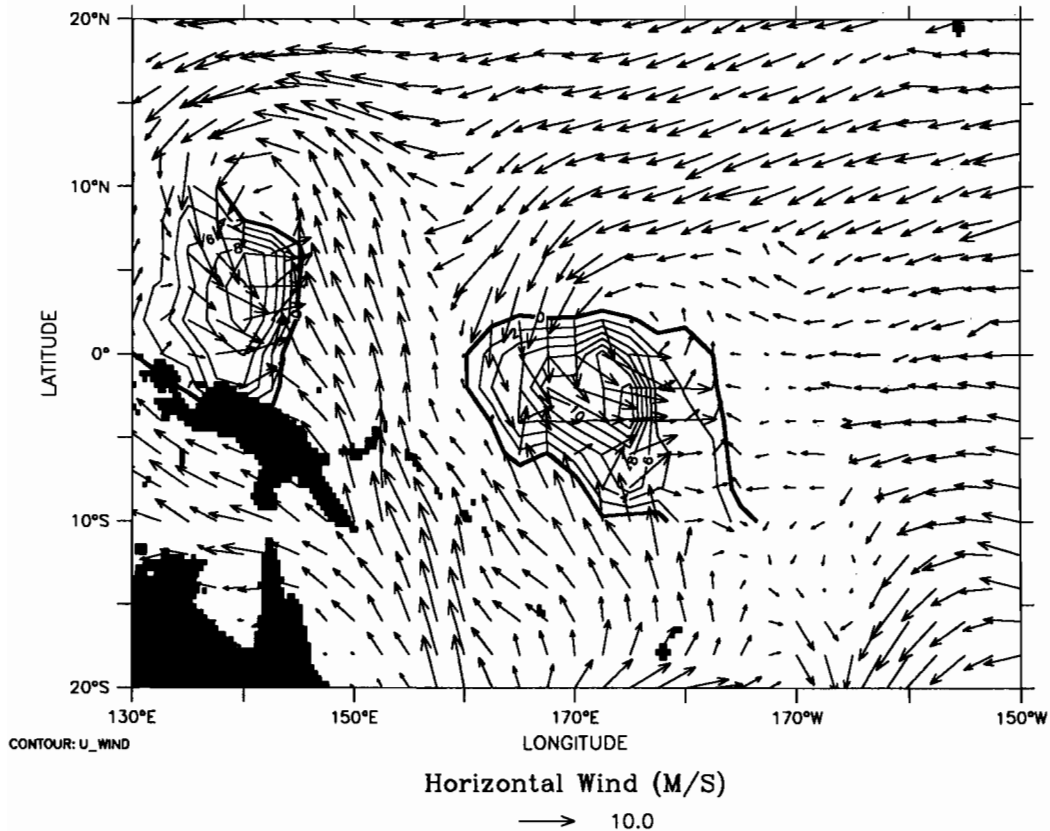
TIME : 14-JUL-1987 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



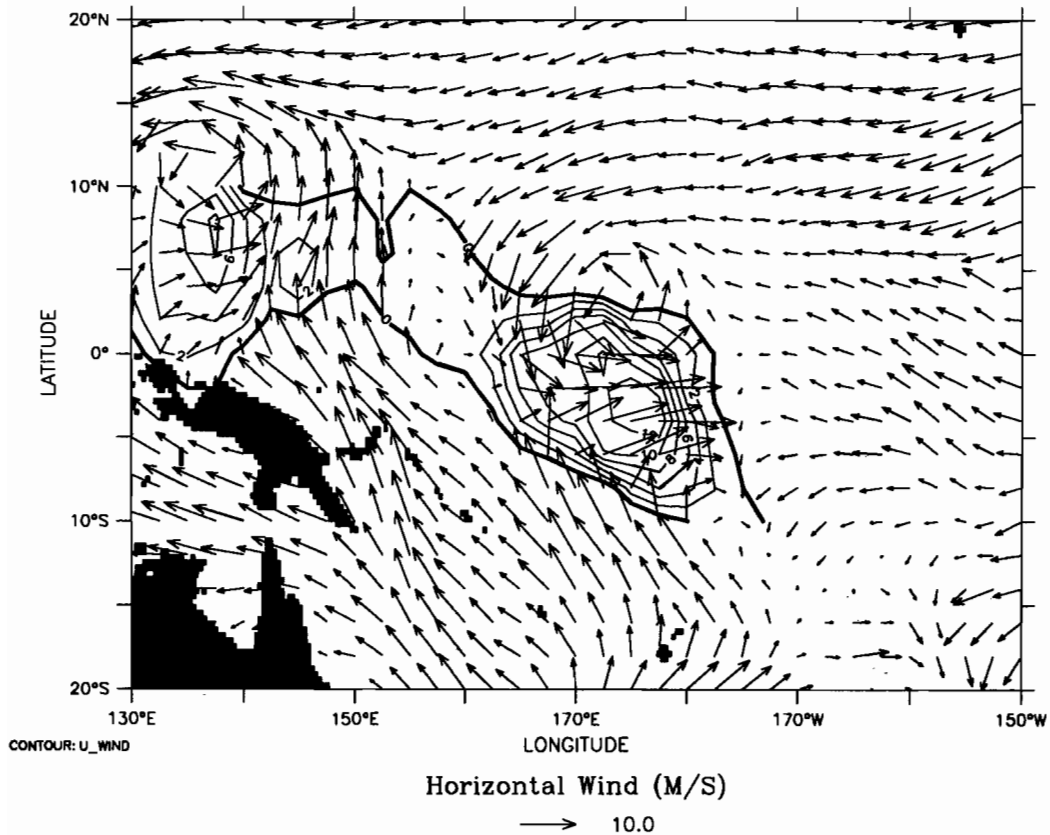
TIME : 15-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



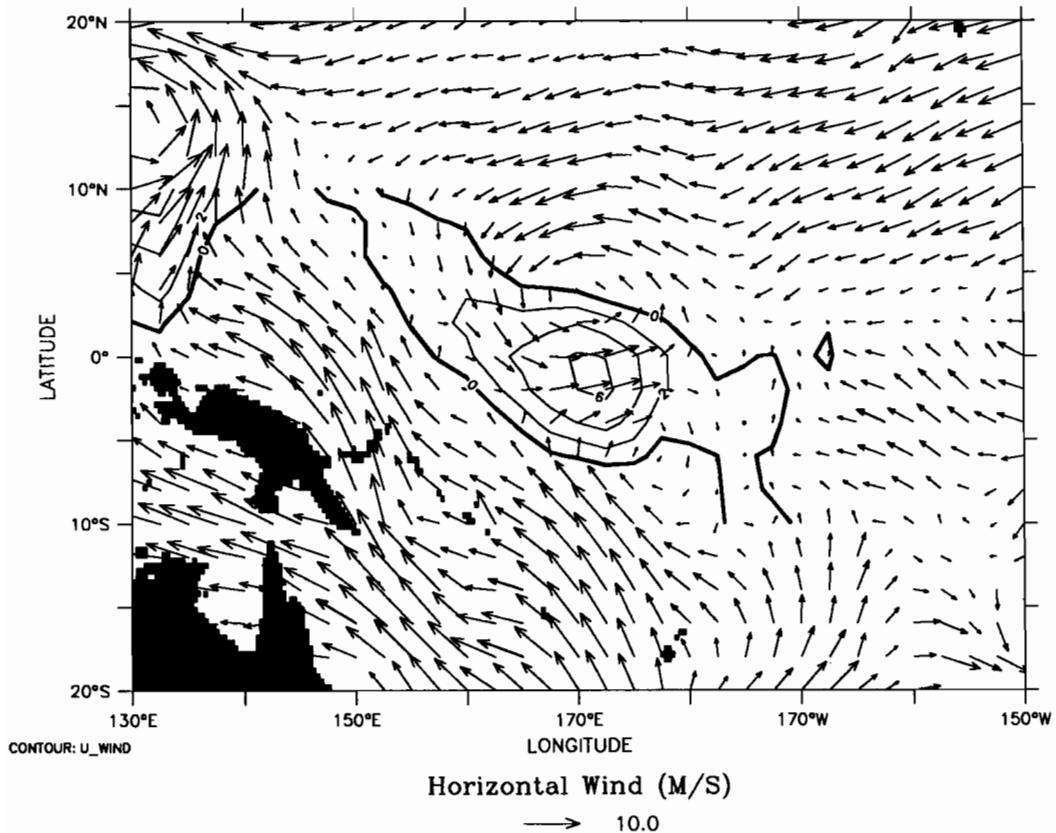
TIME : 16-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



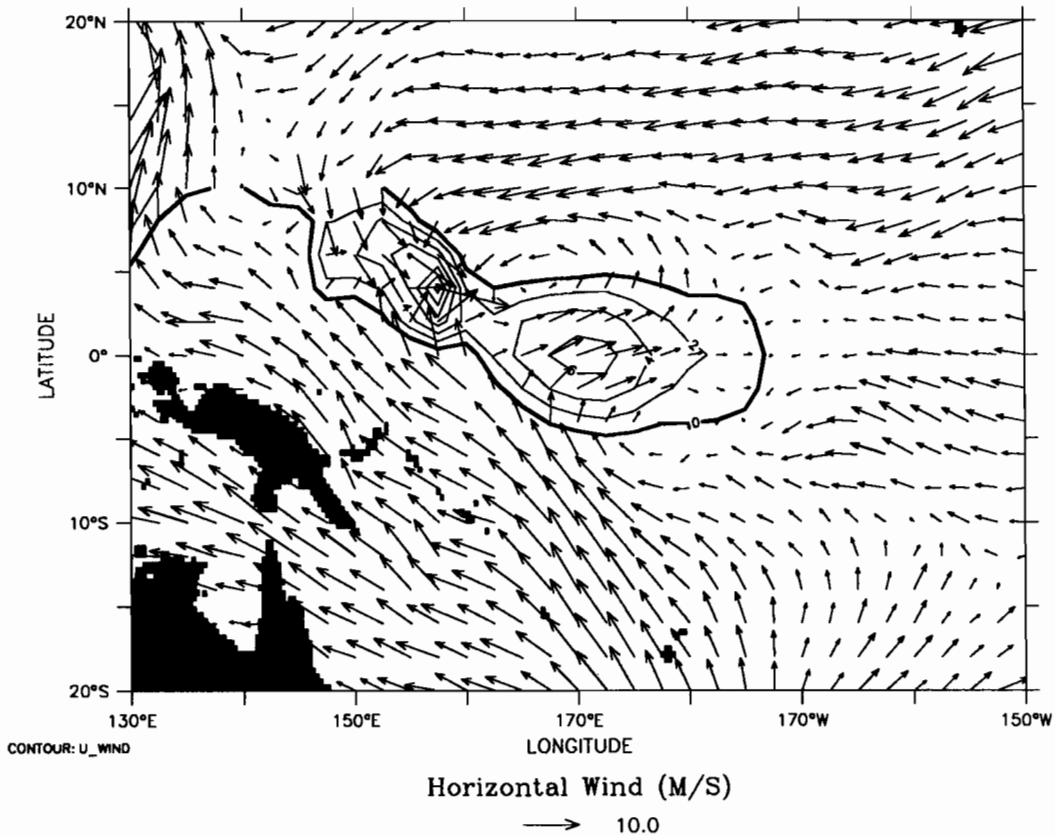
TIME : 17-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



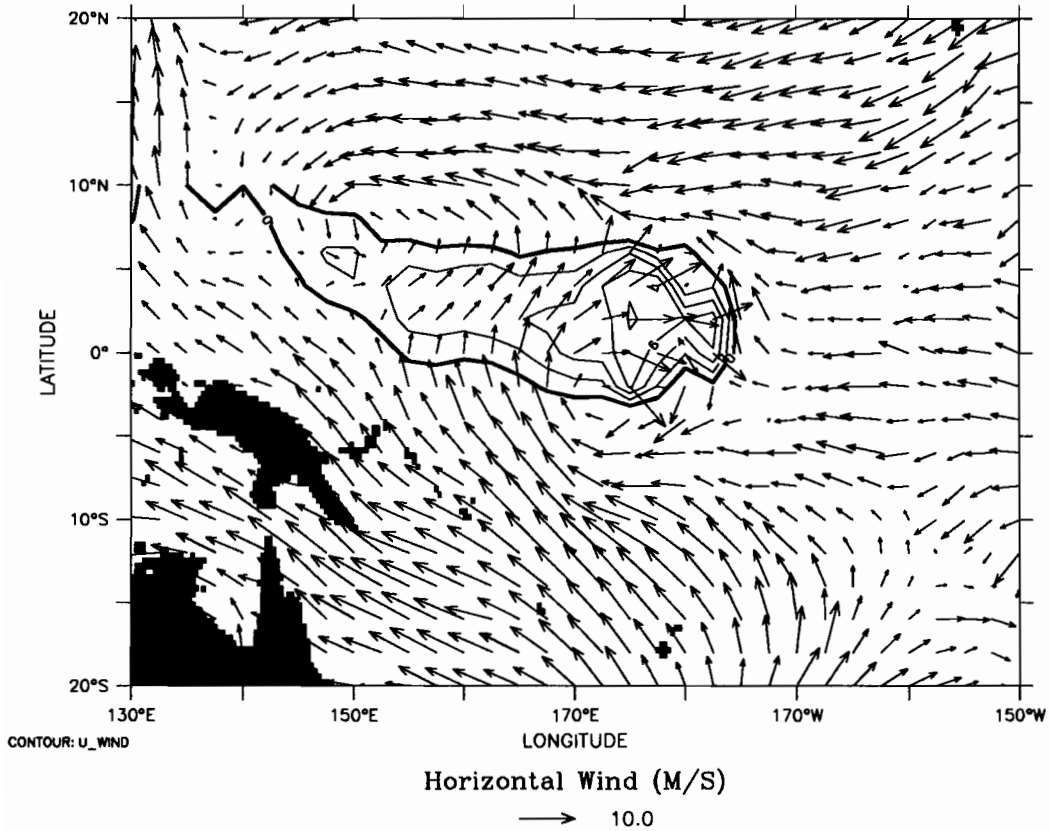
TIME : 18-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



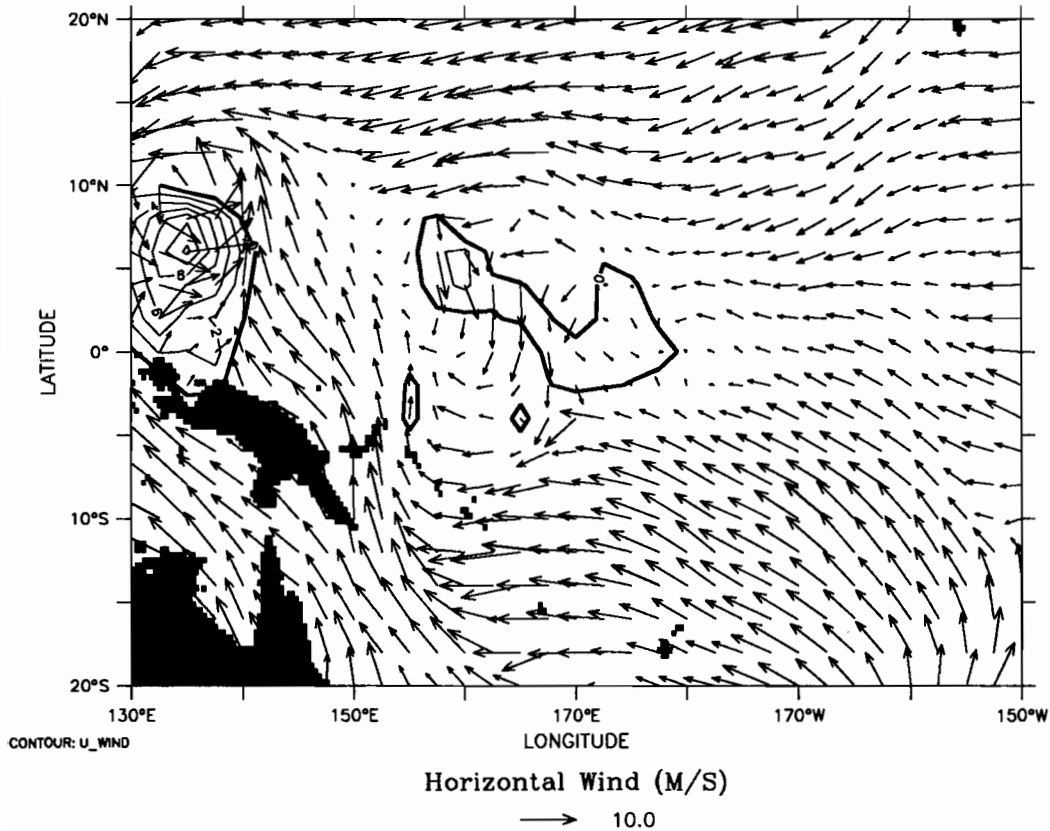
TIME : 19-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



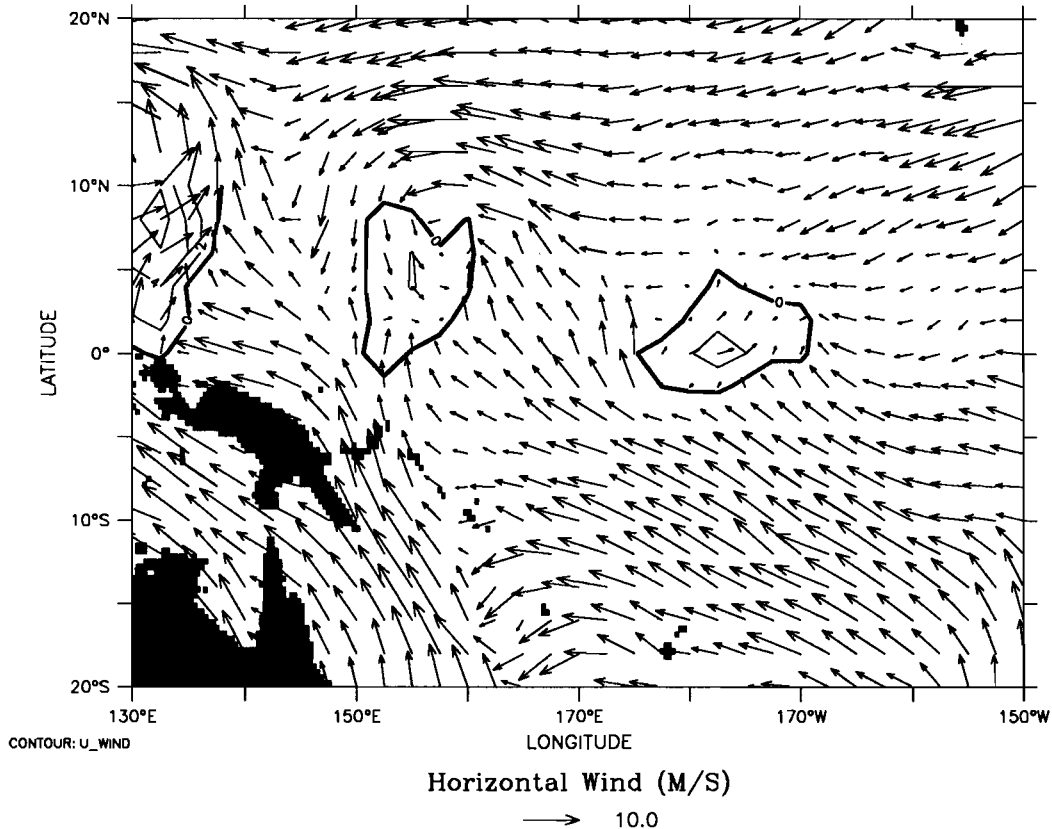
TIME : 22-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



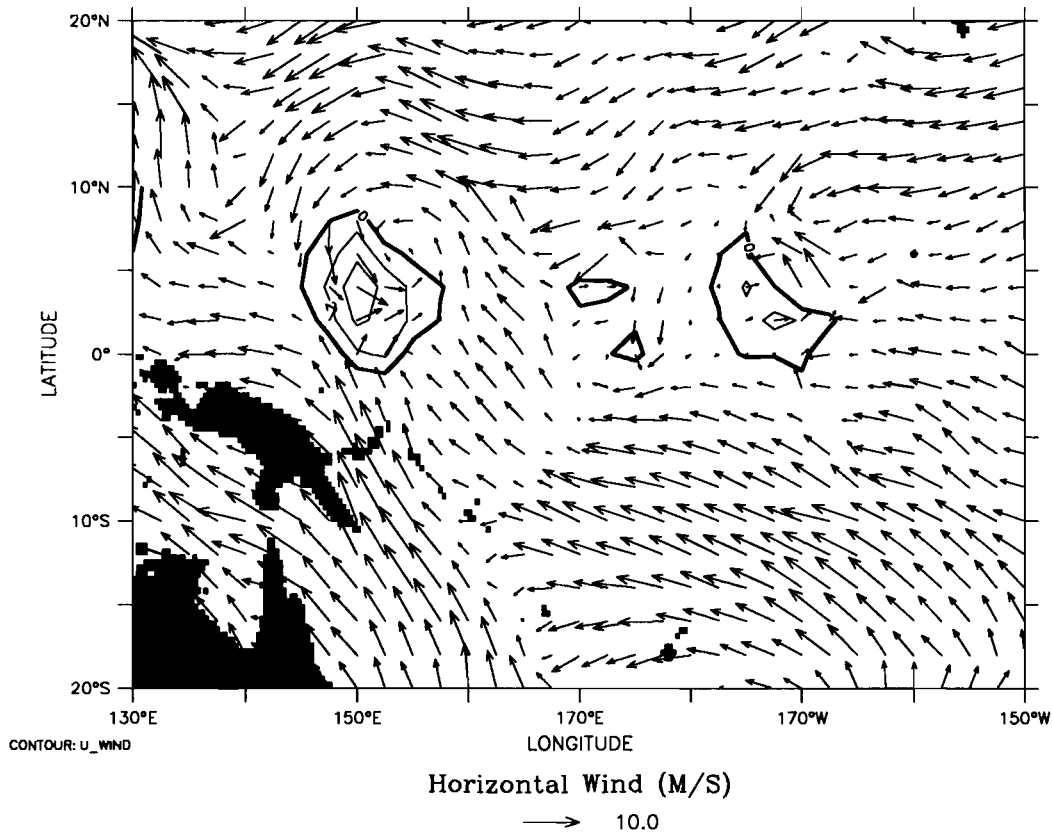
TIME : 23-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 24-JUL-1987 18:00

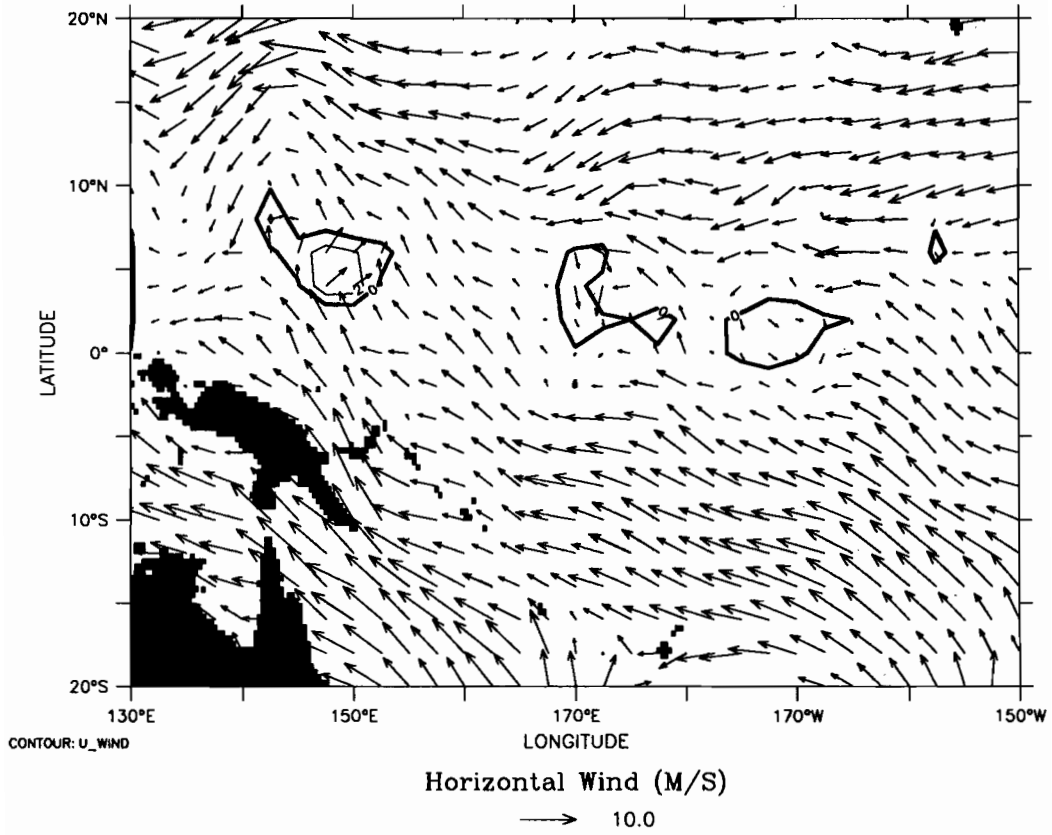
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





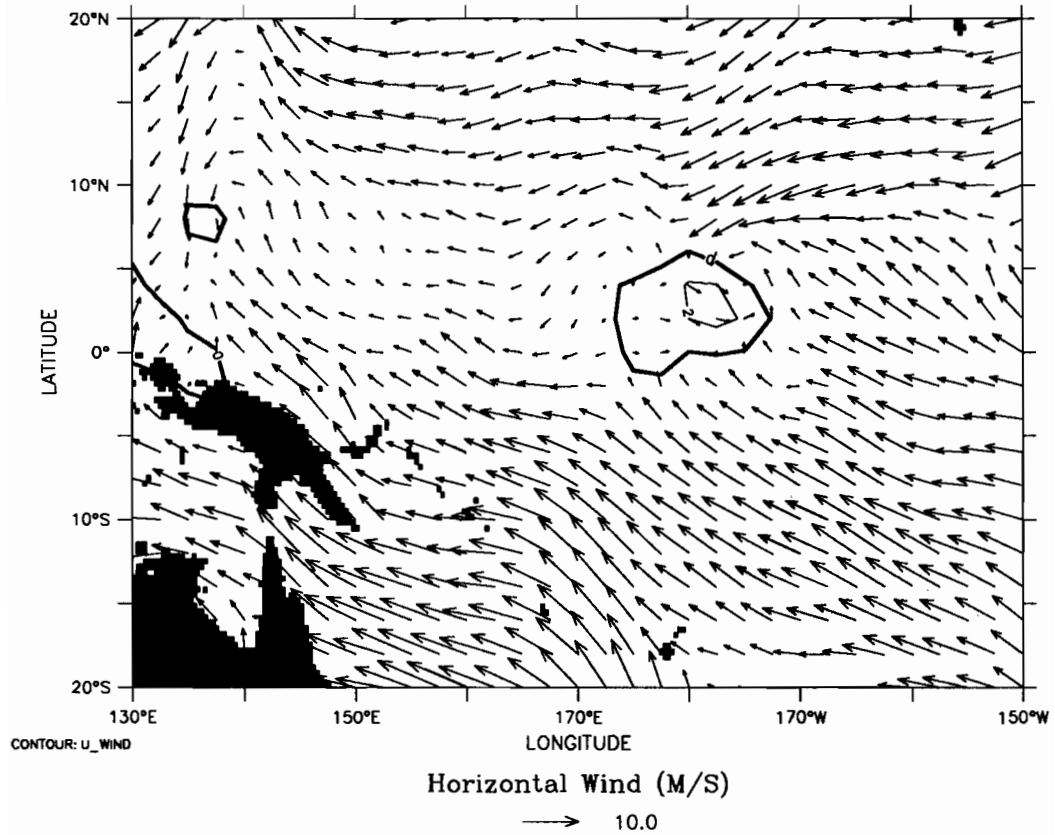
TIME : 25-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



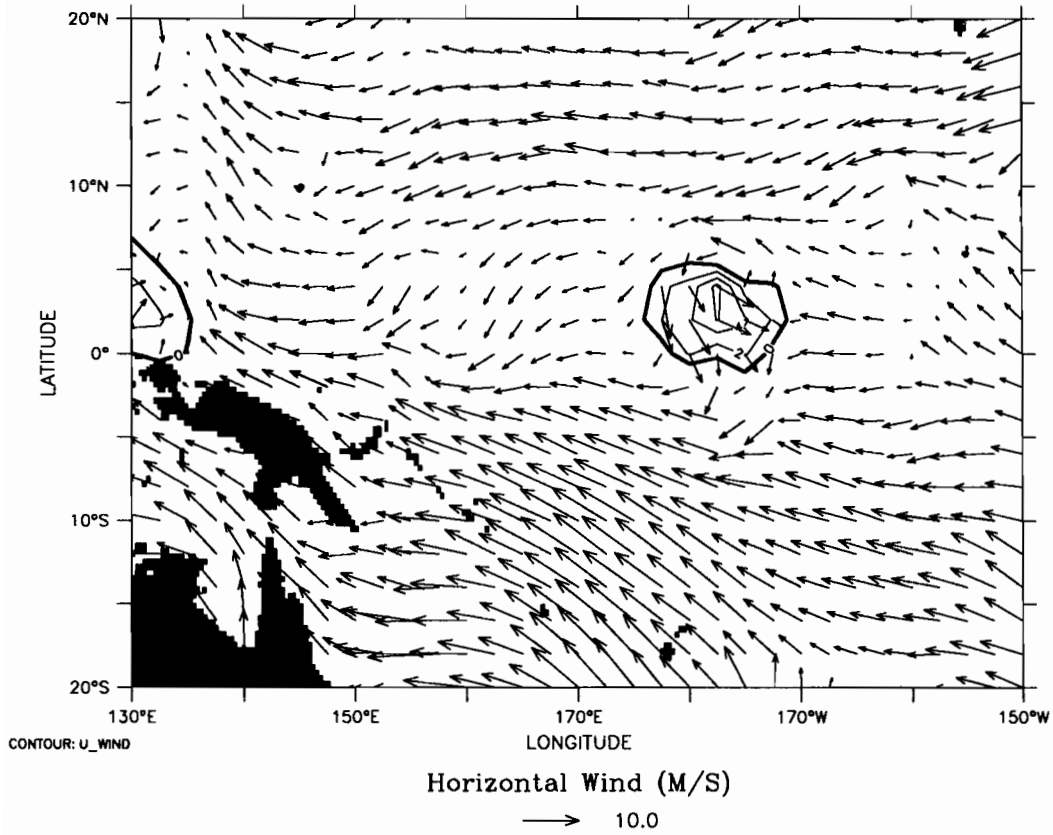
TIME : 26-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



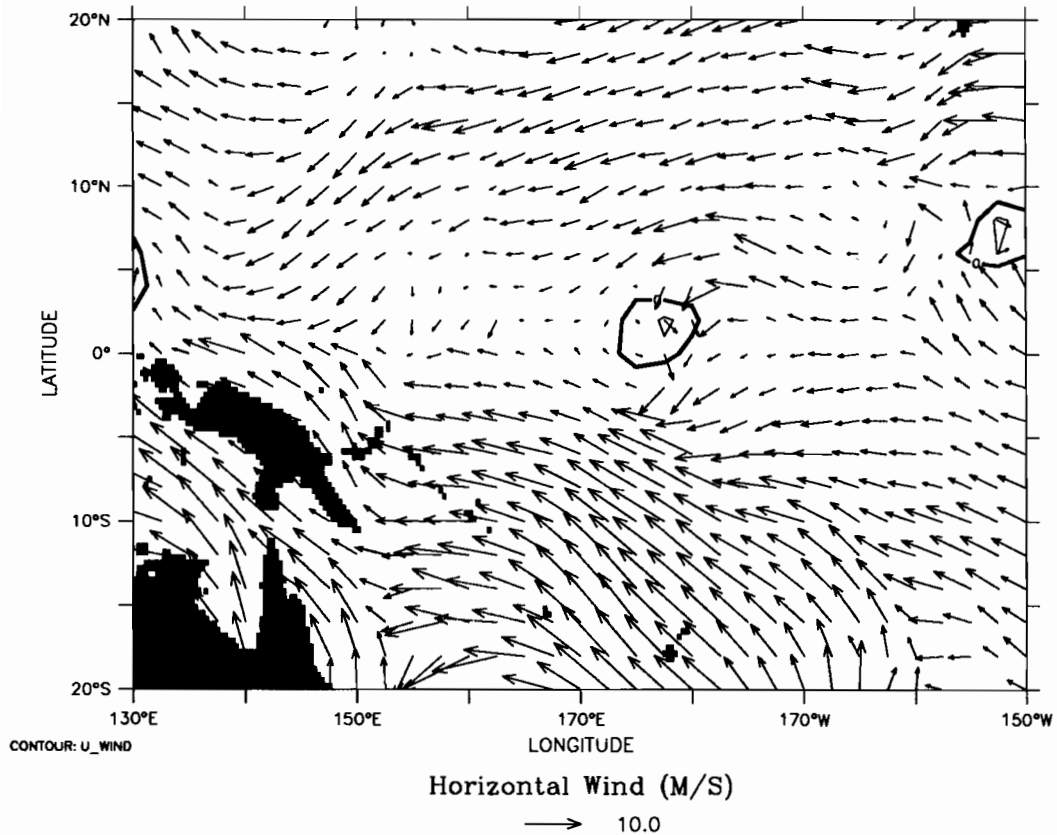
TIME : 27-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



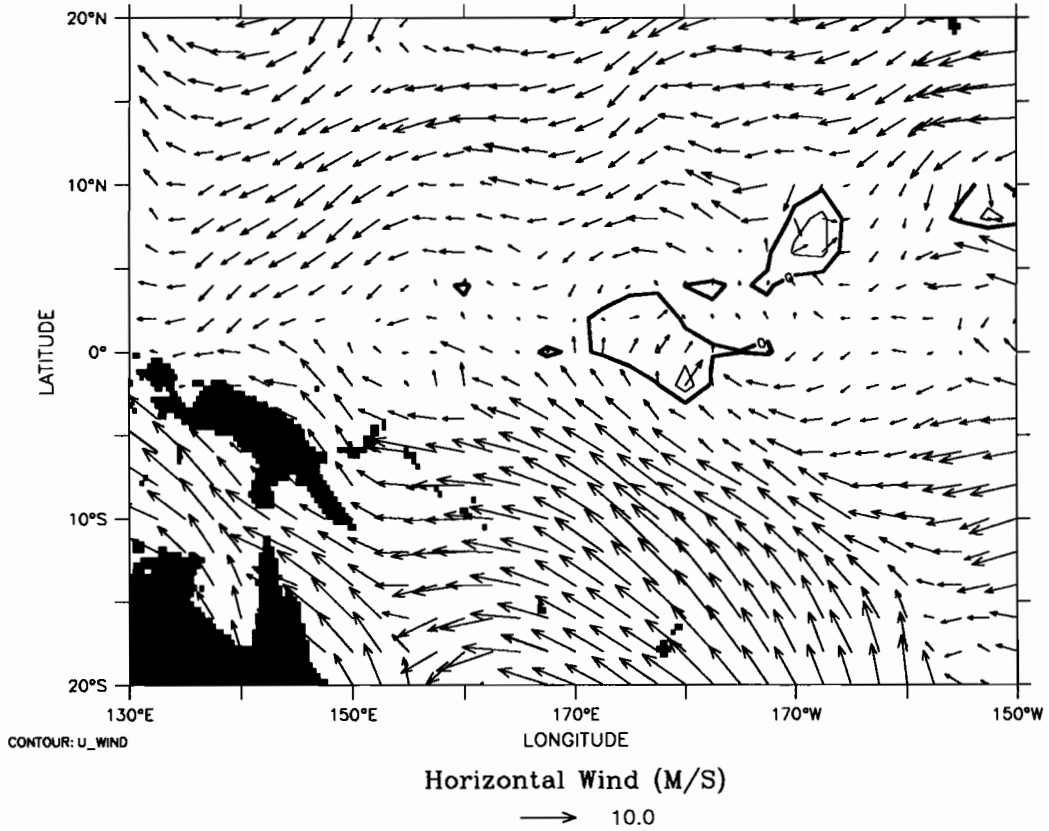
TIME : 28-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



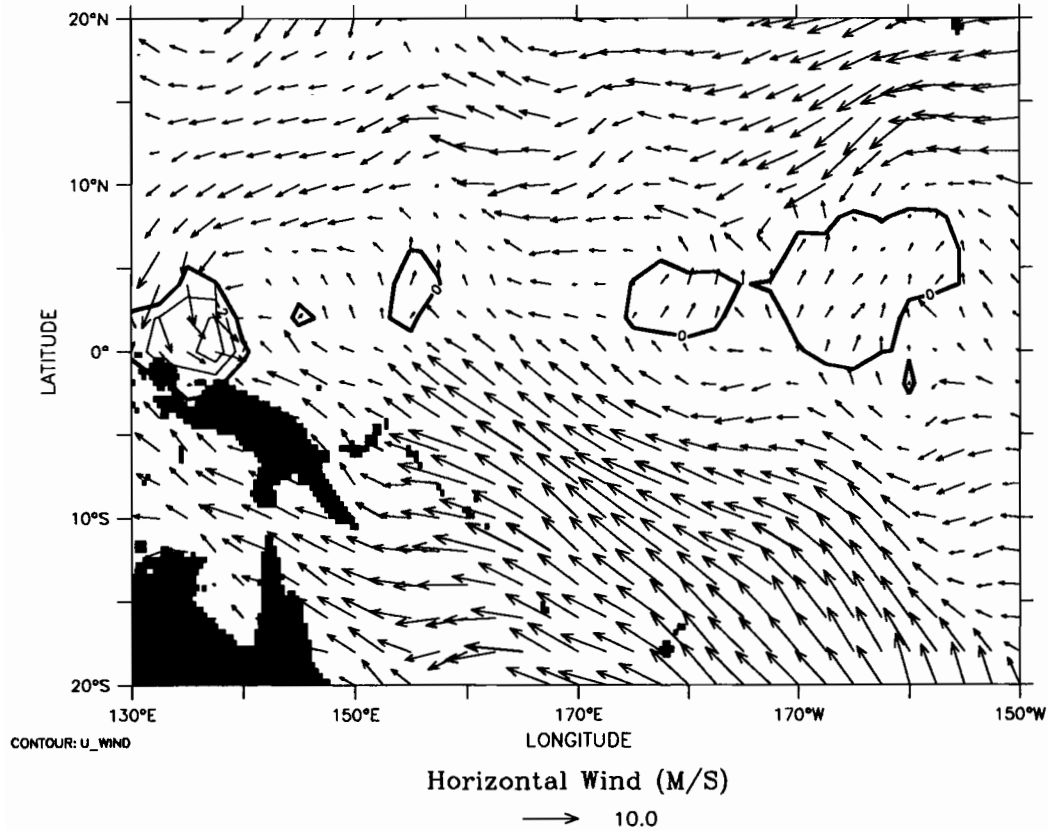
TIME : 29-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



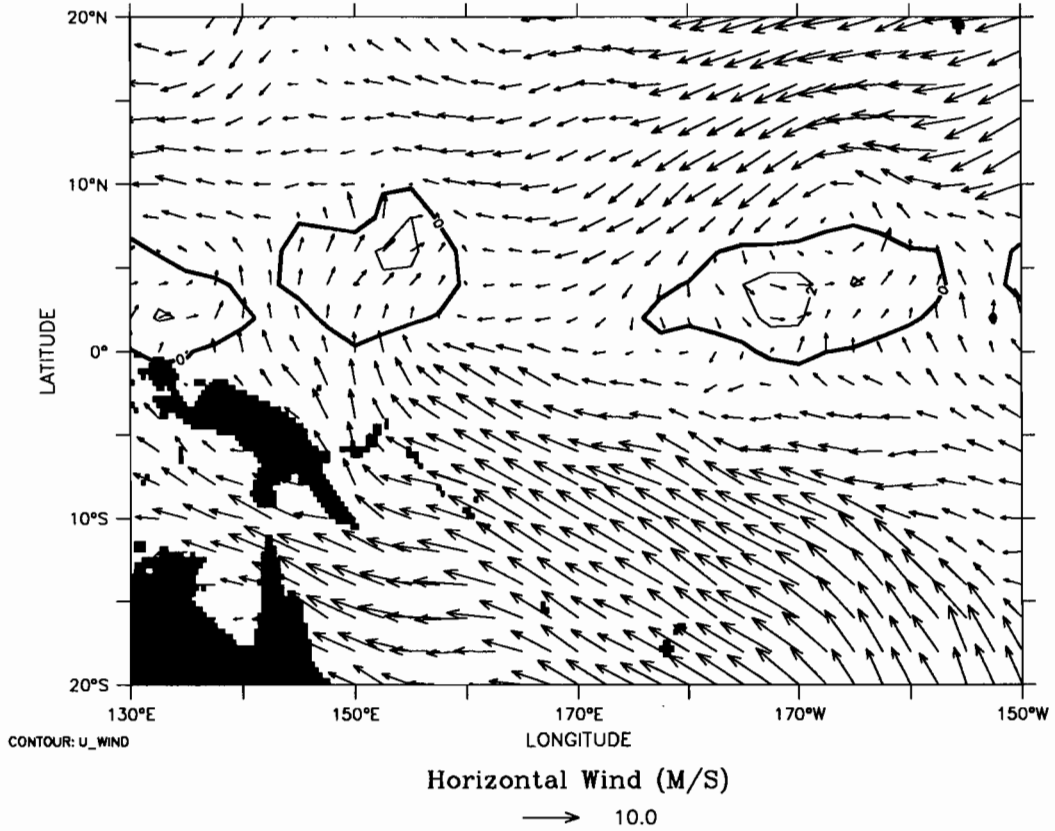
TIME : 30-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



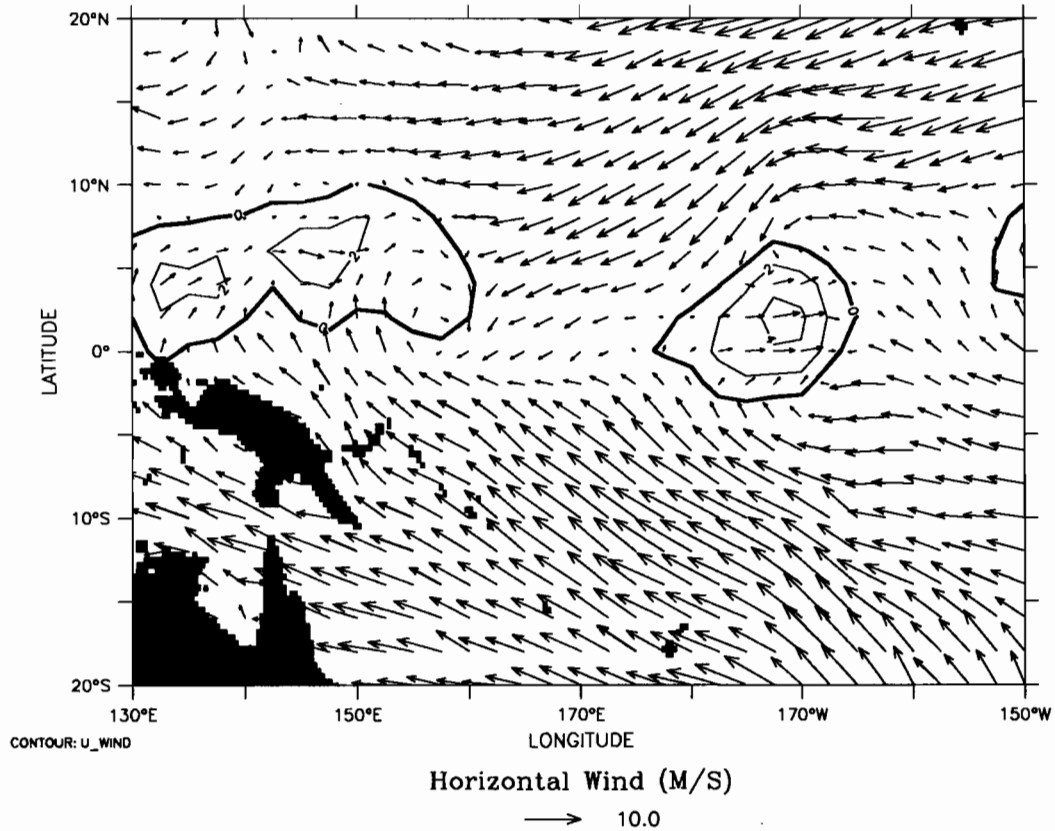
TIME : 31-JUL-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



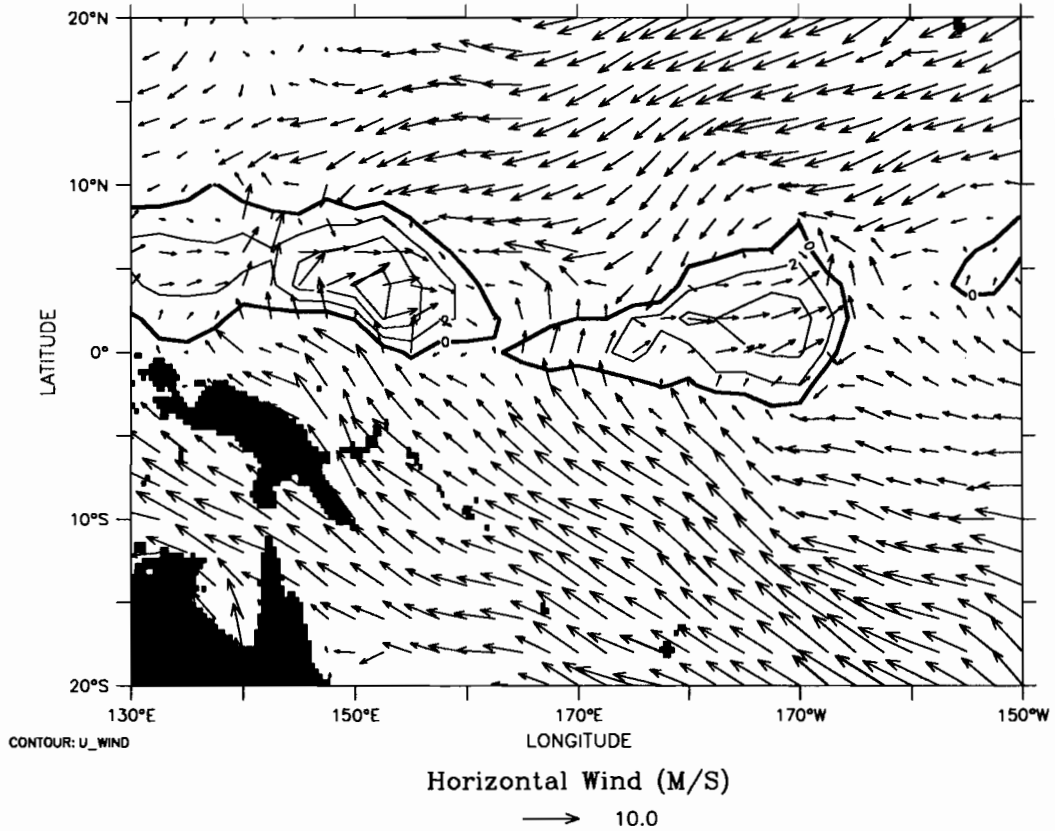
TIME : 01-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



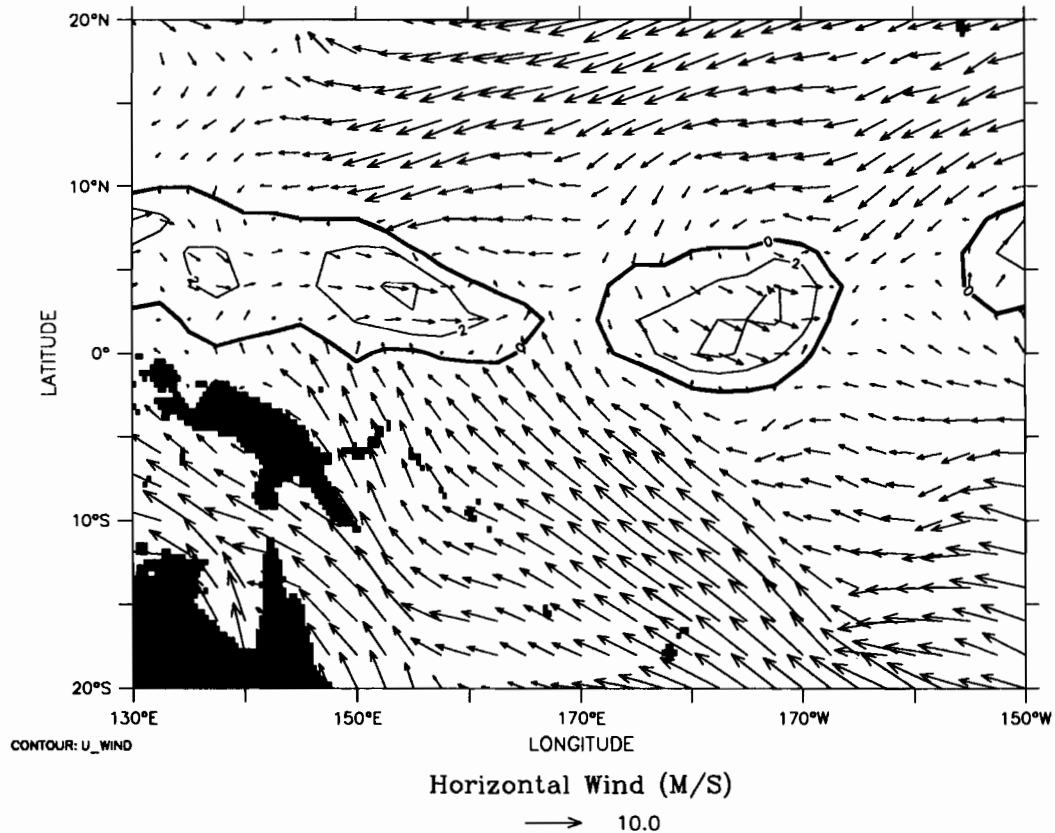
TIME : 02-AUG-1987 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



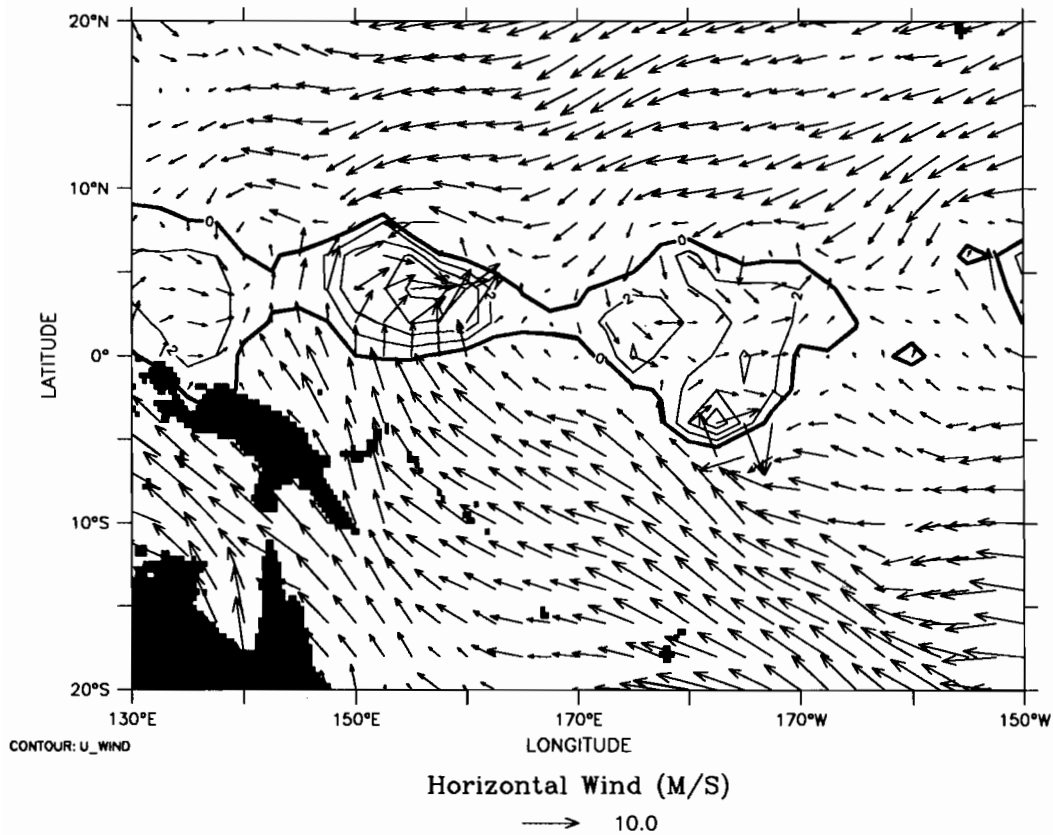
TIME : 03-AUG-1987 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



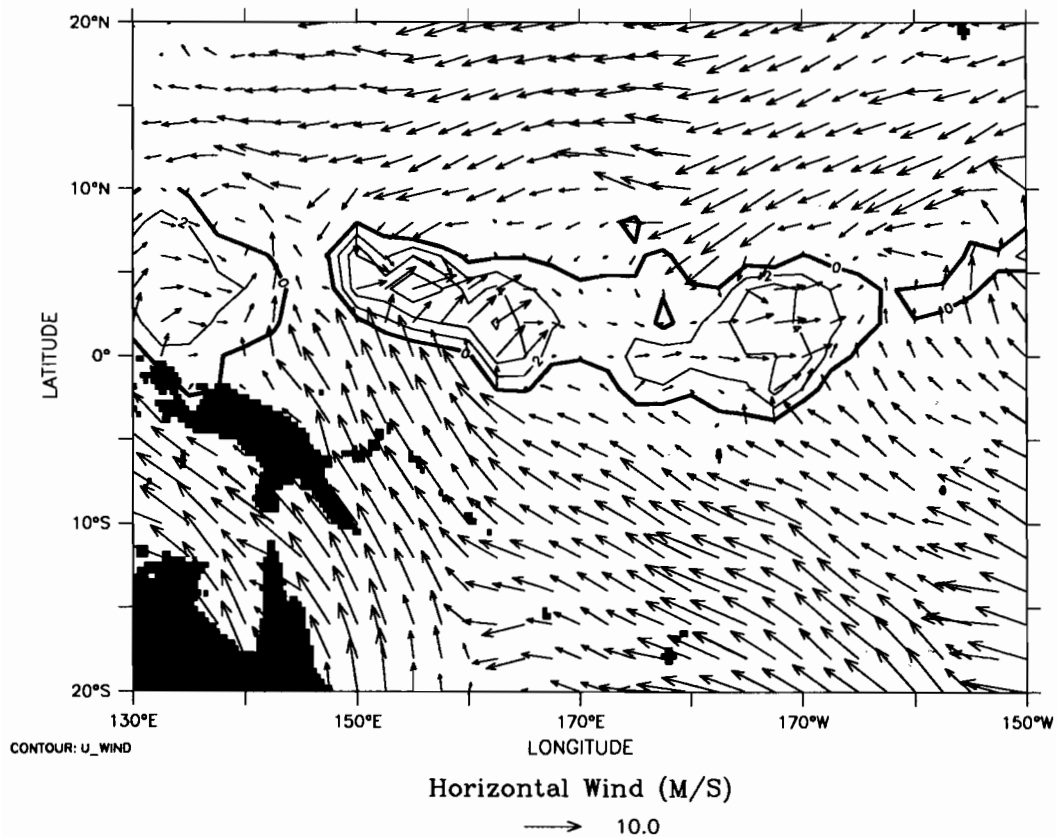
TIME : 04-AUG-1987 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



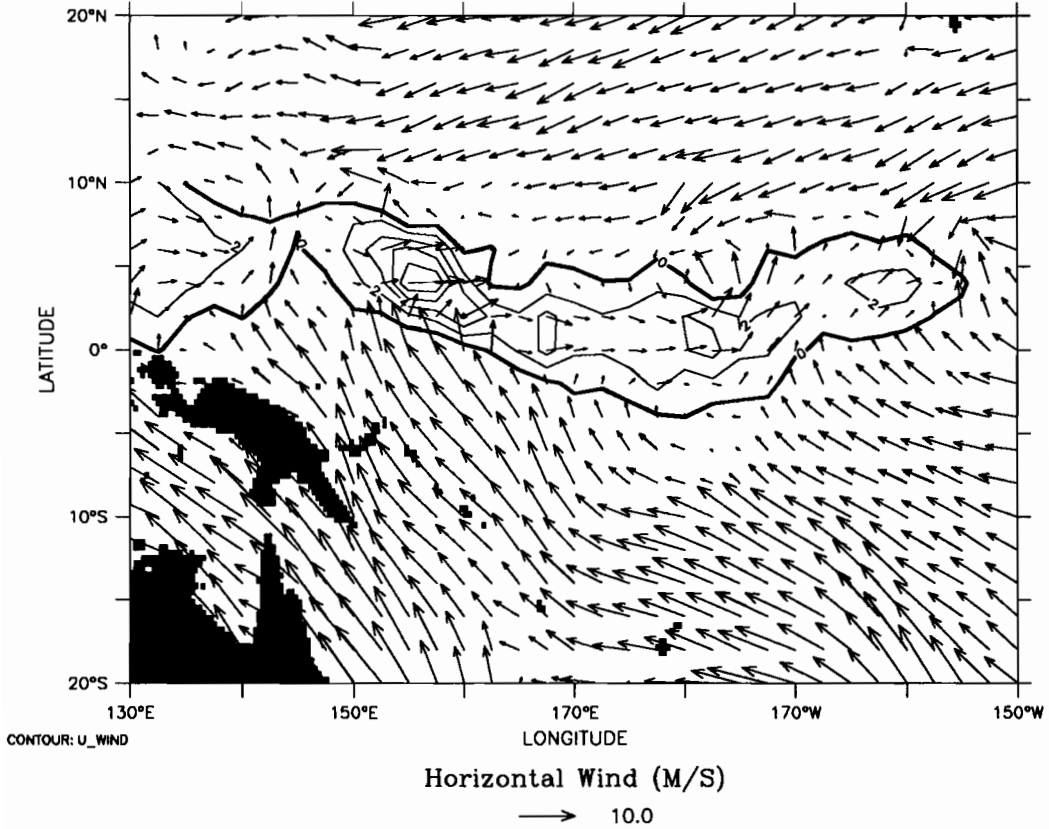
TIME : 05-AUG-1987 18:00

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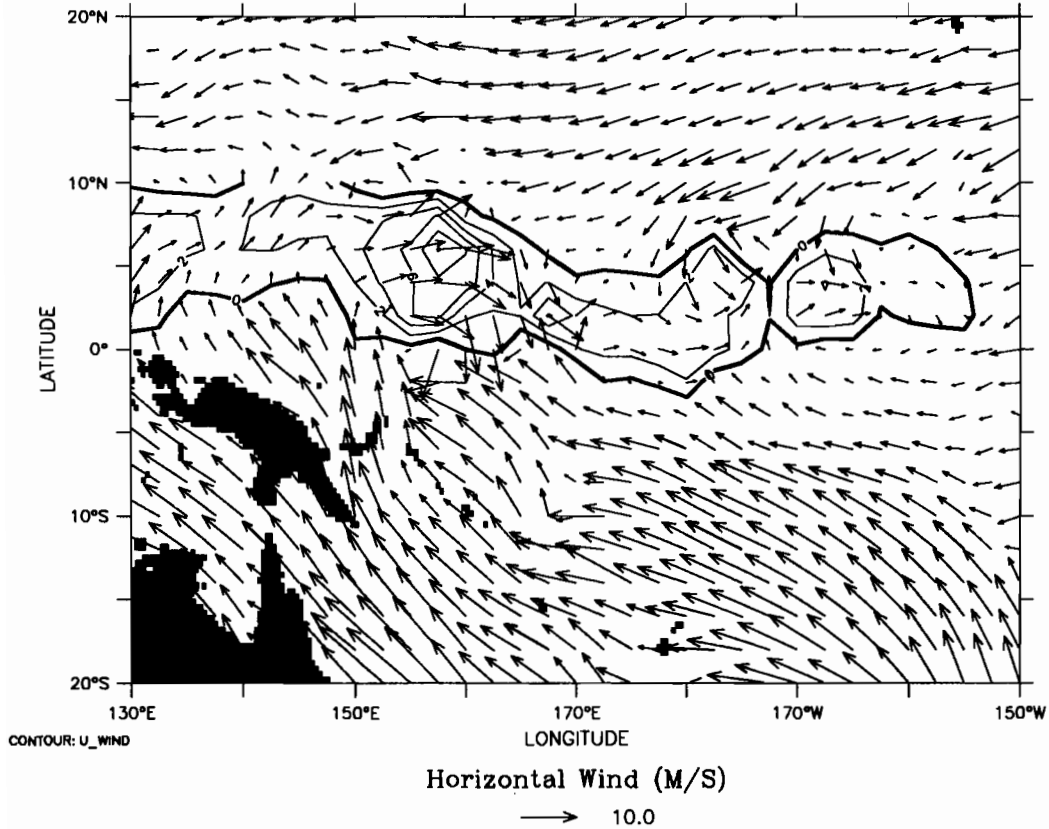
TIME : 06-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



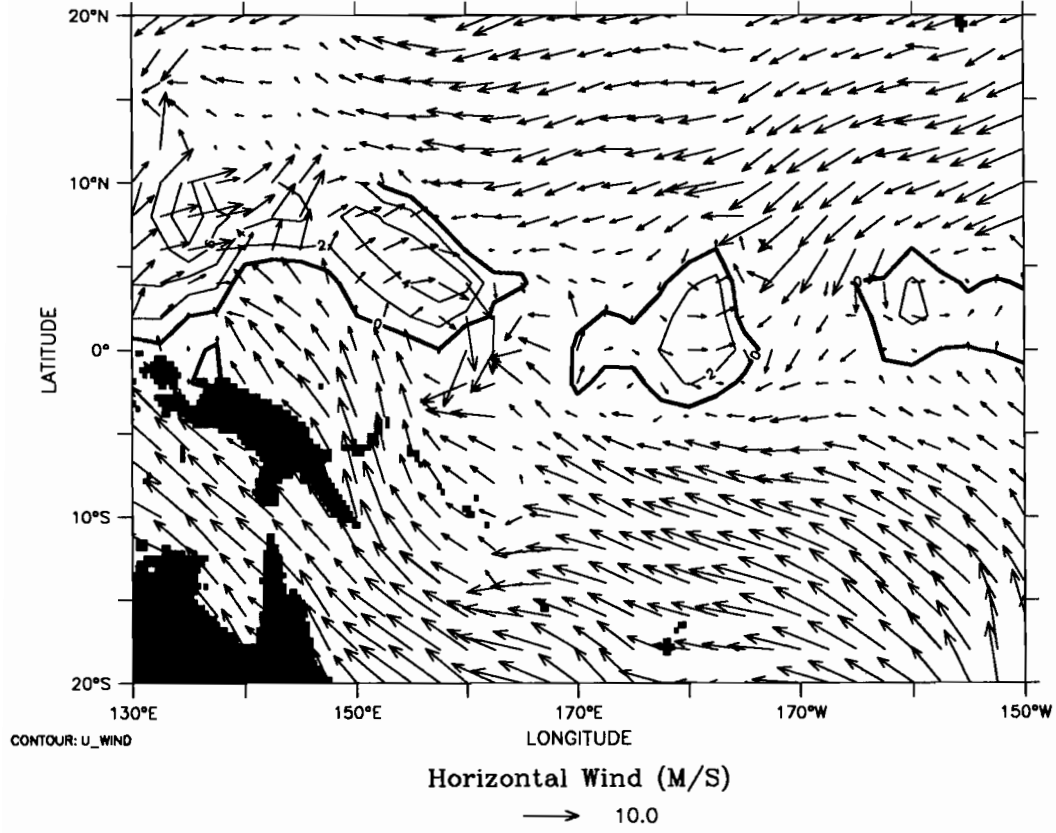
TIME : 07-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



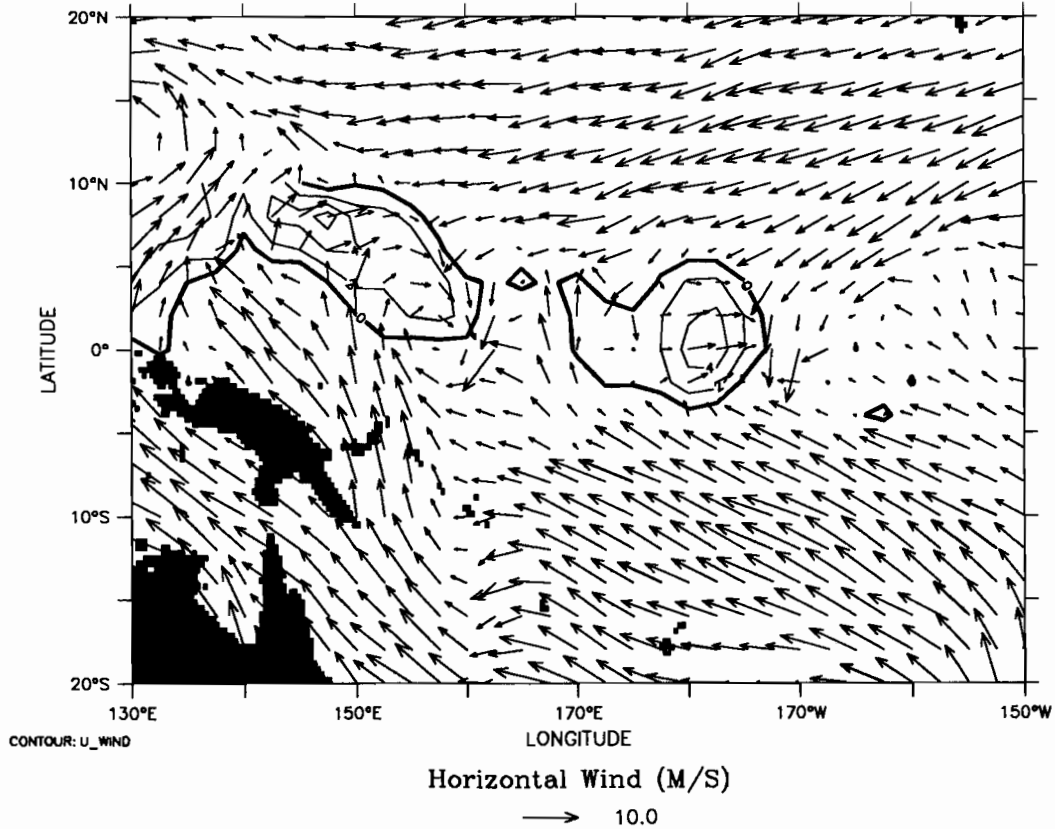
TIME : 08-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 09-AUG-1987 18:00

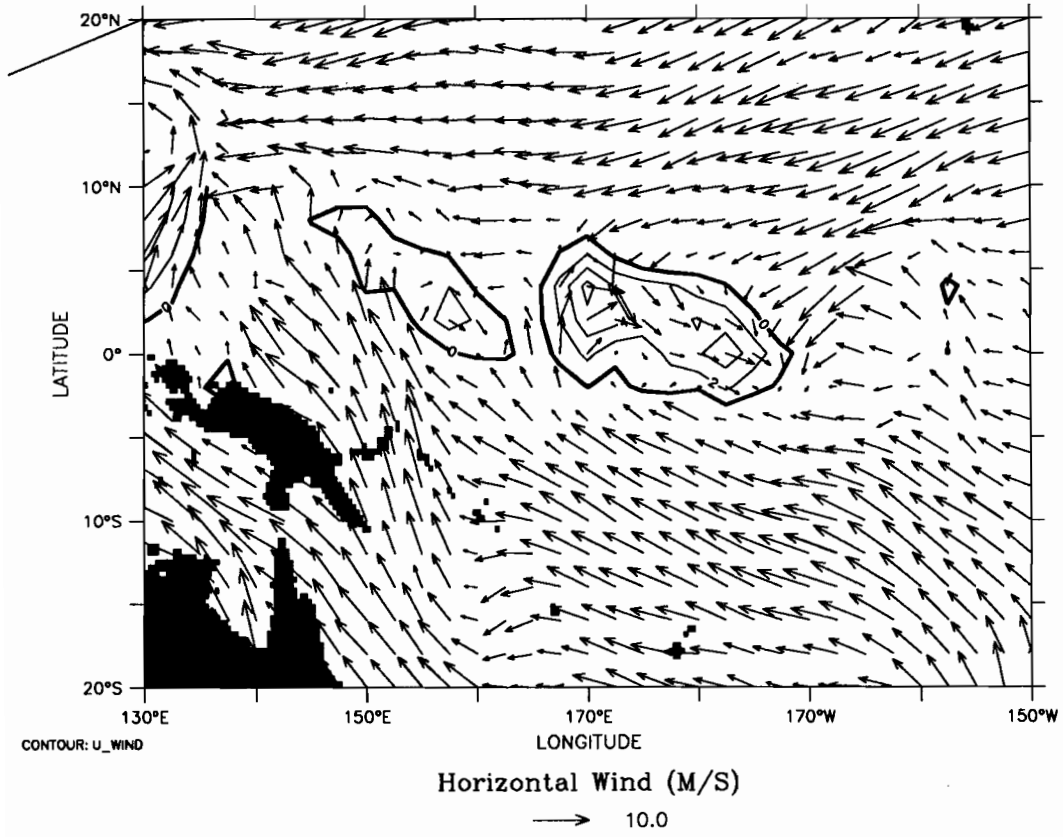
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





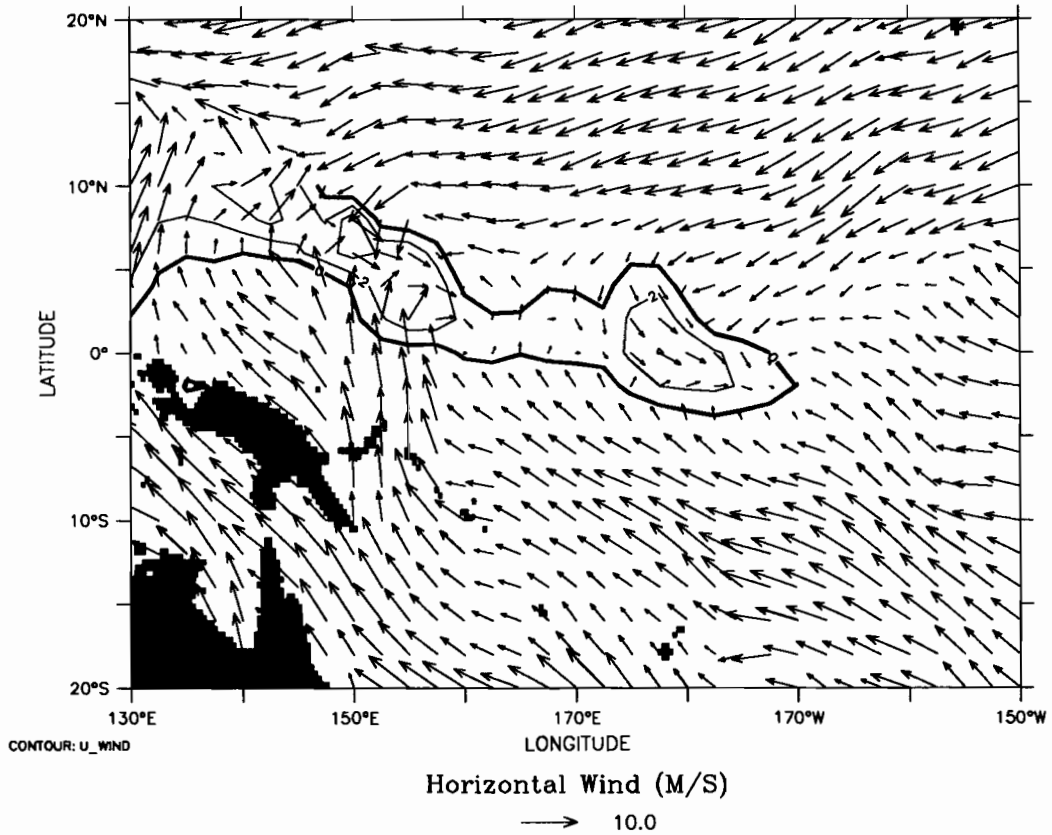
TIME : 10-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



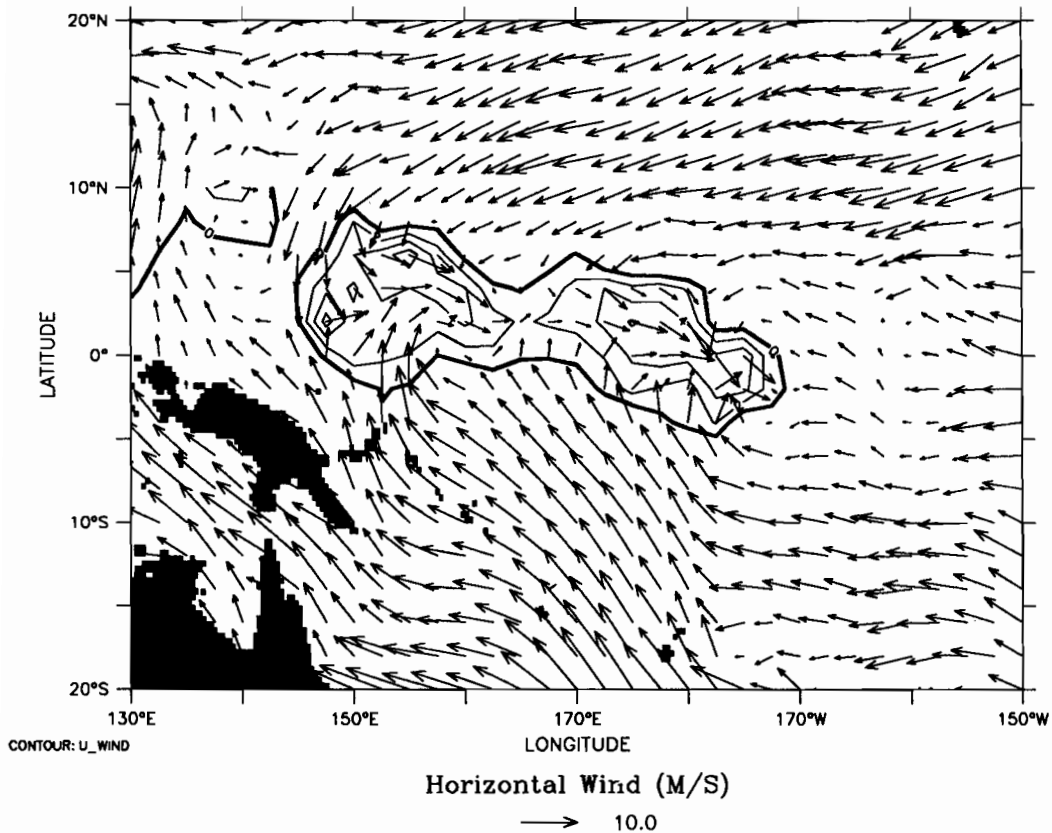
TIME : 11-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



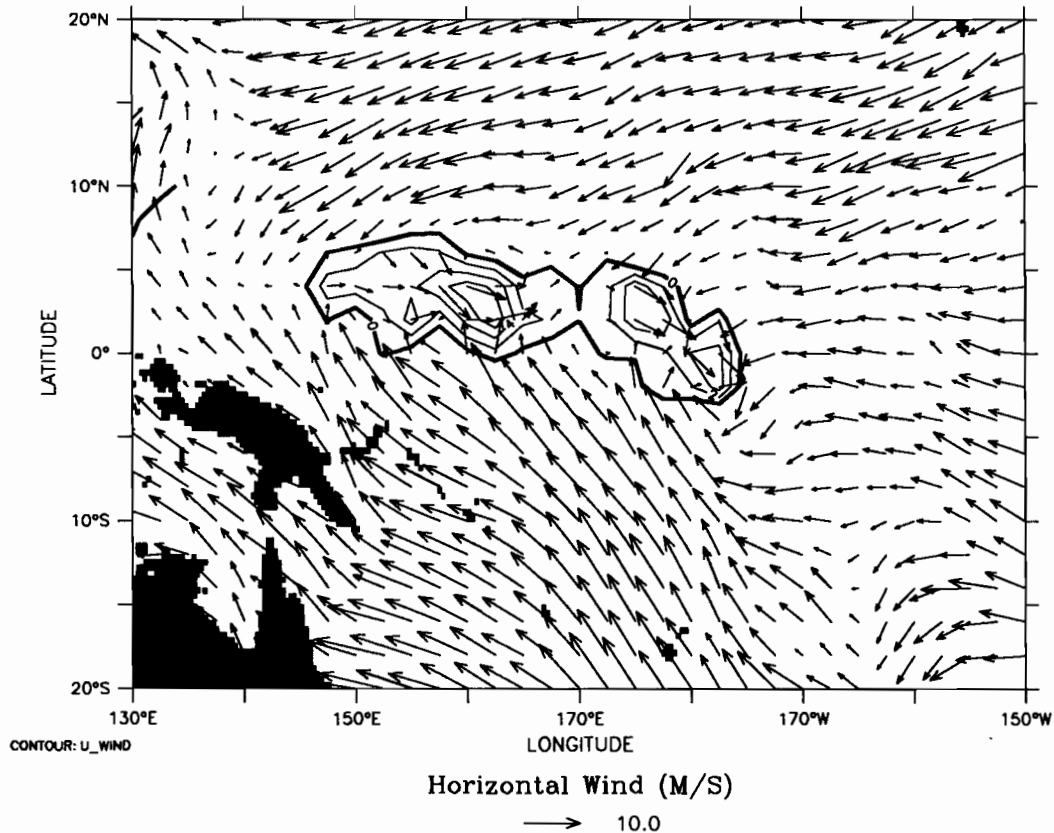
TIME : 12-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



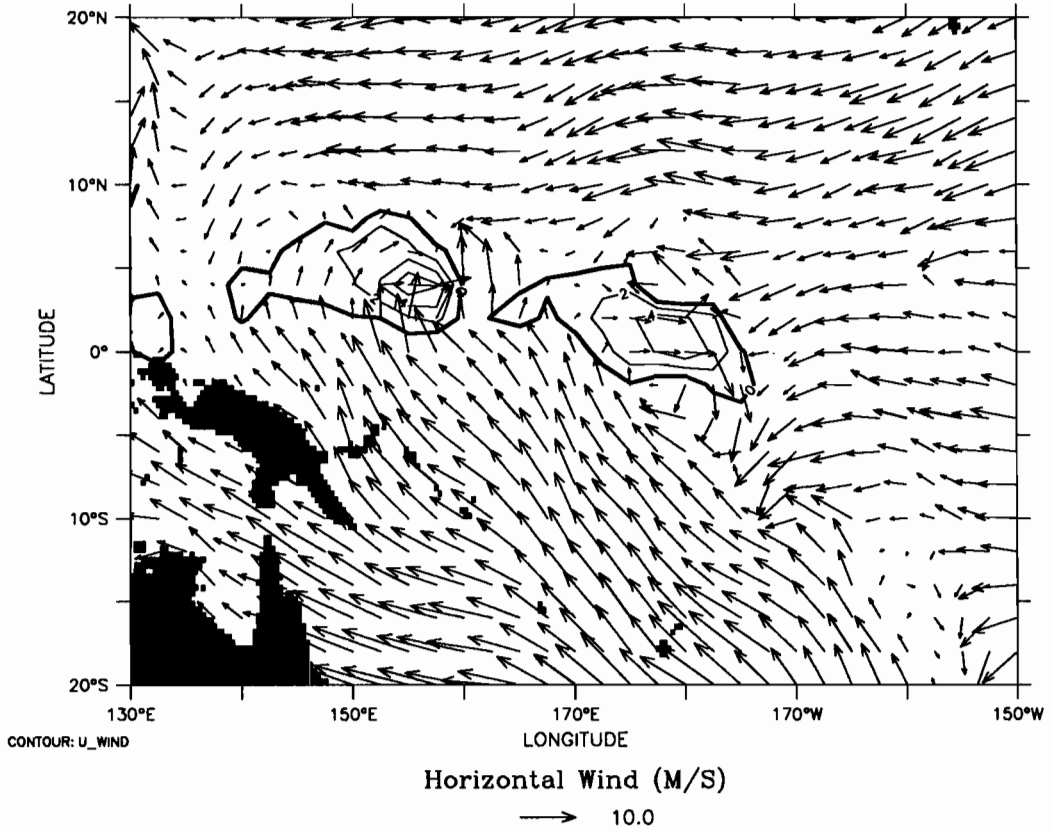
TIME : 13-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



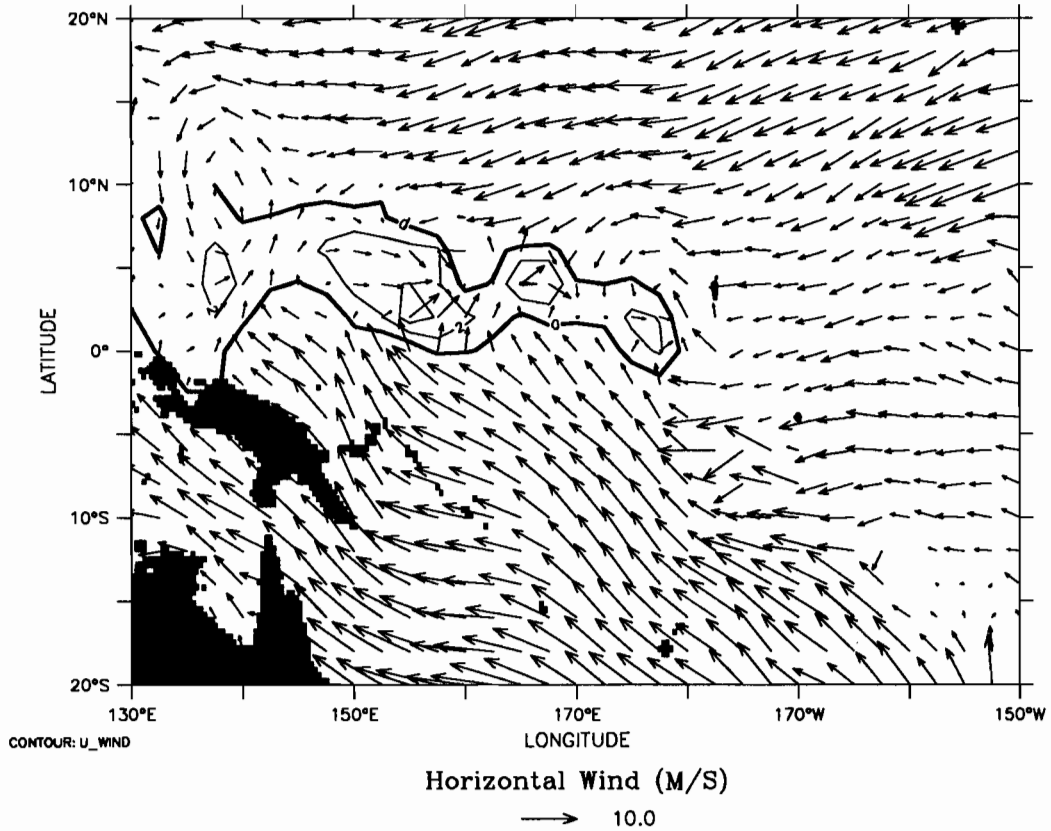
TIME : 14-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSML/Atlas gridded winds



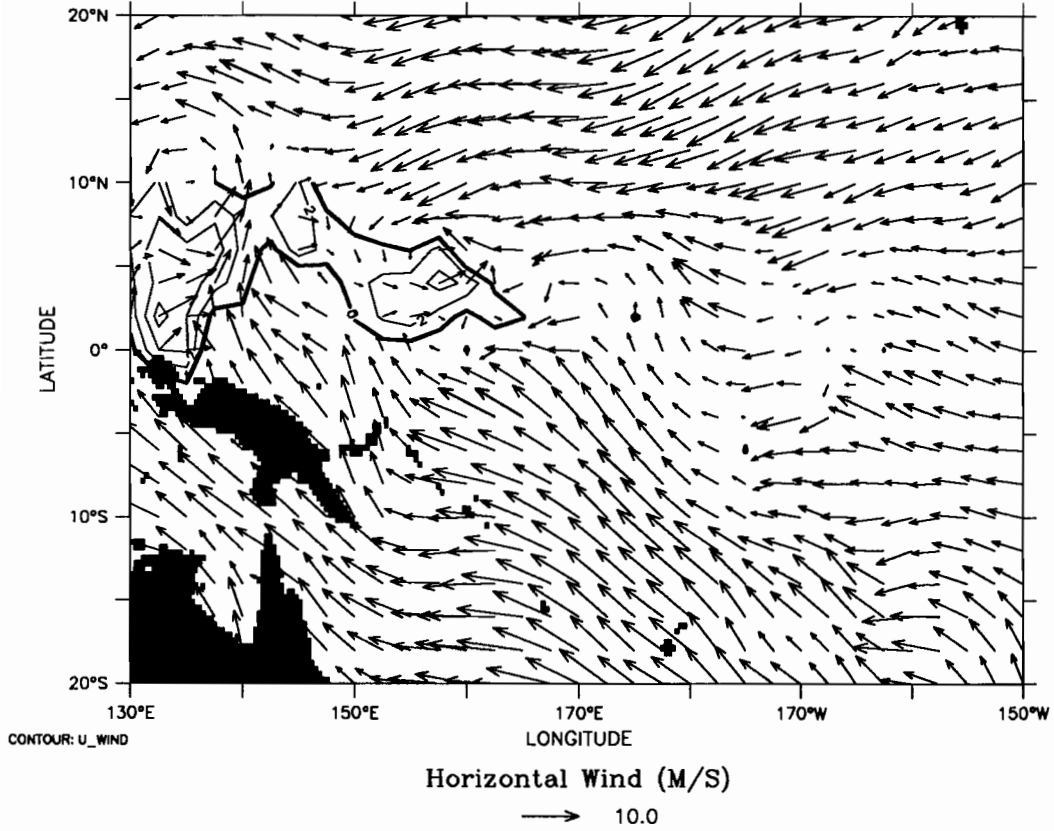
TIME : 15-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSML/Atlas gridded winds



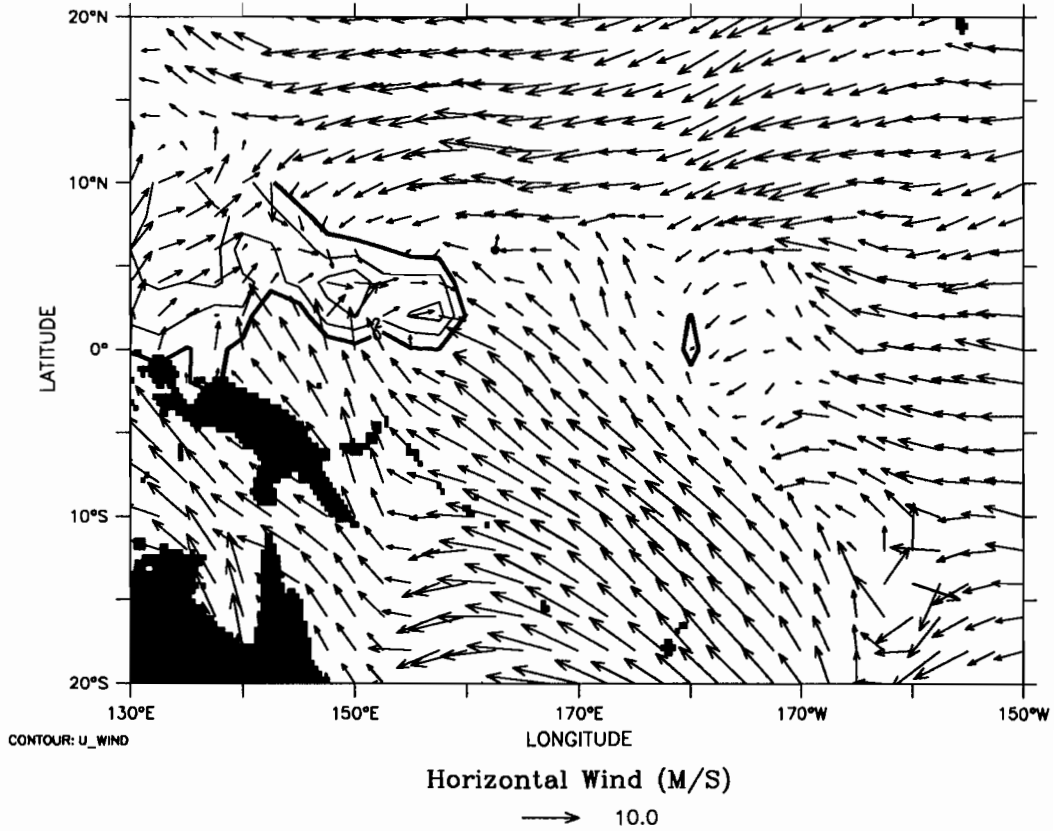
TIME : 16-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



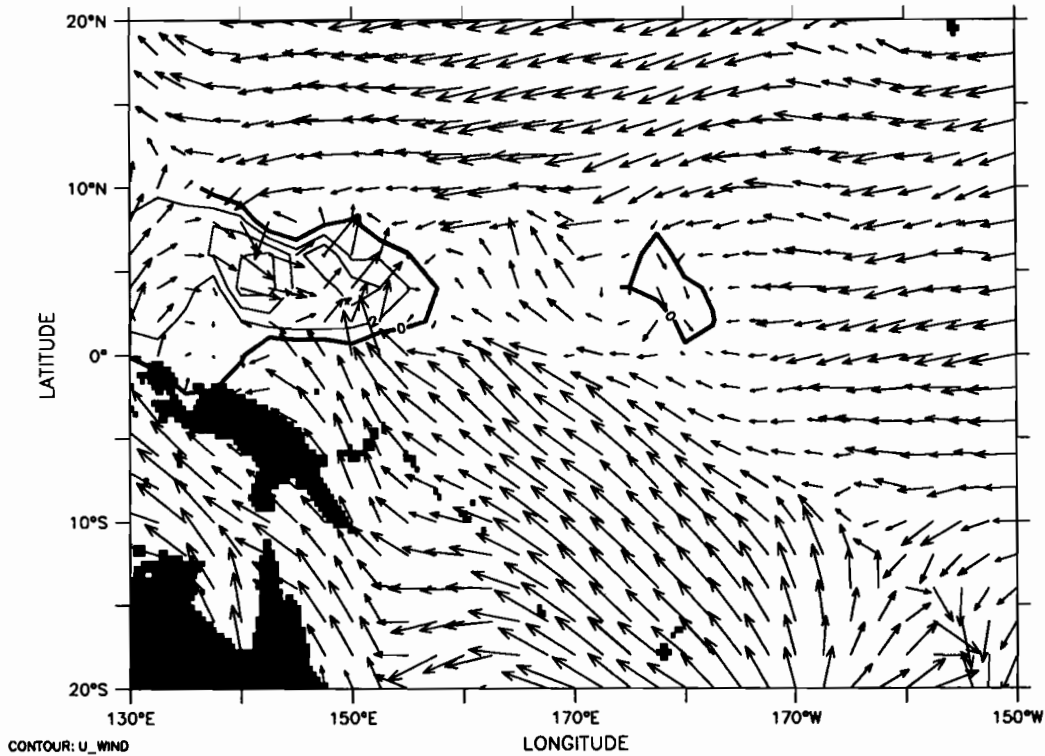
TIME : 17-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



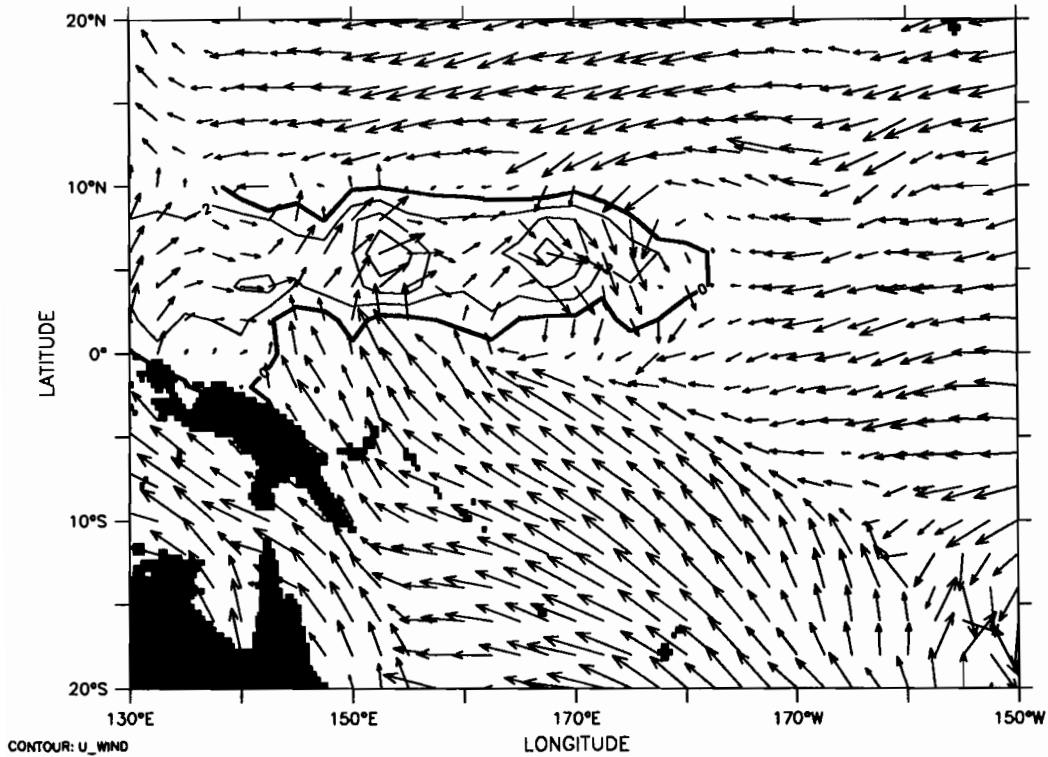
TIME : 18-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



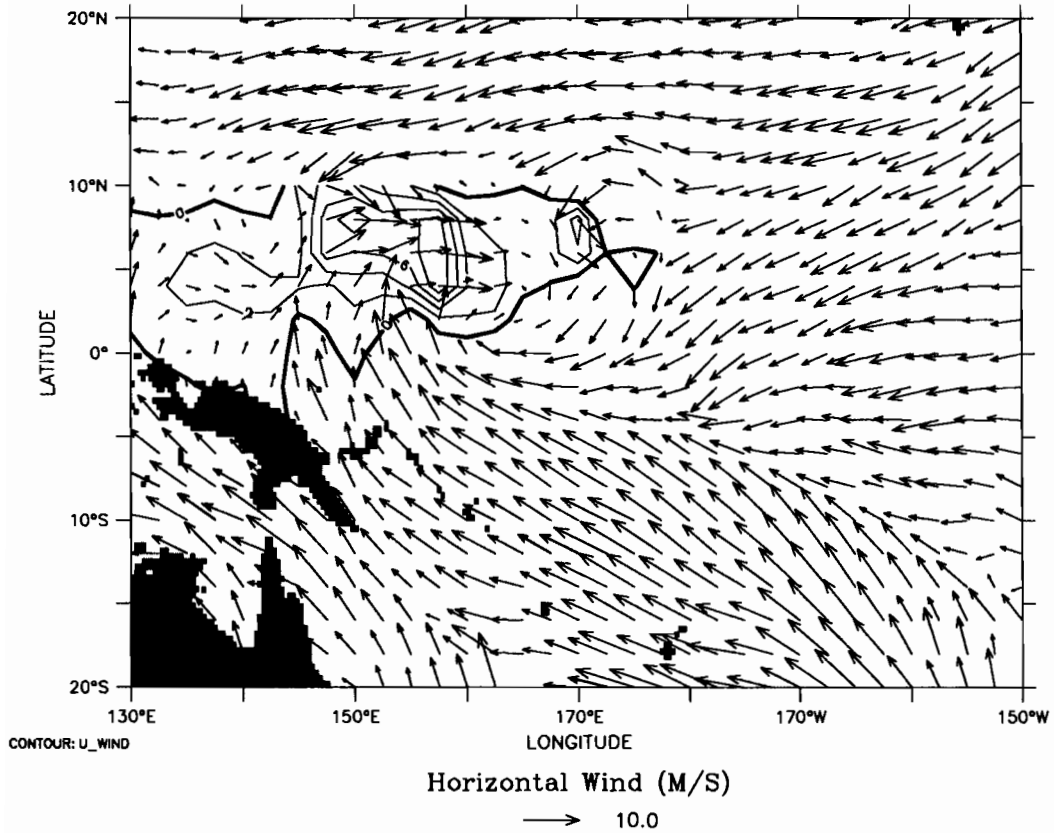
TIME : 19-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



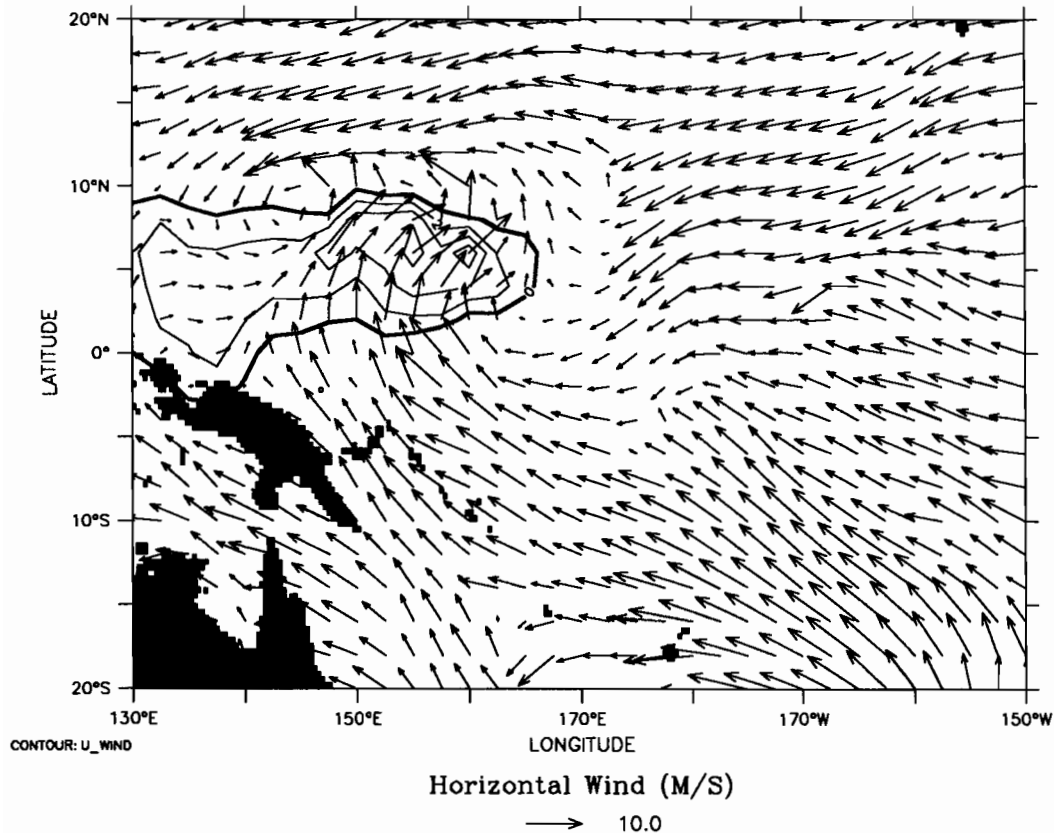
TIME : 20-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



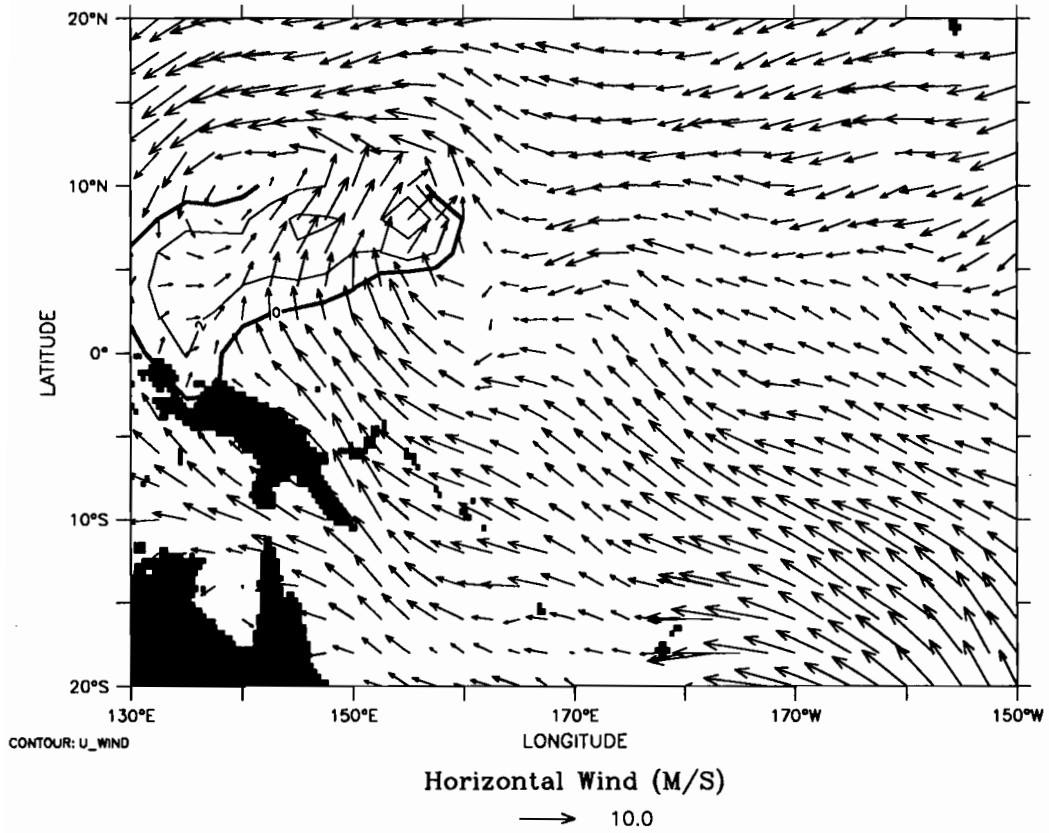
TIME : 21-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



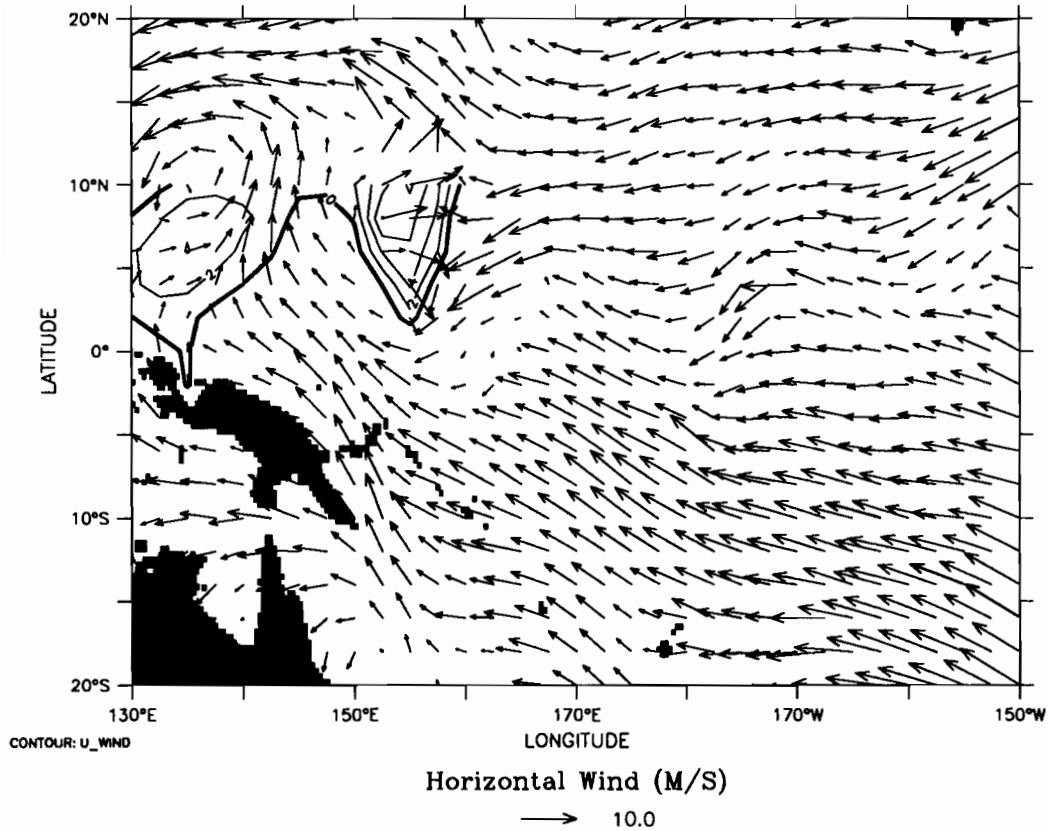
TIME : 22-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



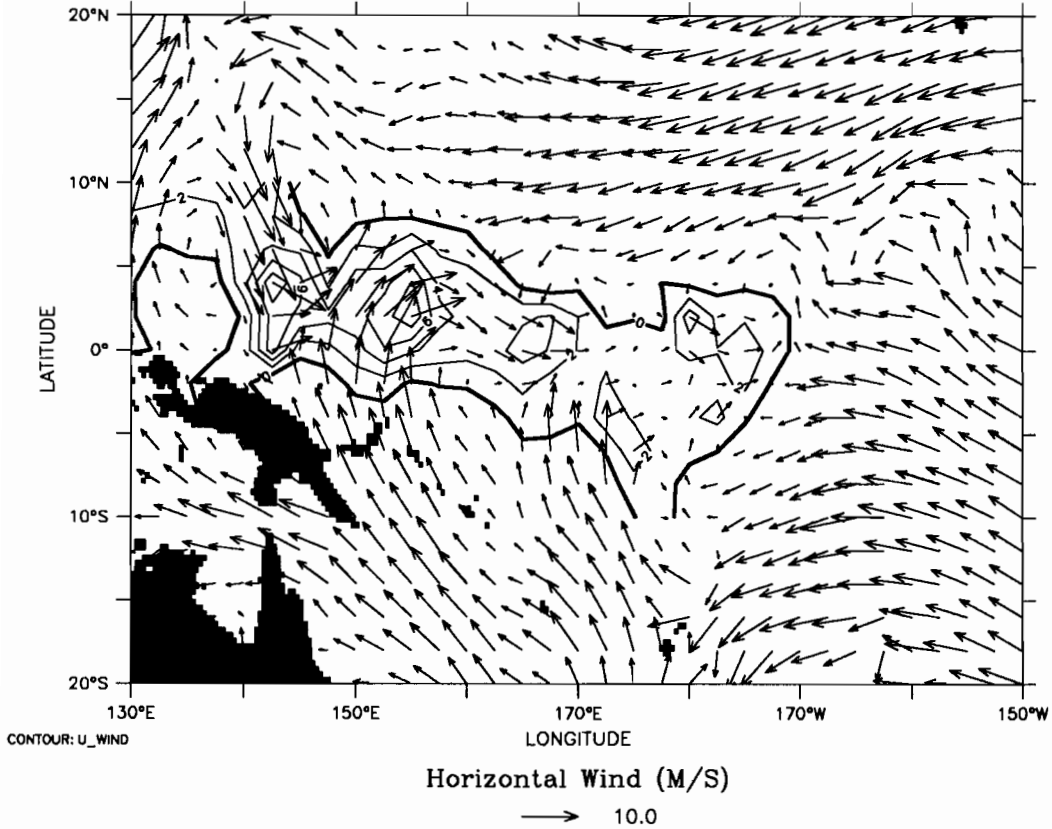
TIME : 23-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



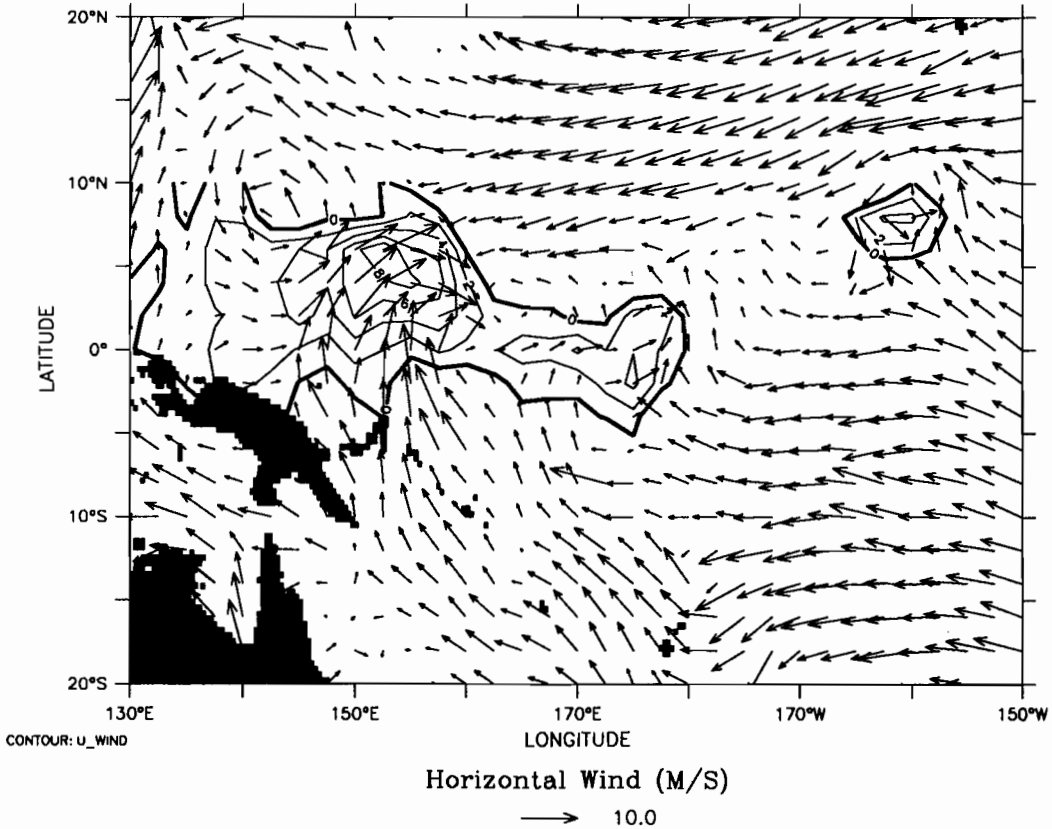
TIME : 27-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 28-AUG-1987 18:00

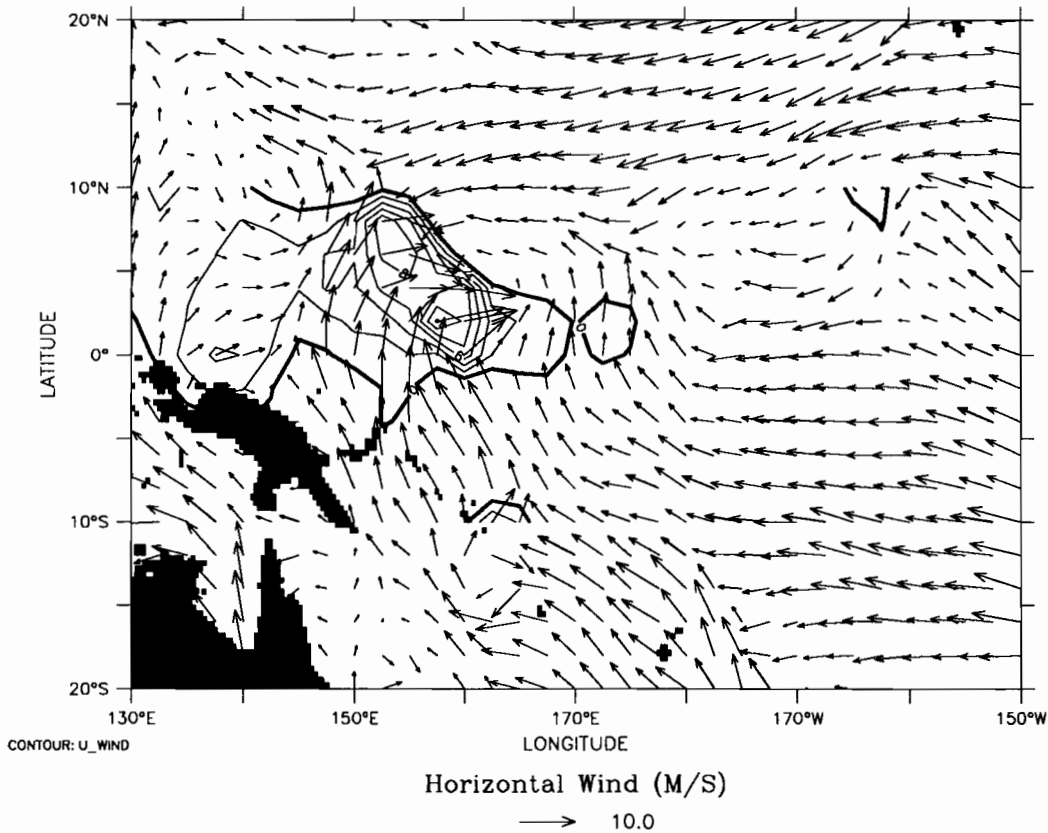
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





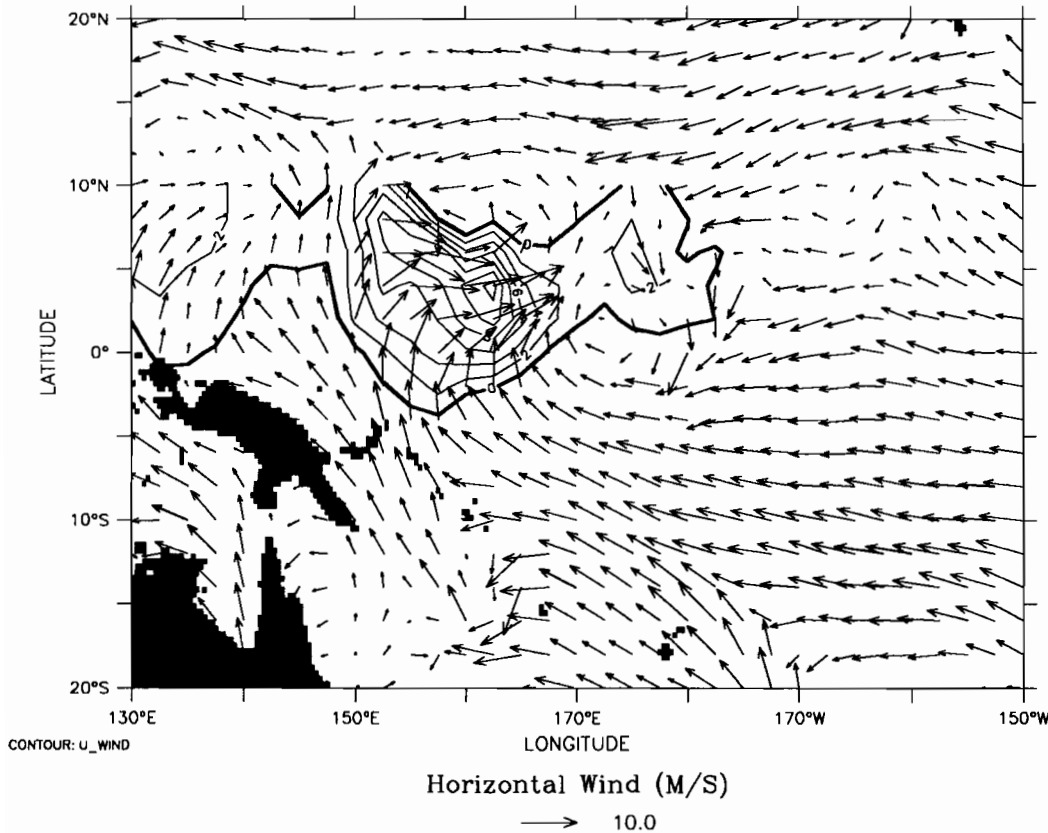
TIME : 29-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



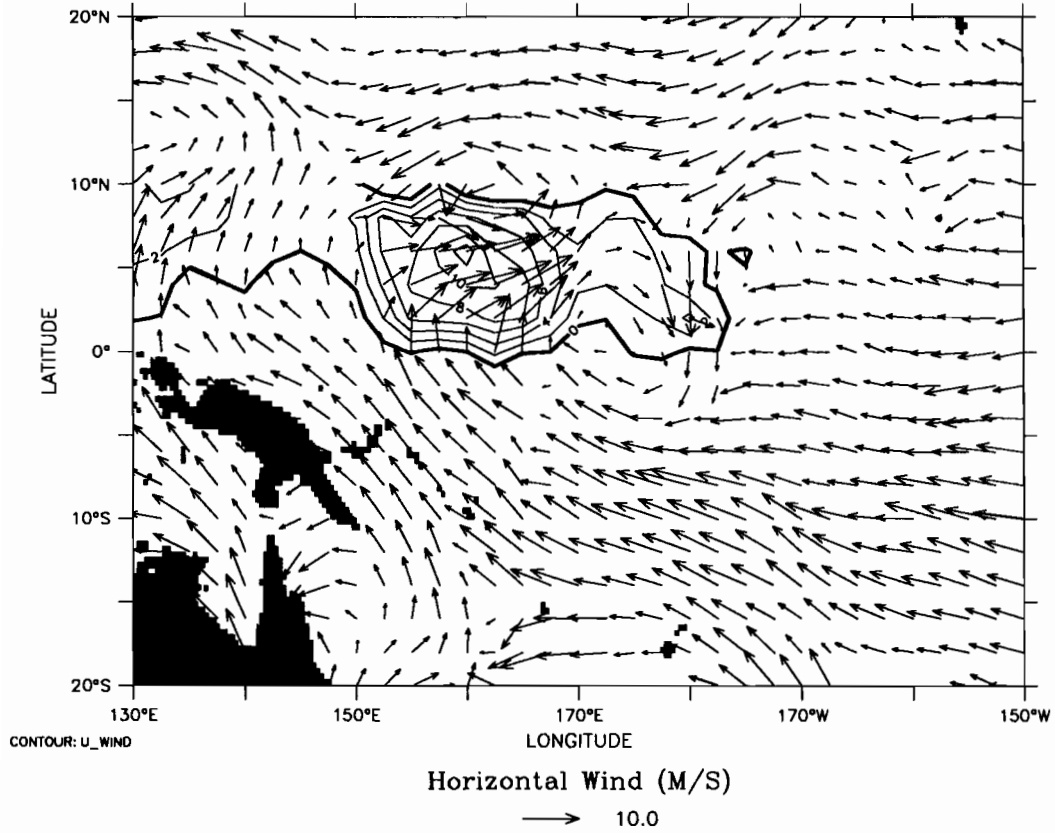
TIME : 30-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



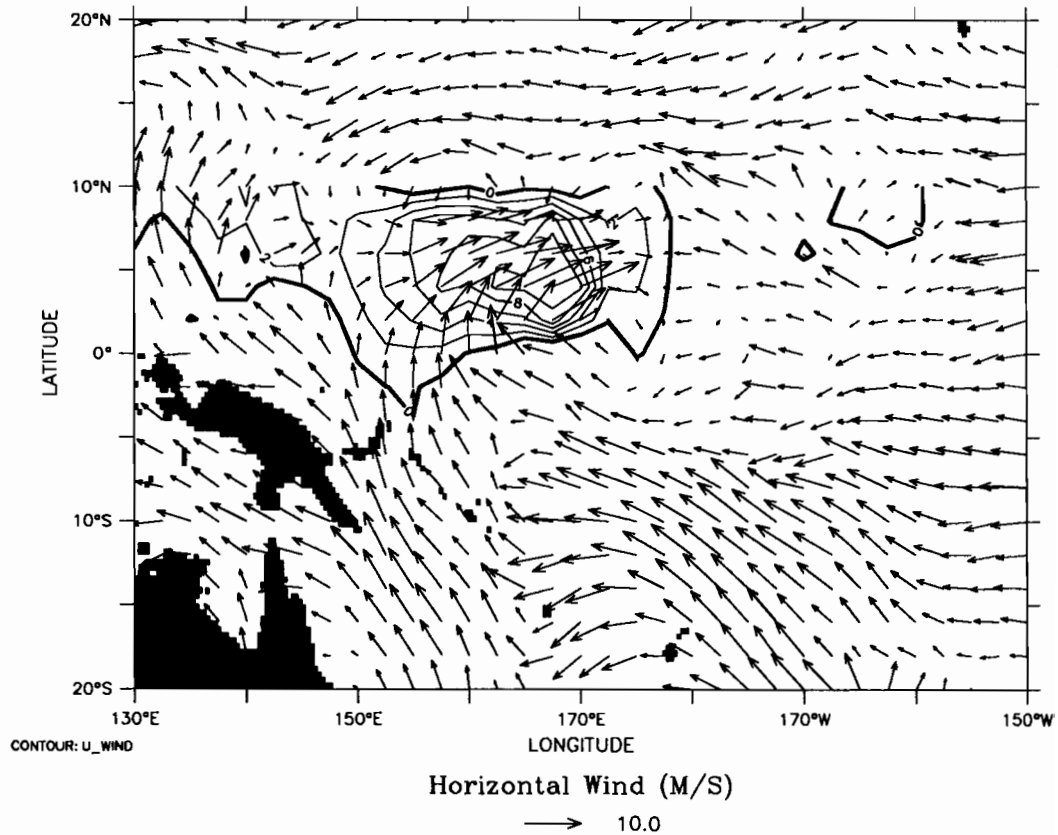
TIME : 31-AUG-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



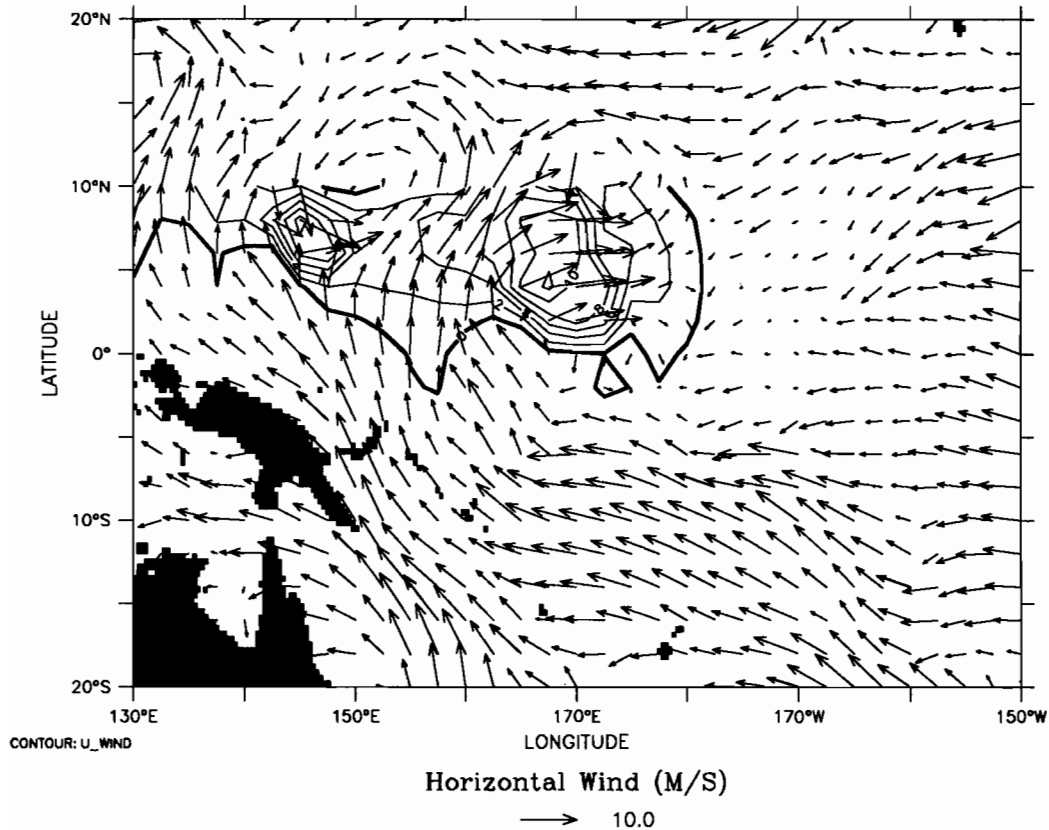
TIME : 01-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



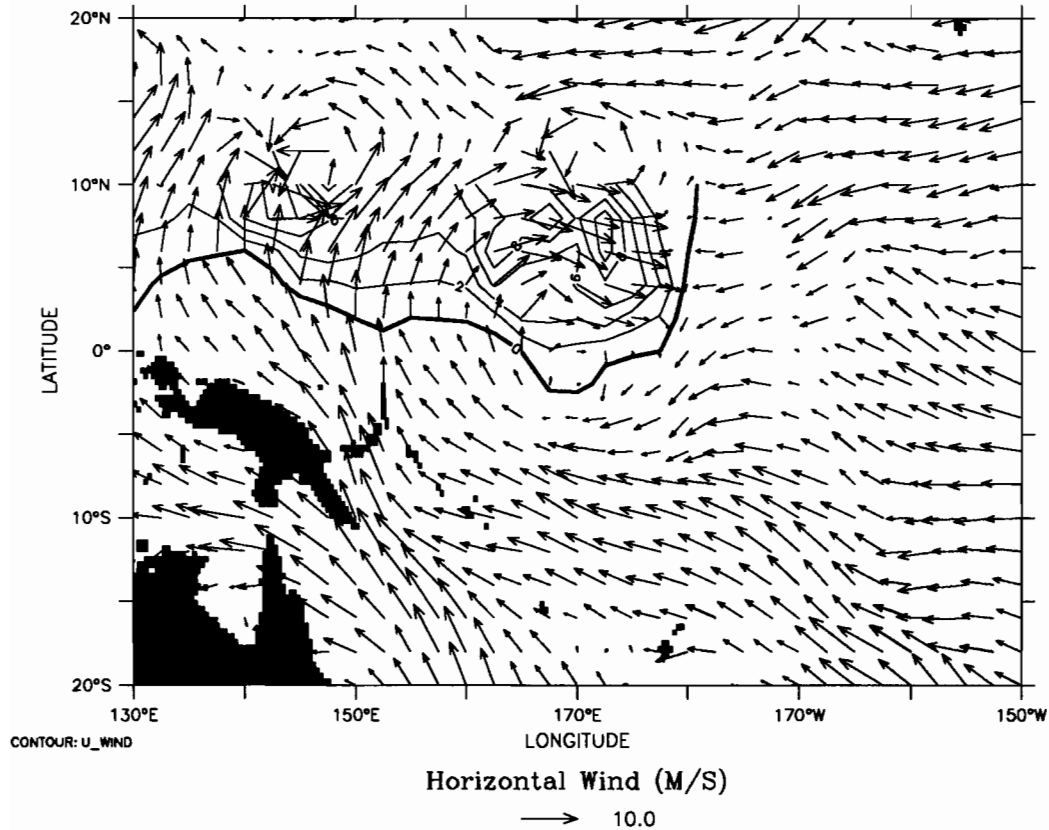
TIME : 02-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



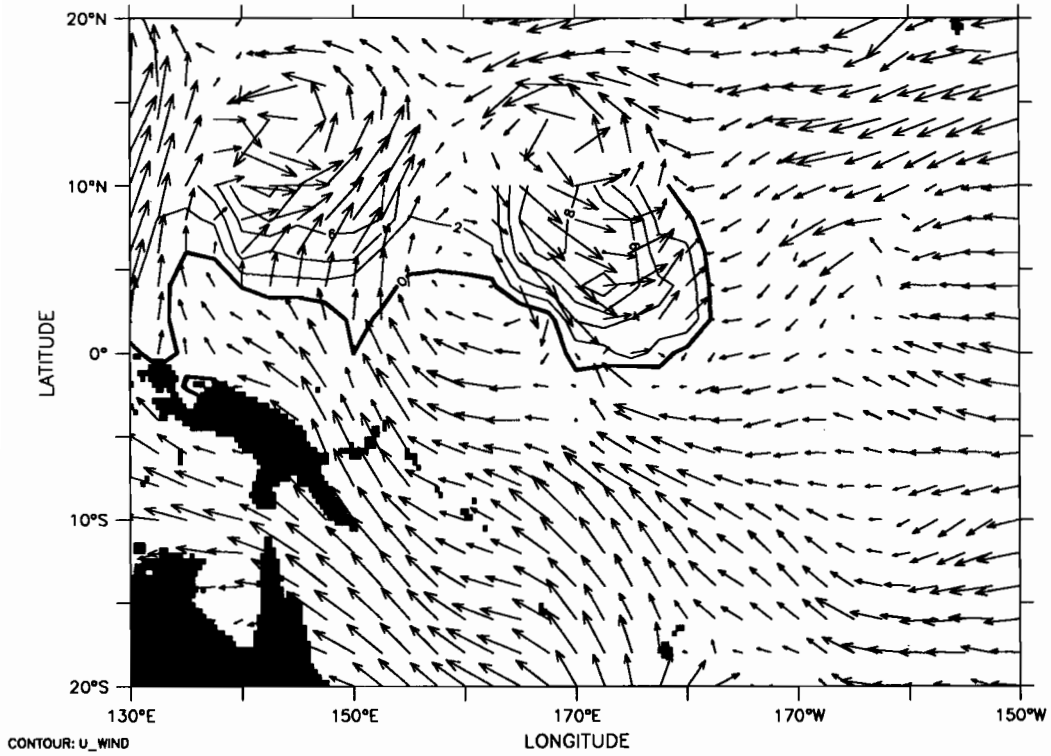
TIME : 03-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



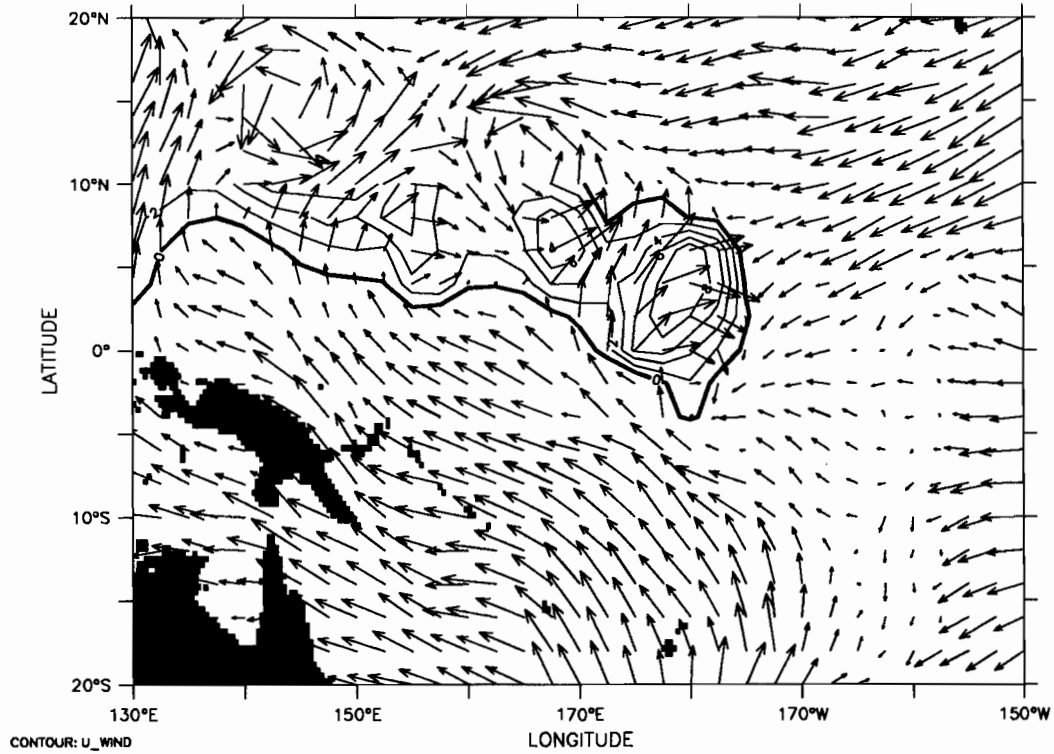
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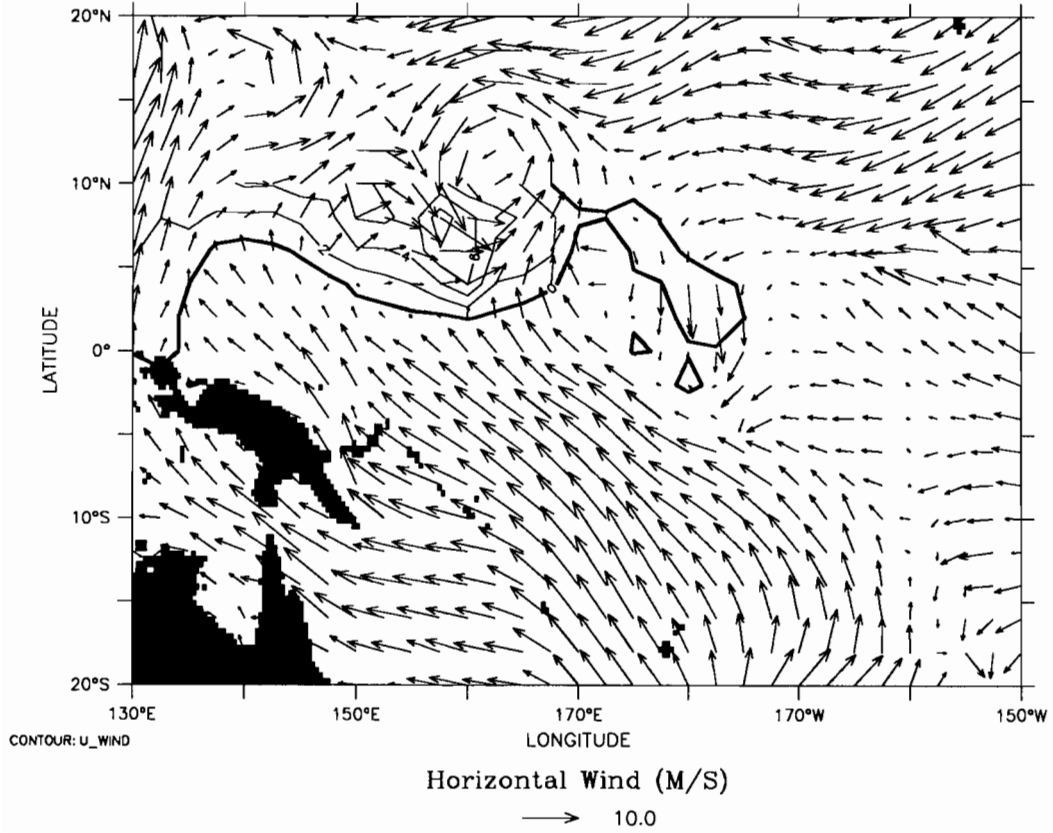
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6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



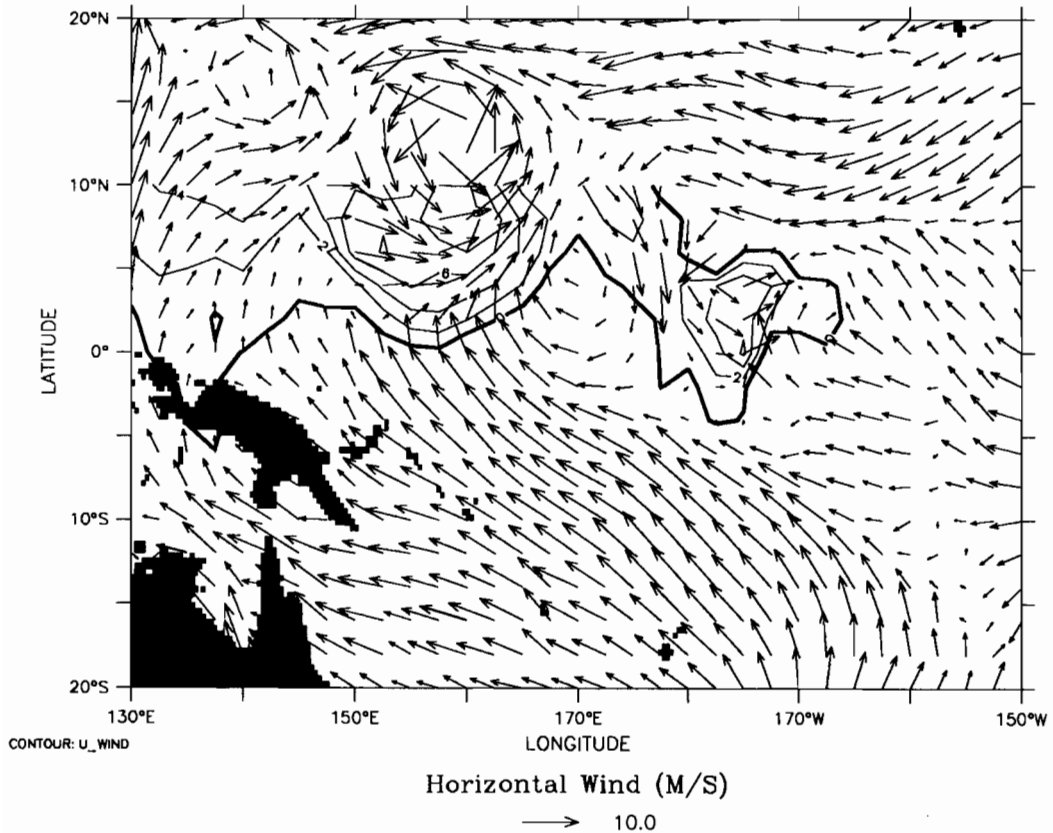
TIME : 06-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



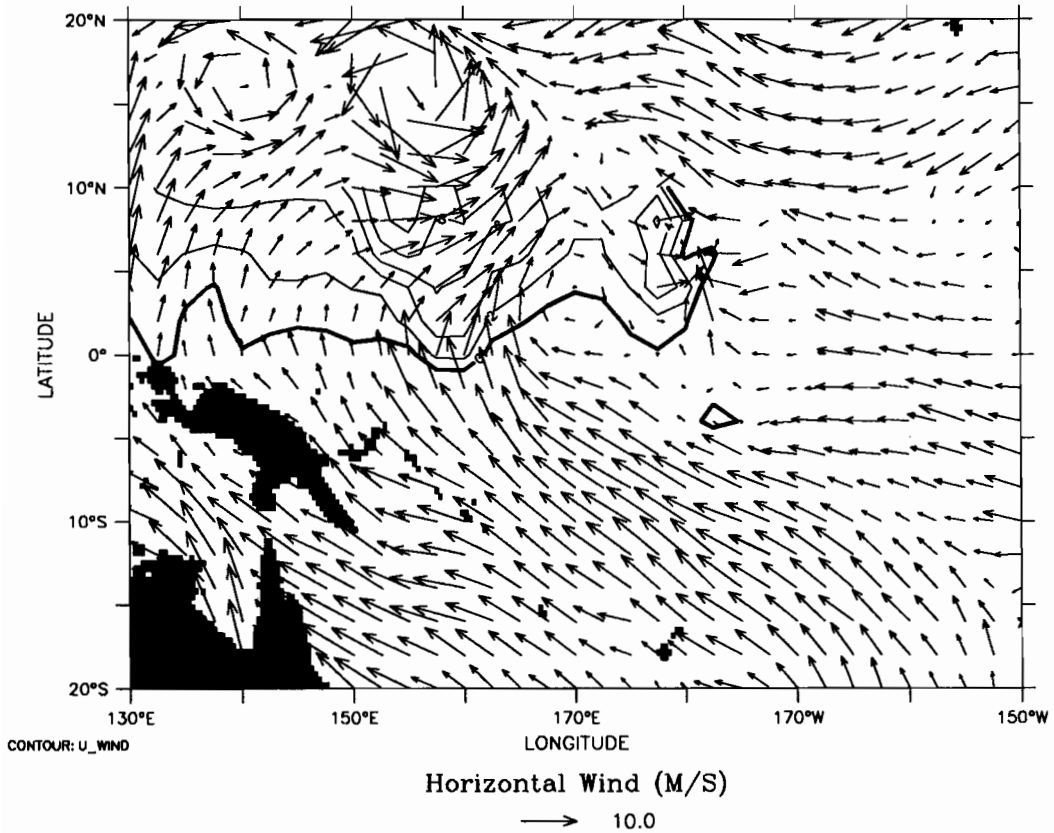
TIME : 07-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



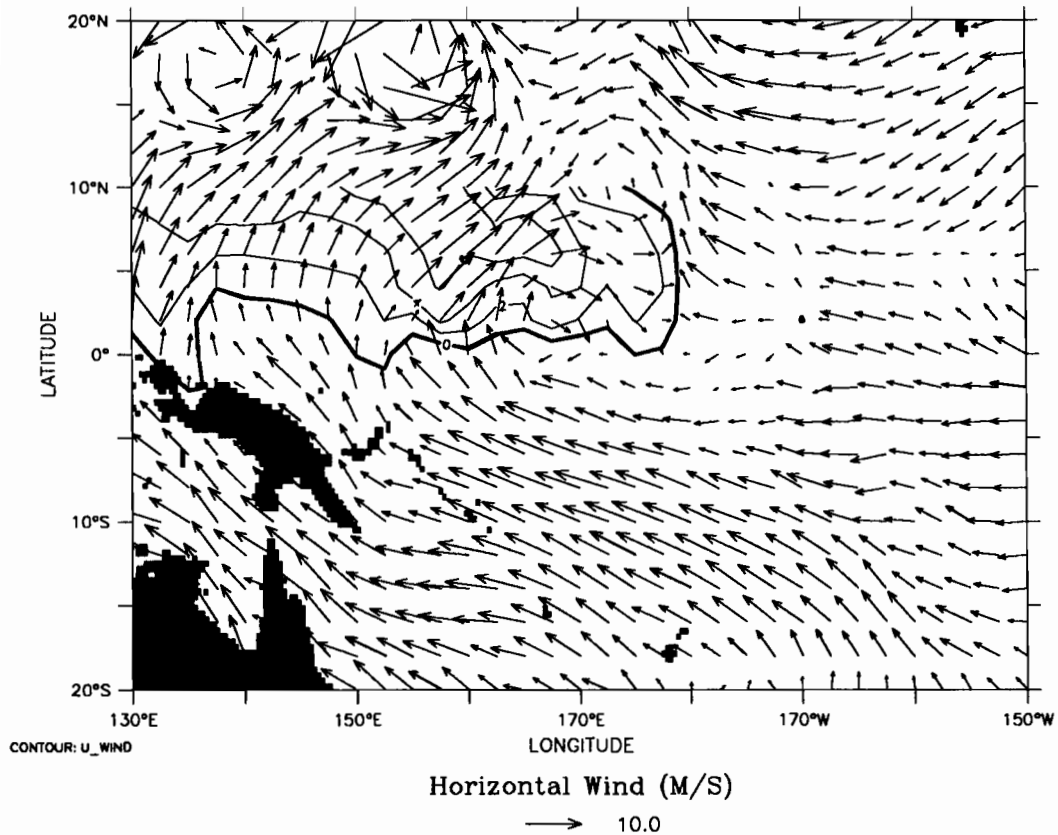
TIME : 08-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



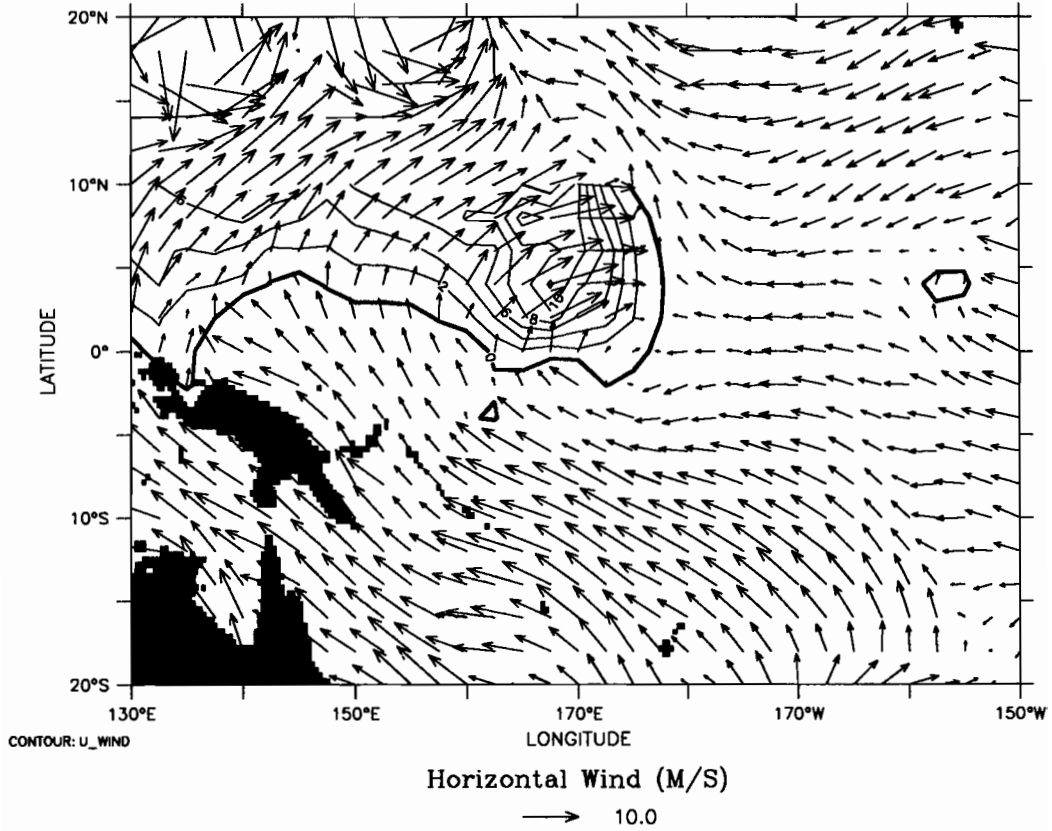
TIME : 09-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



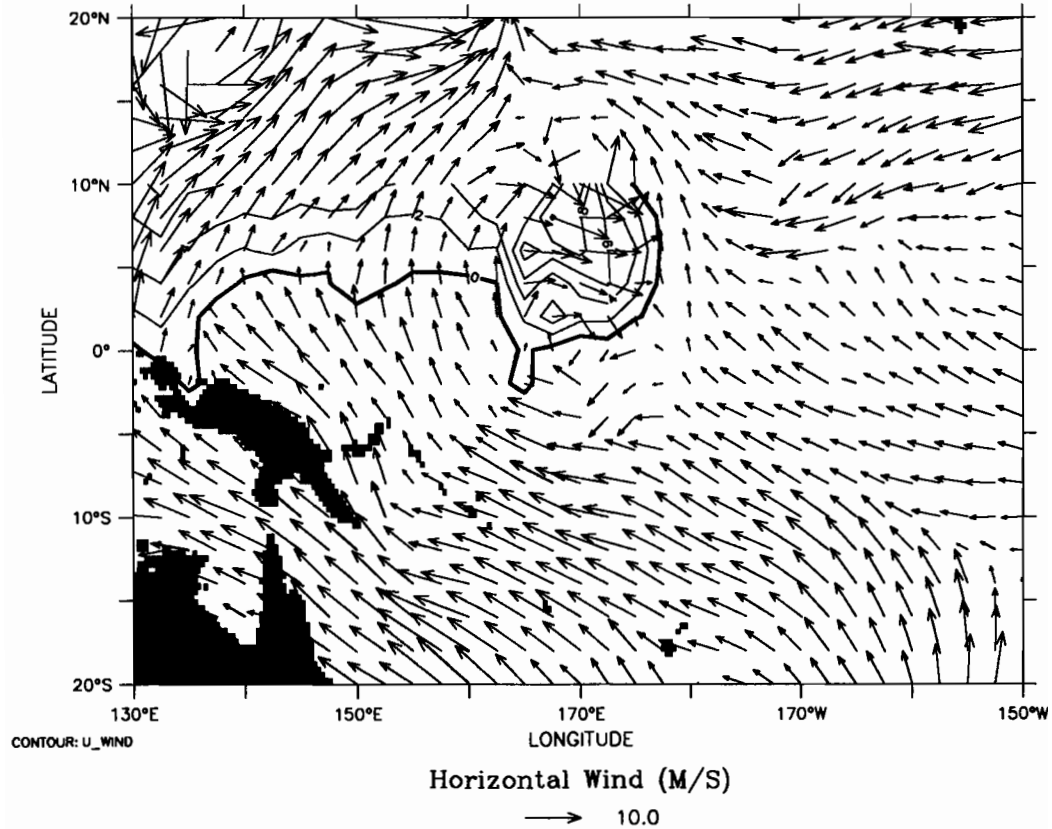
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6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



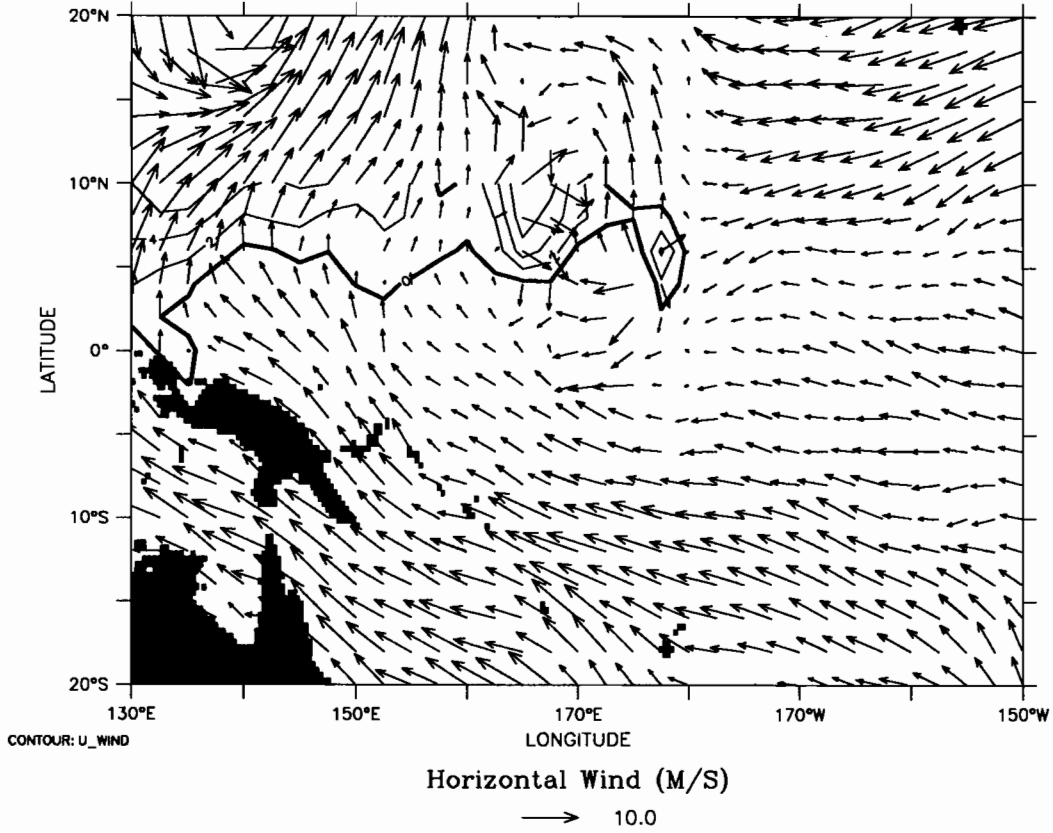
TIME : 11-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



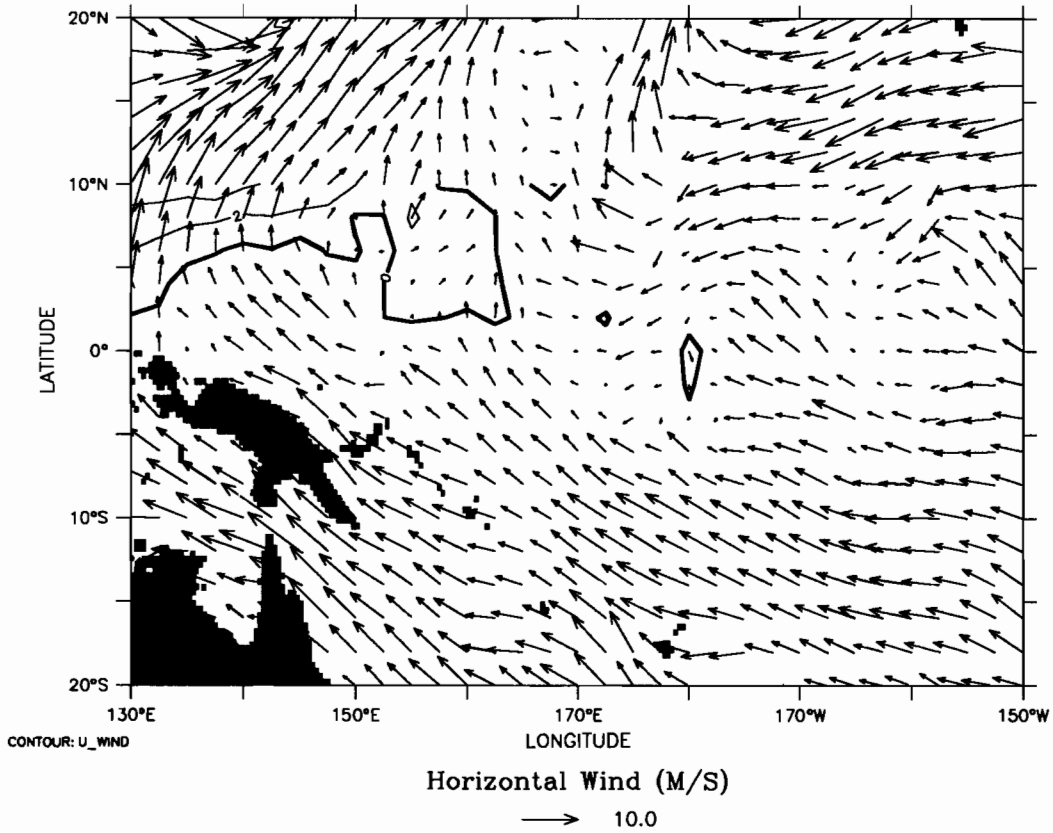
TIME : 12-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 13-SEP-1987 18:00

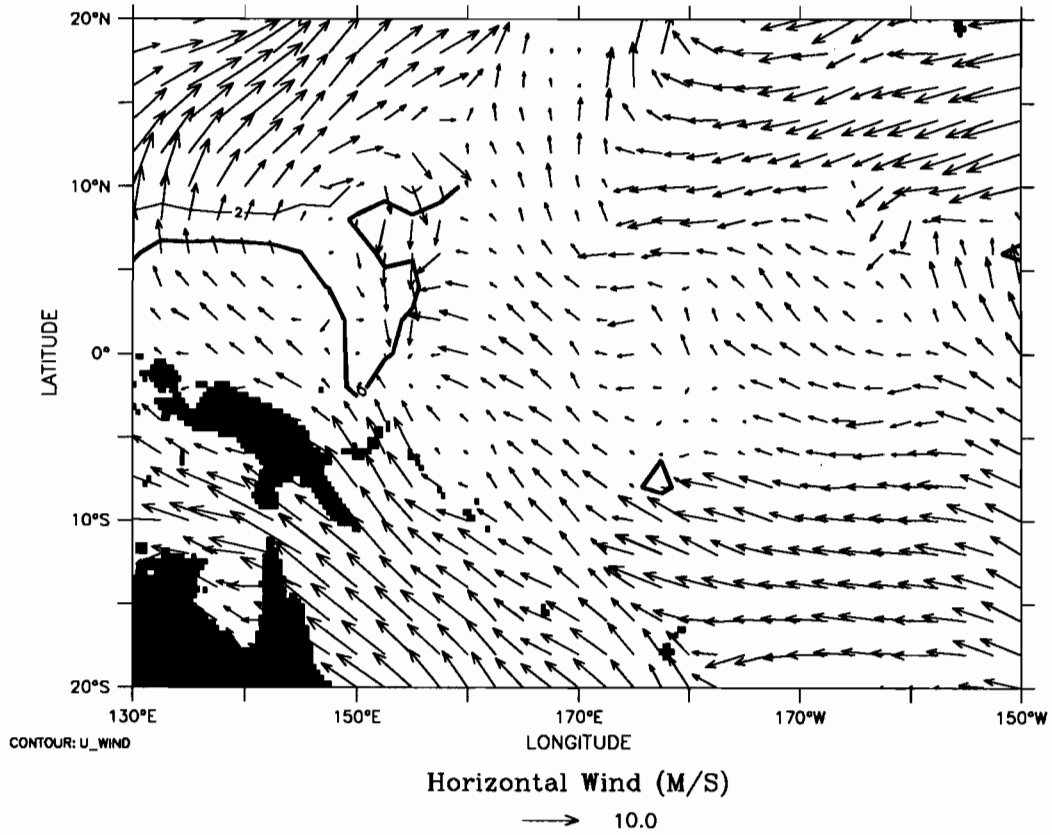
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





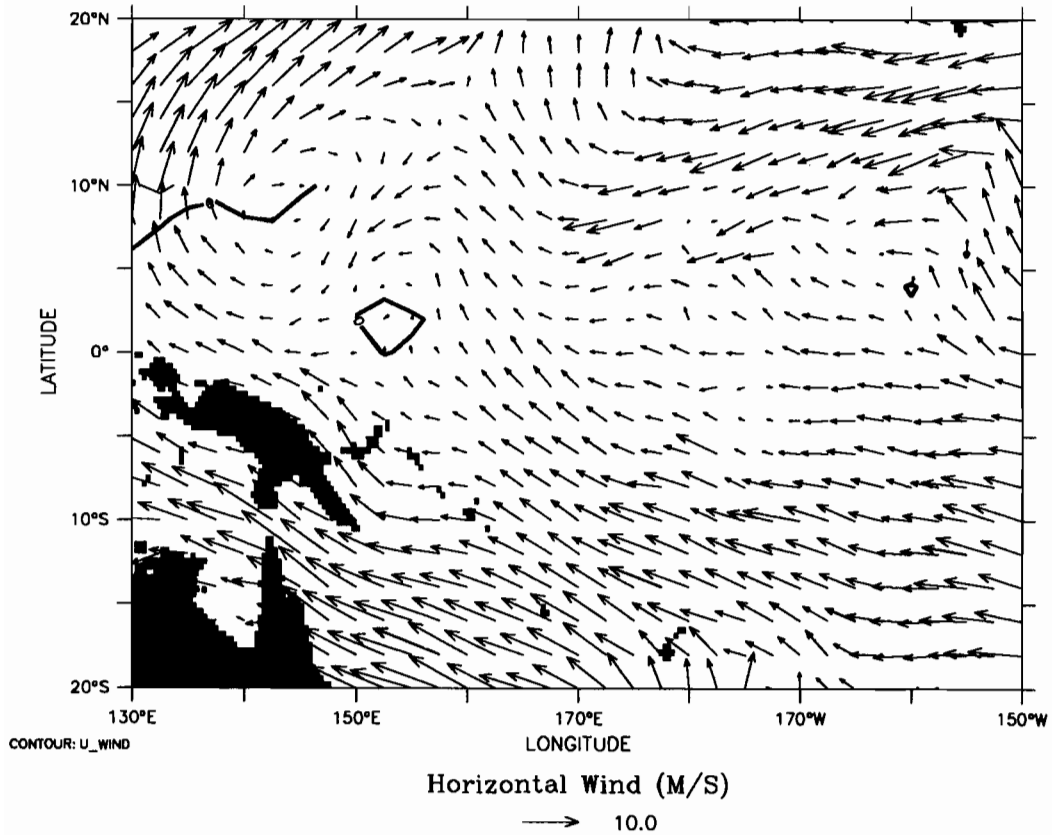
TIME : 14-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



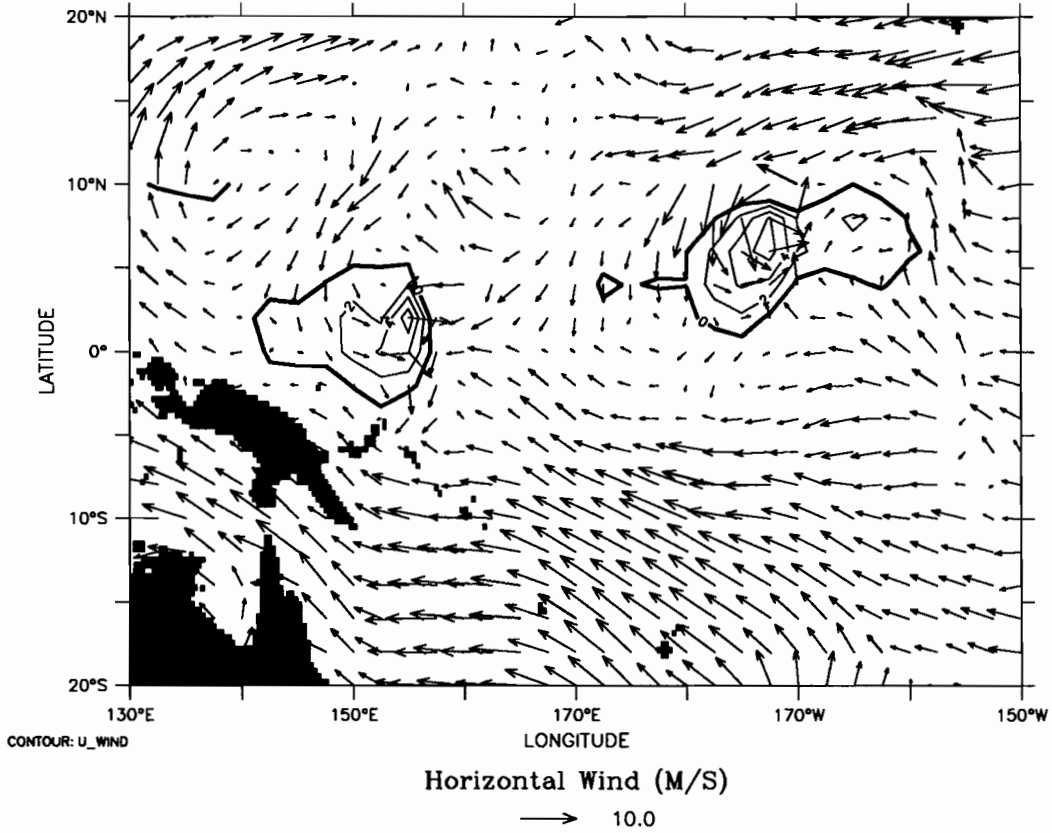
TIME : 15-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



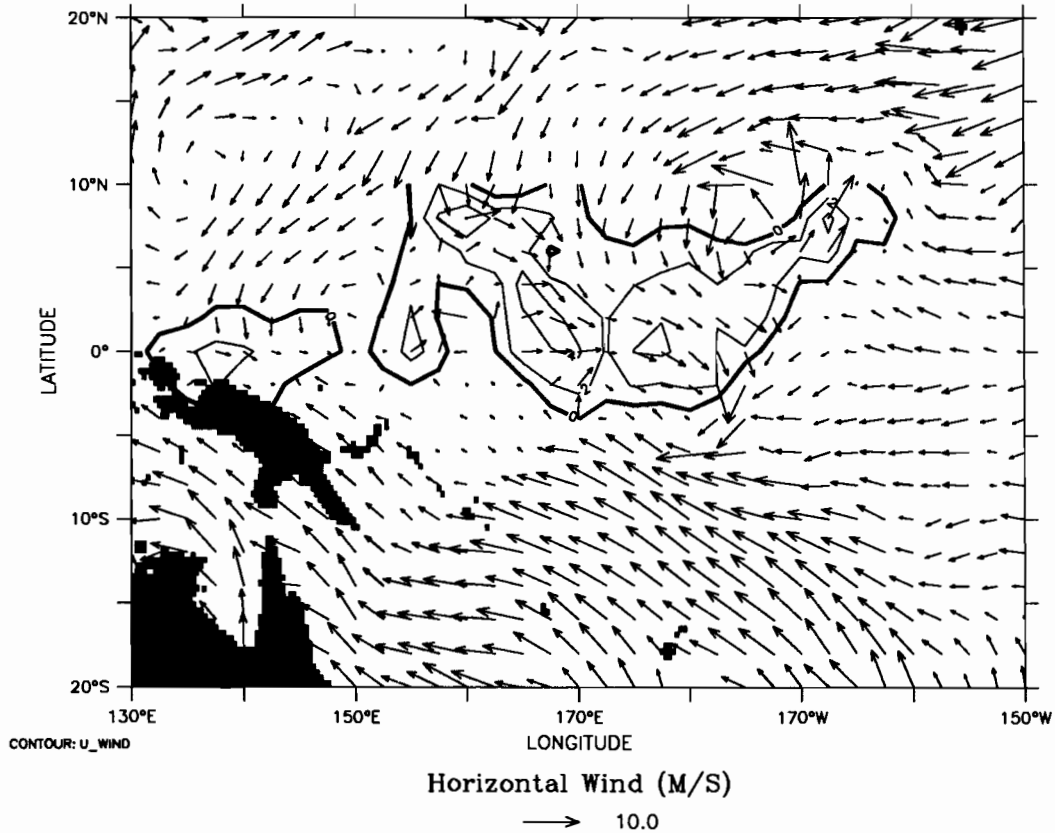
TIME : 16-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



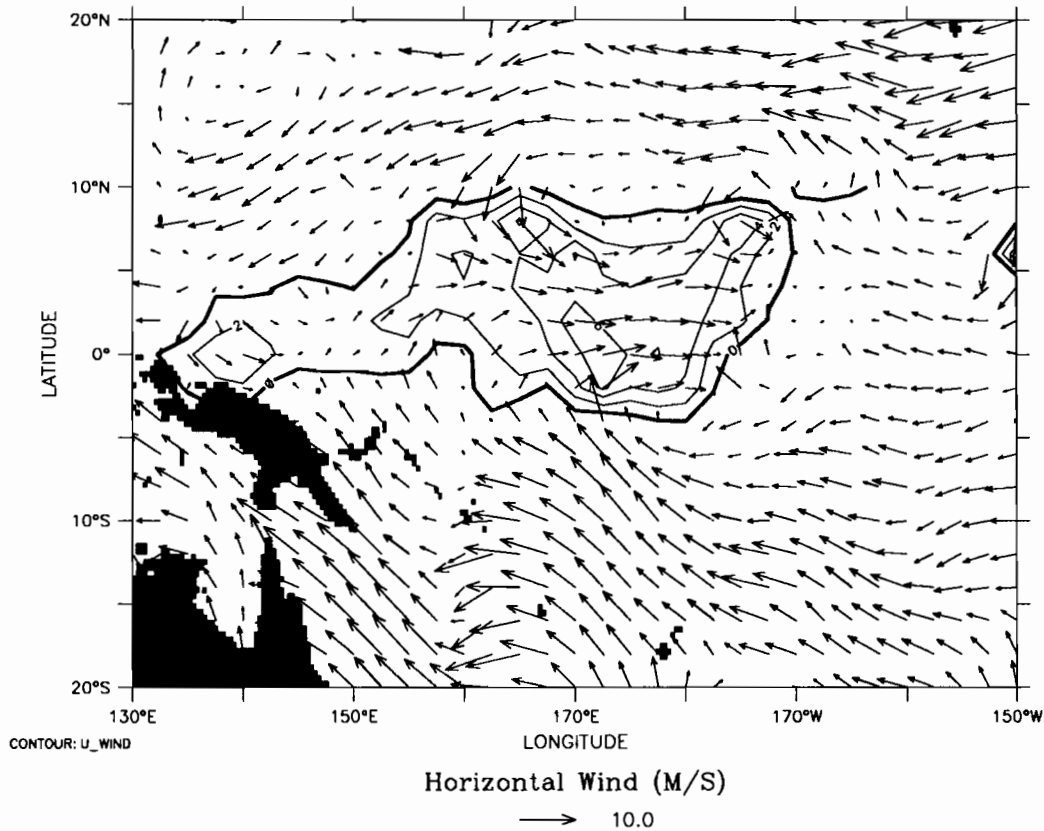
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6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



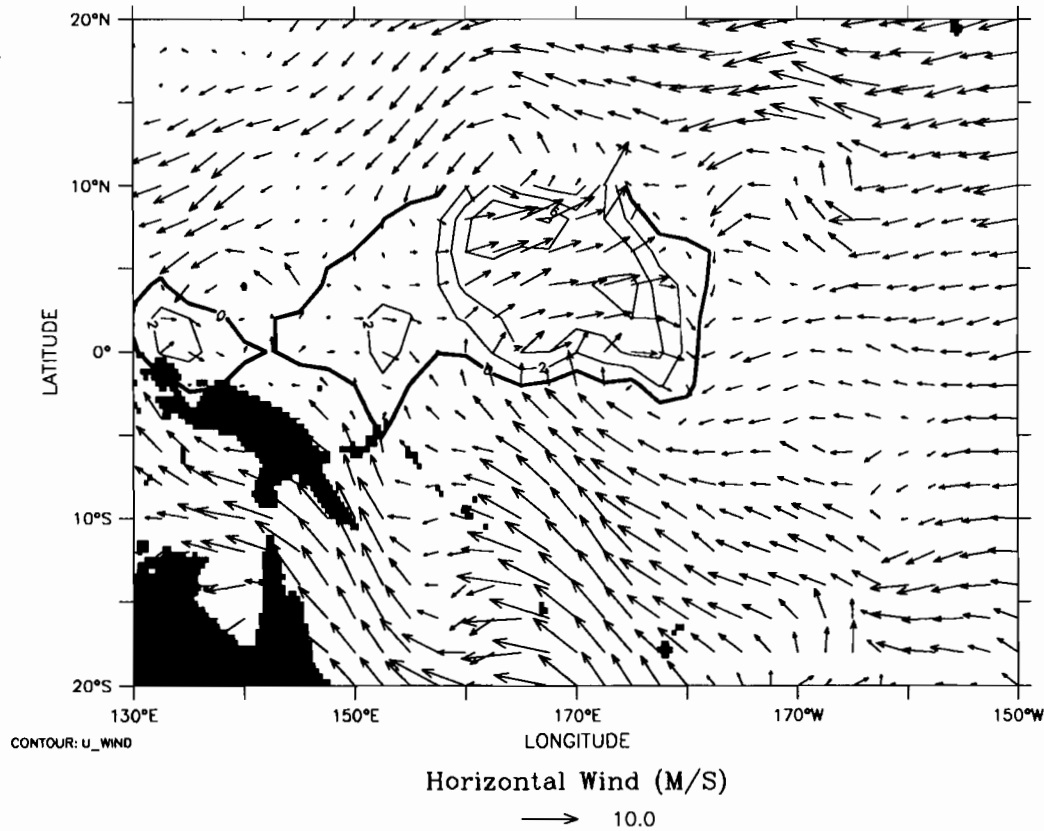
TIME : 18-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



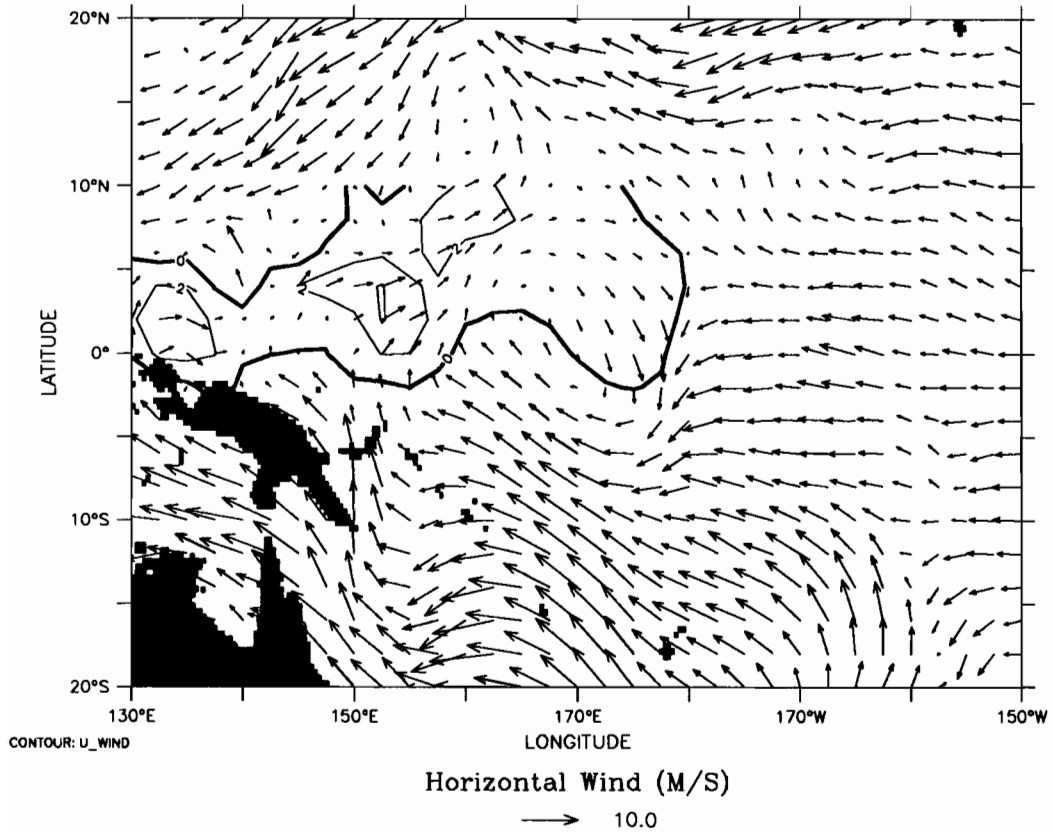
TIME : 19-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



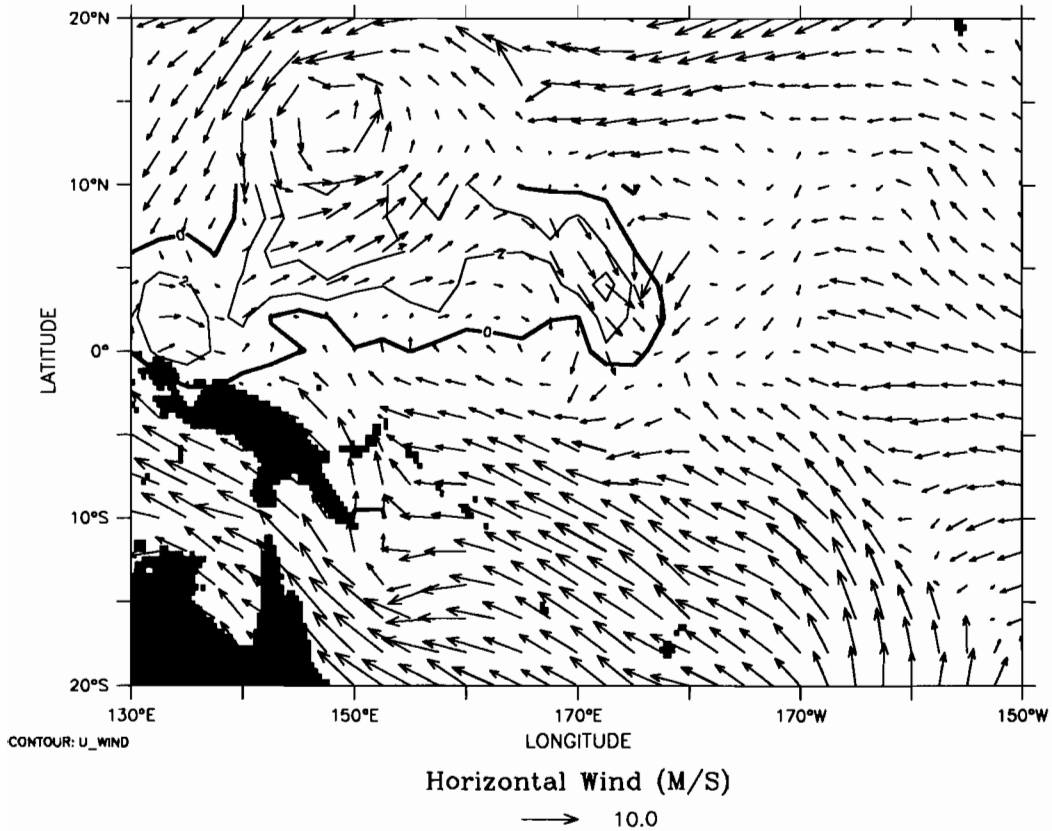
TIME : 20-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



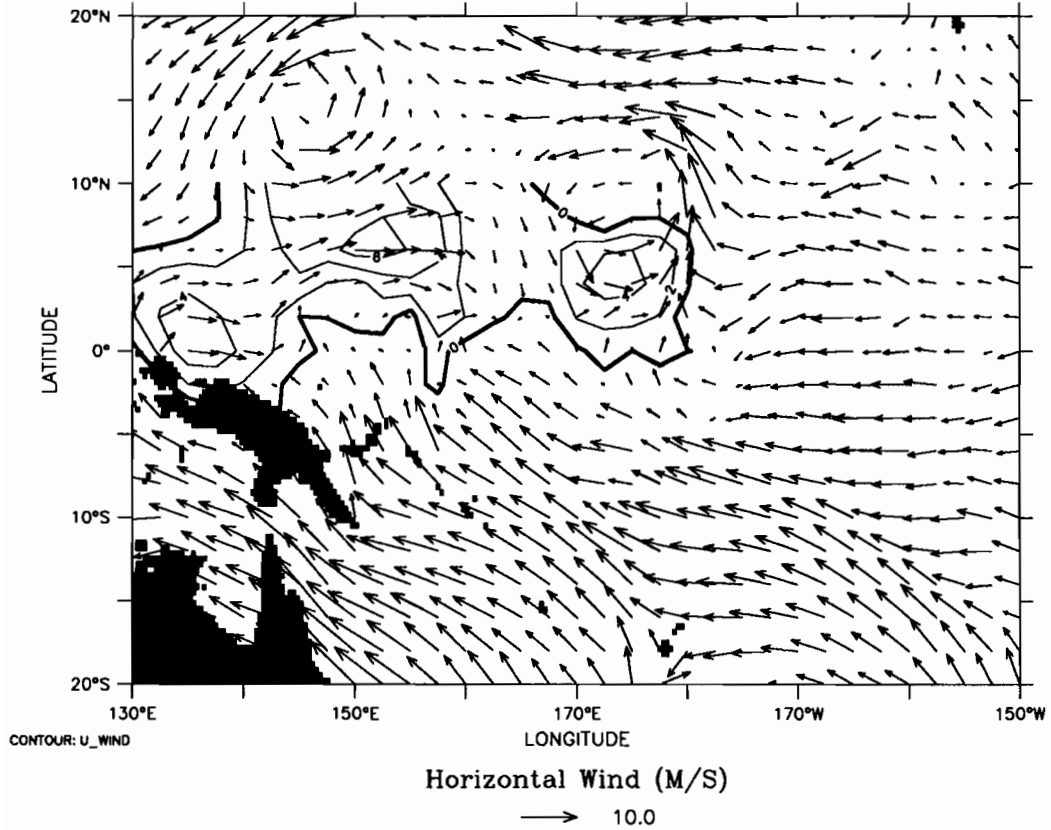
TIME : 21-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



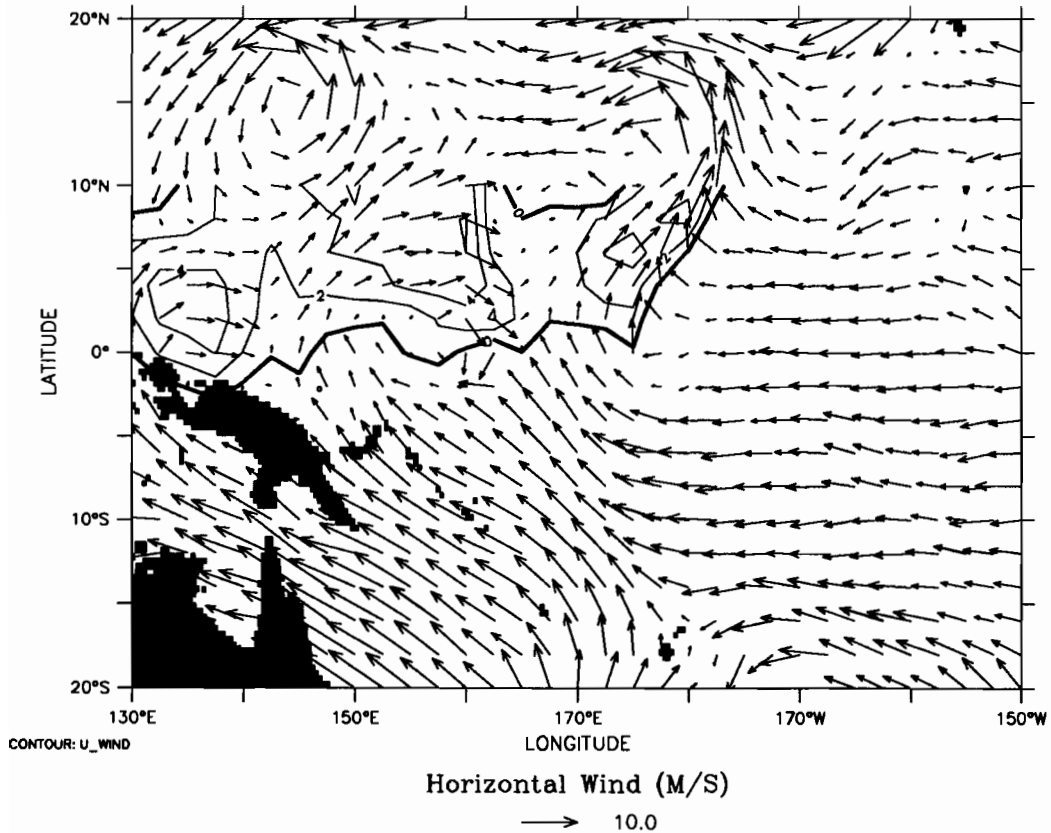
TIME : 22-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



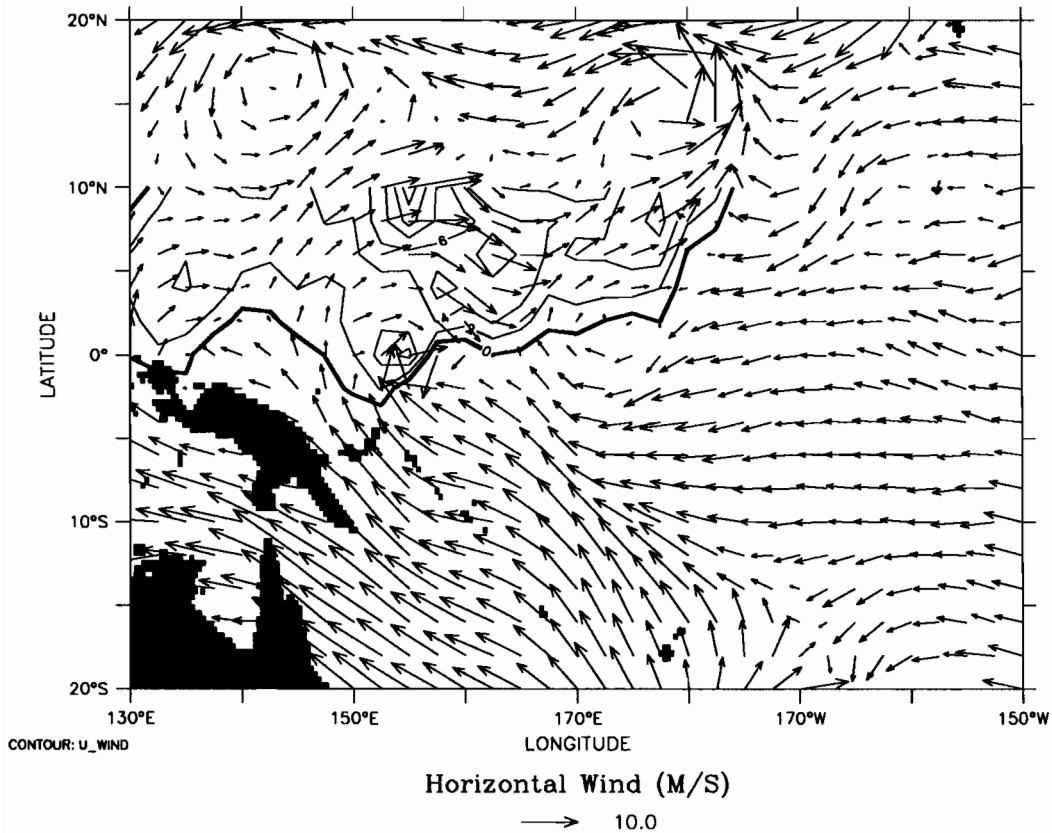
TIME : 23-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



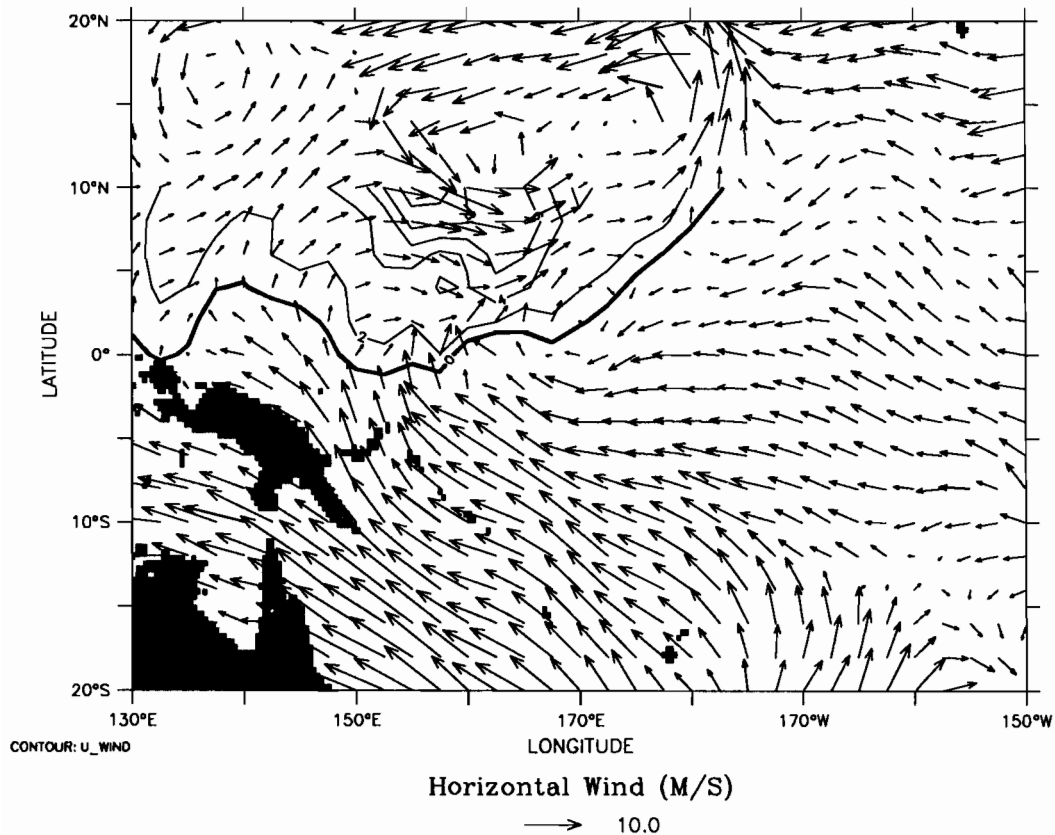
TIME : 24-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



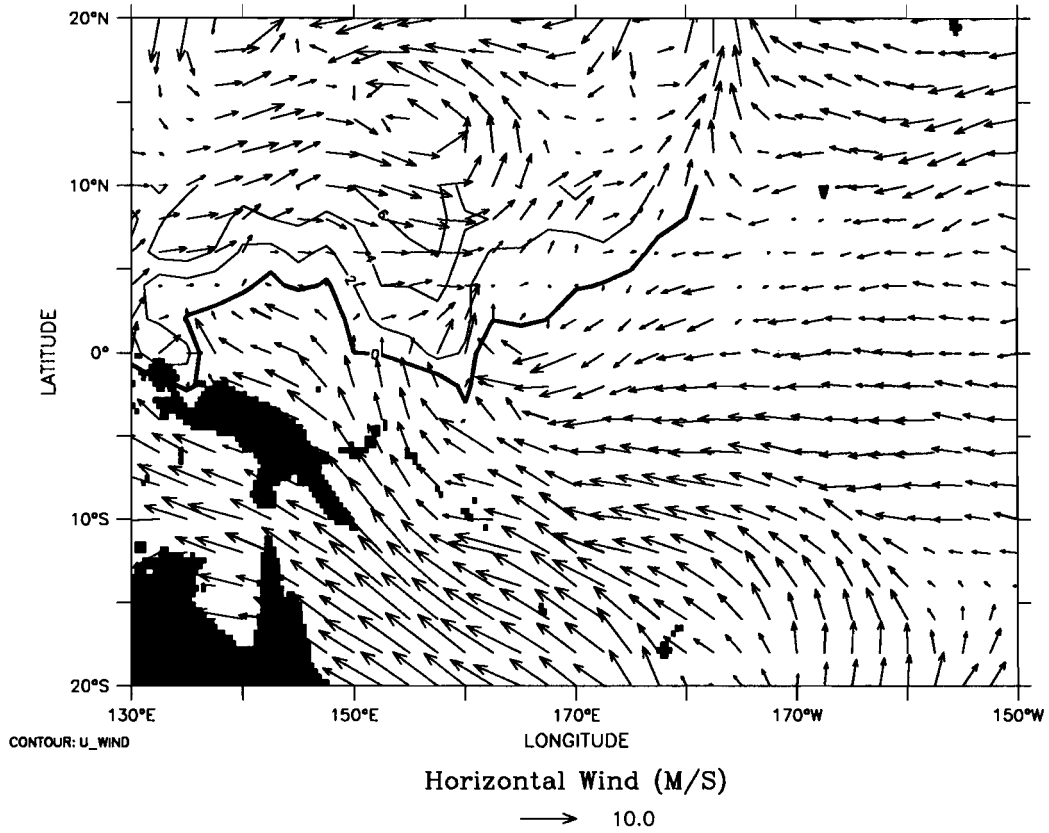
TIME : 25-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



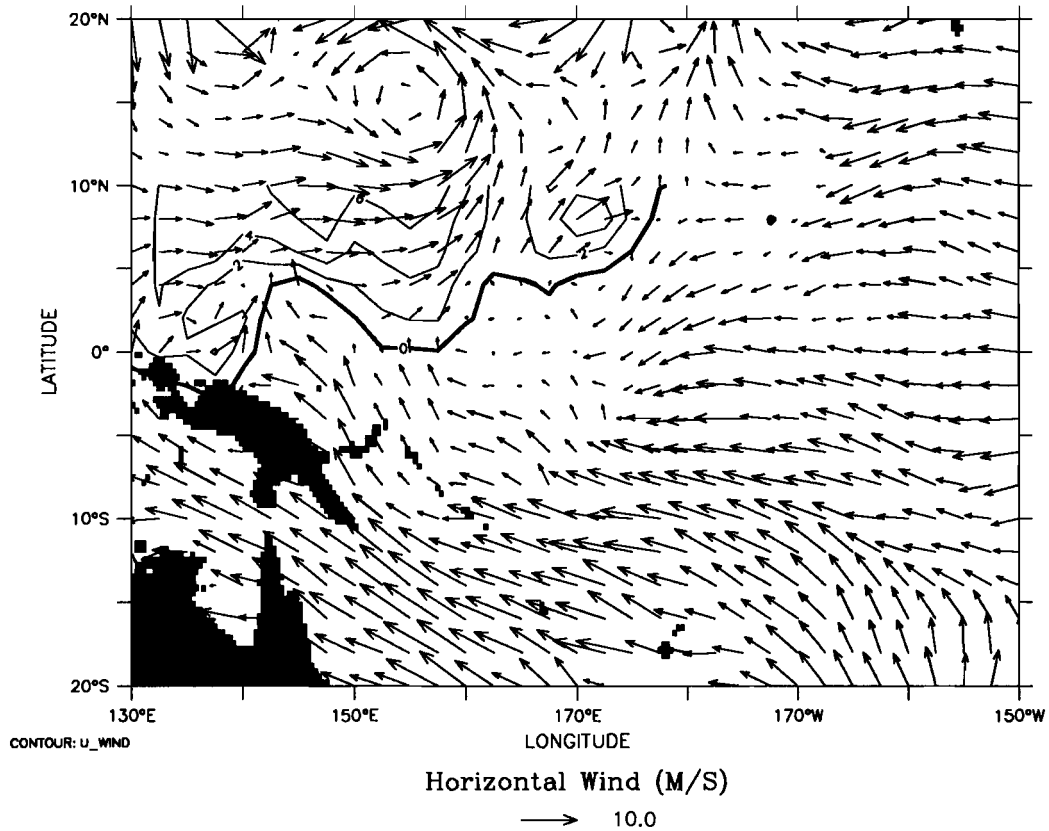
TIME : 26-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



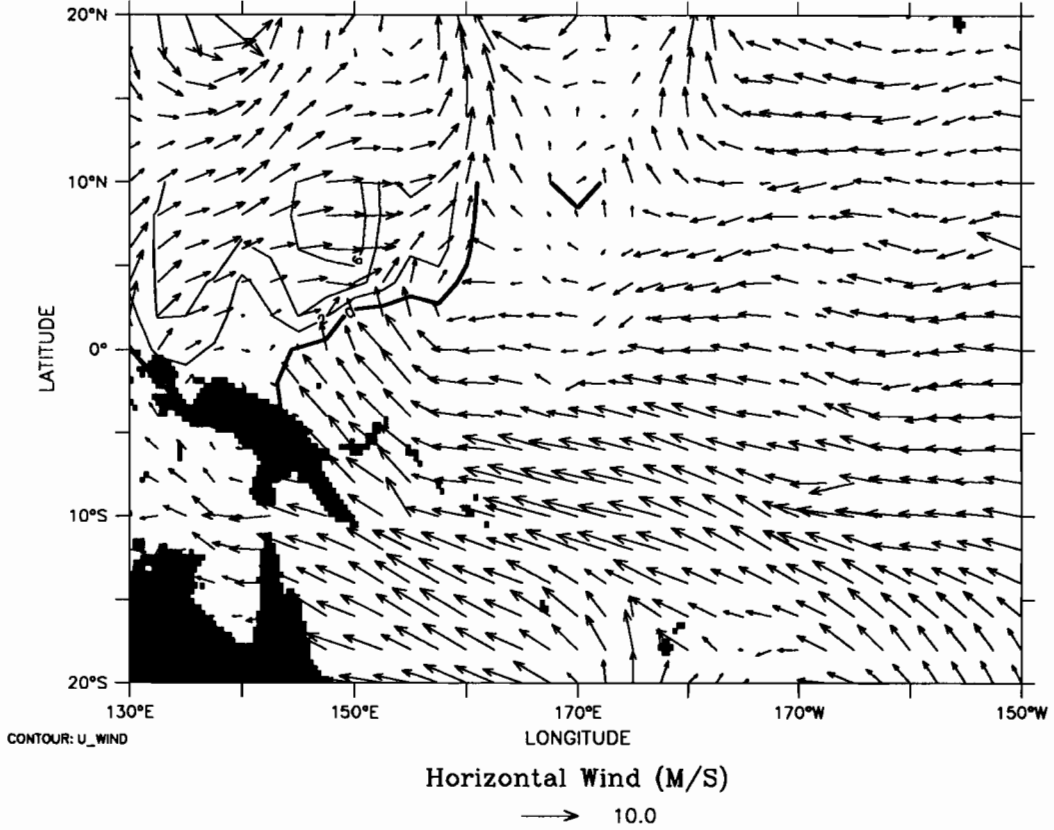
TIME : 27-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



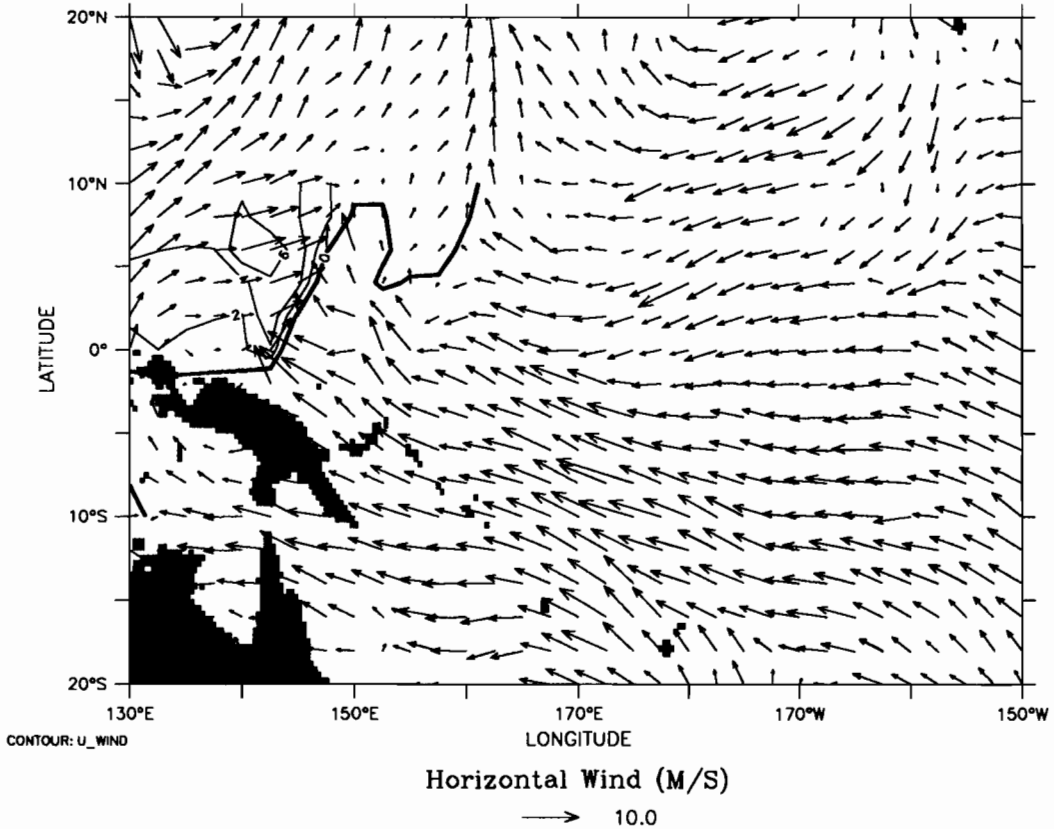
TIME : 28-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 29-SEP-1987 18:00

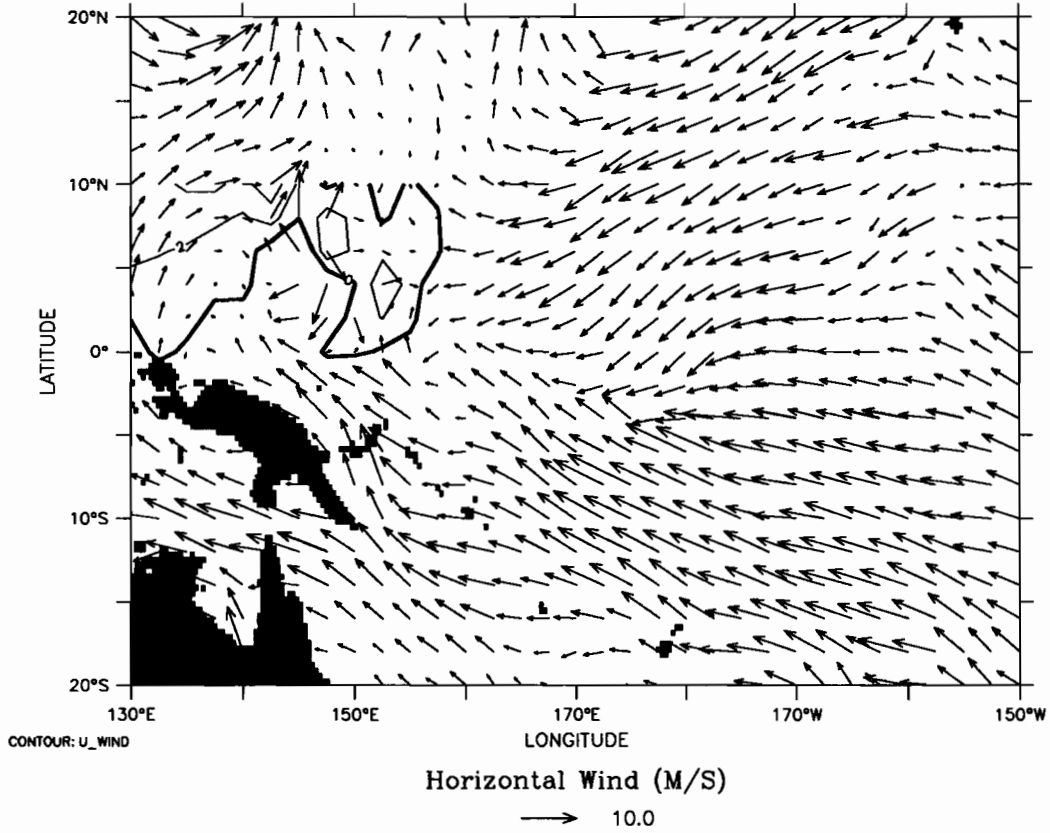
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





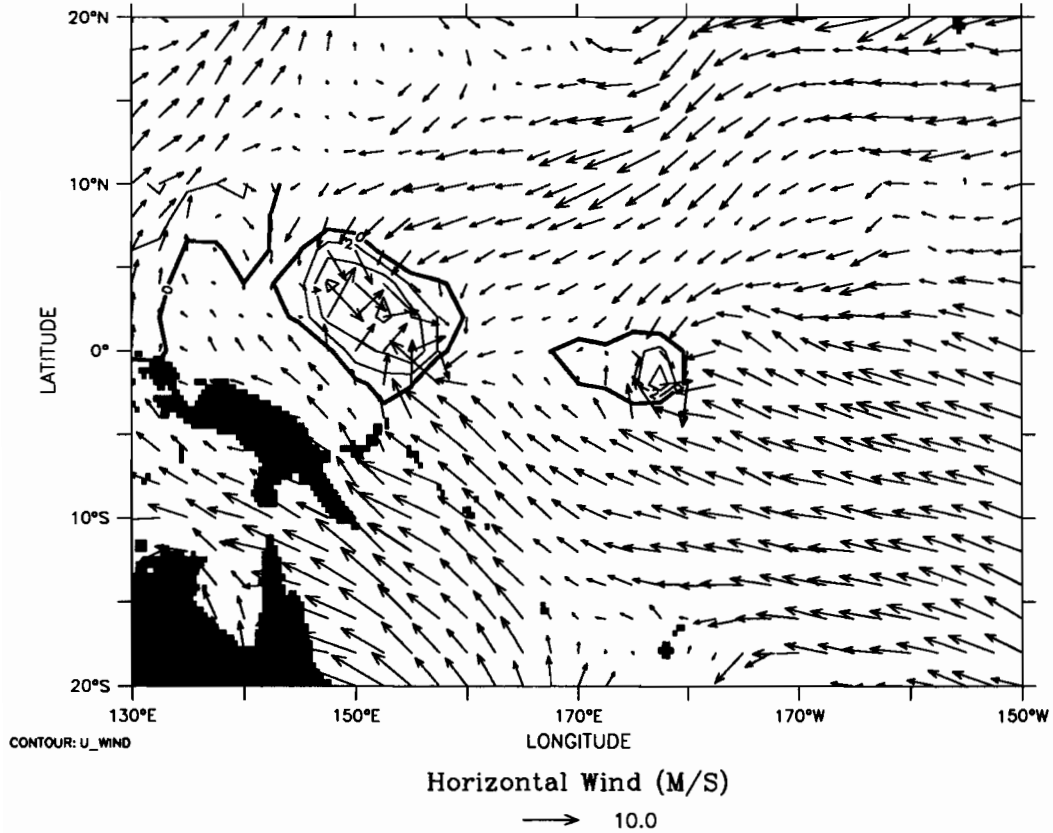
TIME : 30-SEP-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



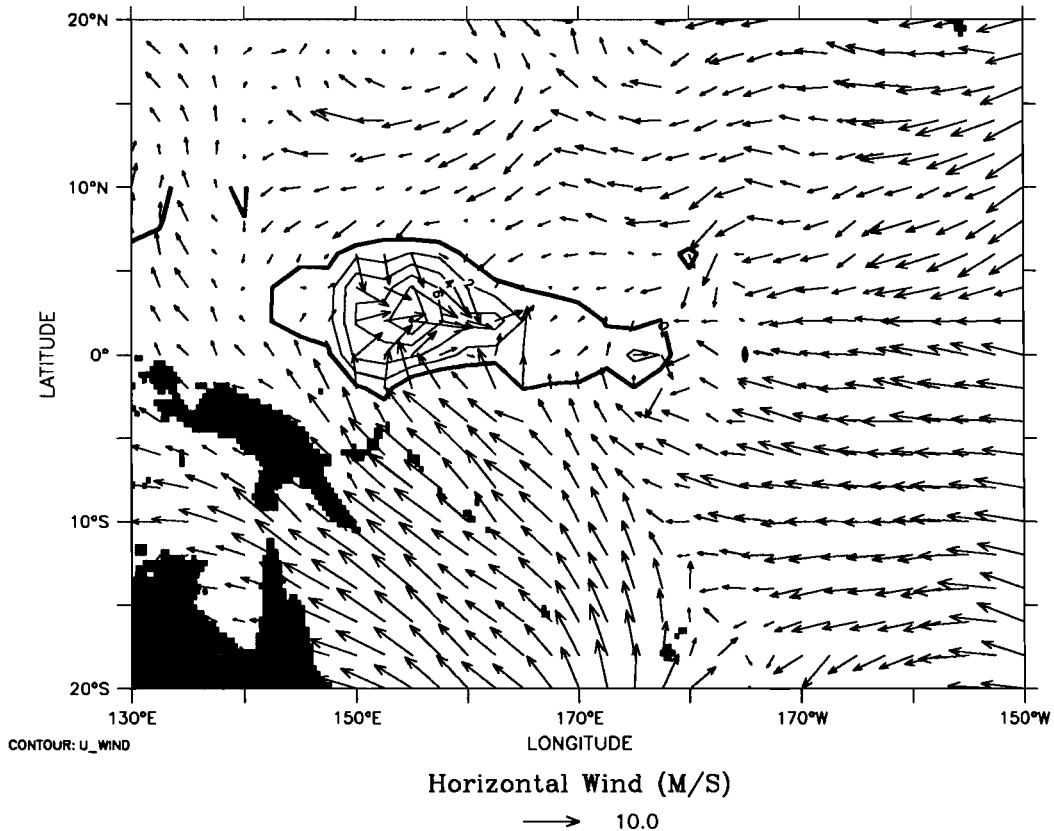
TIME : 01-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



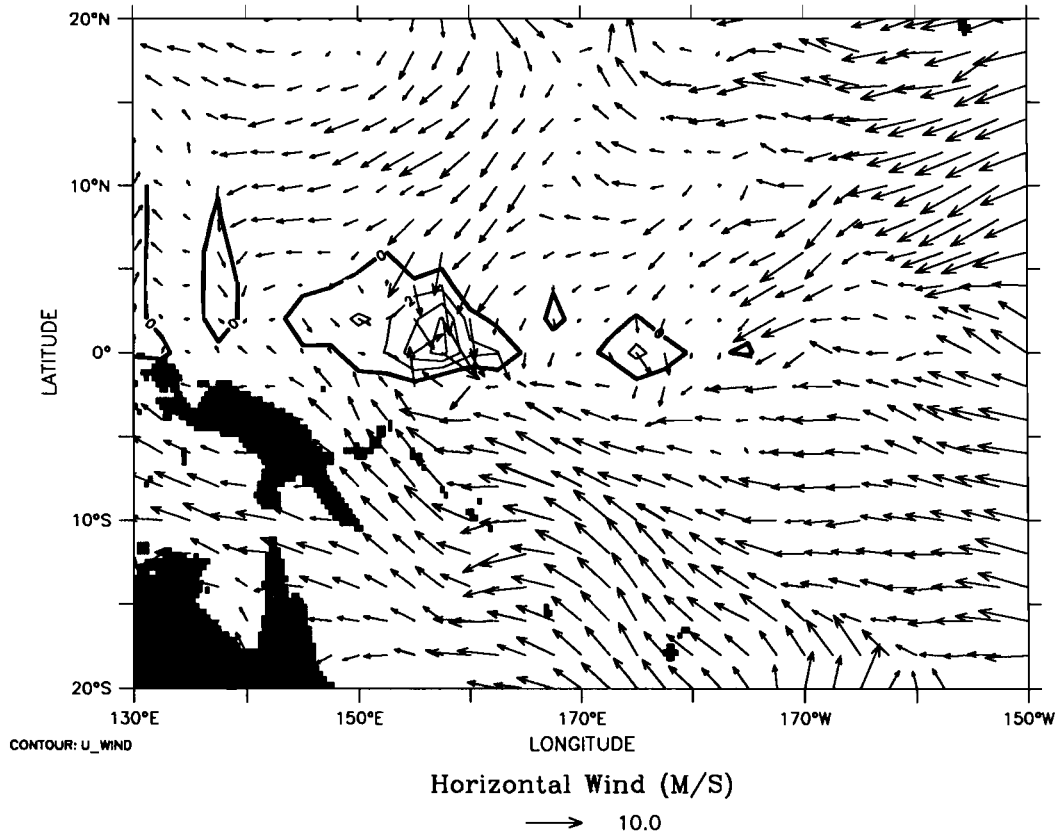
TIME : 02-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



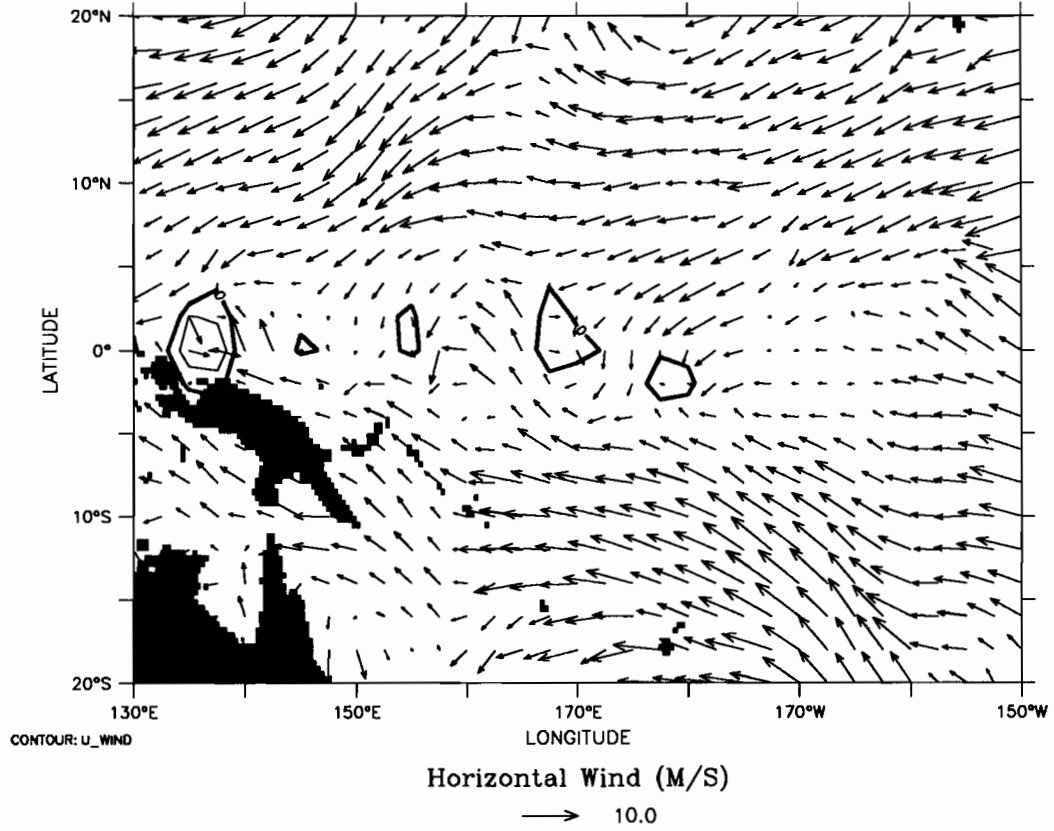
TIME : 03-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



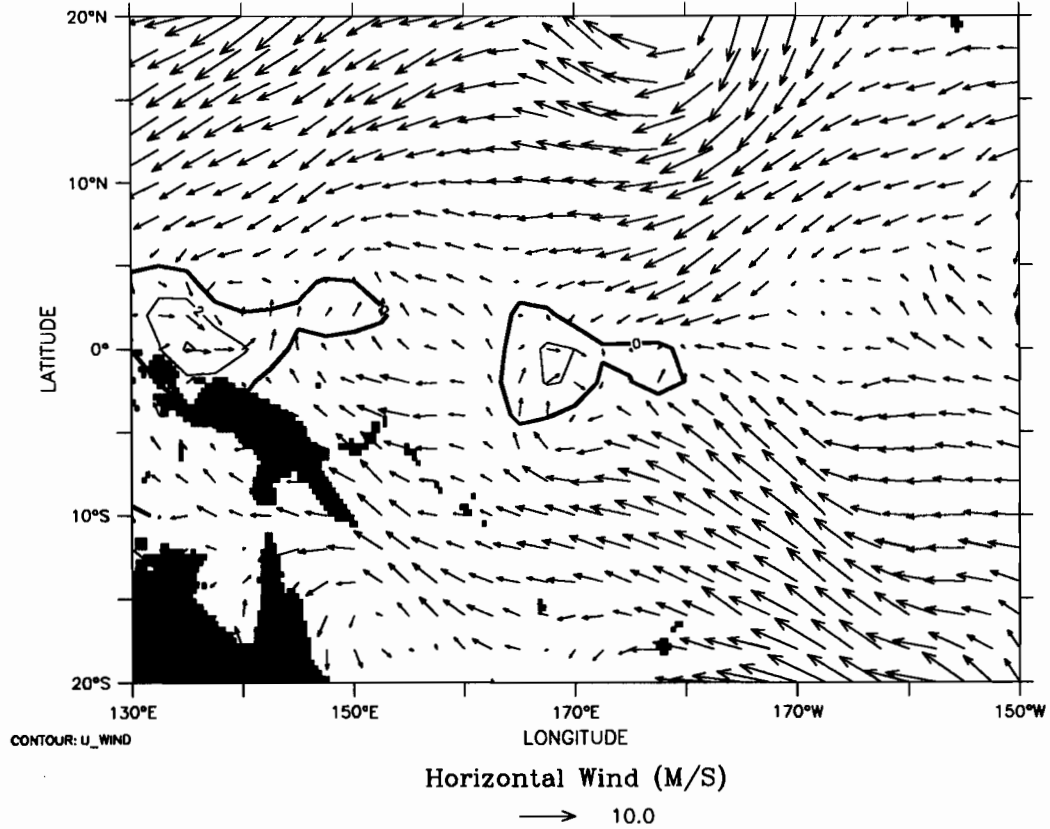
TIME : 04-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



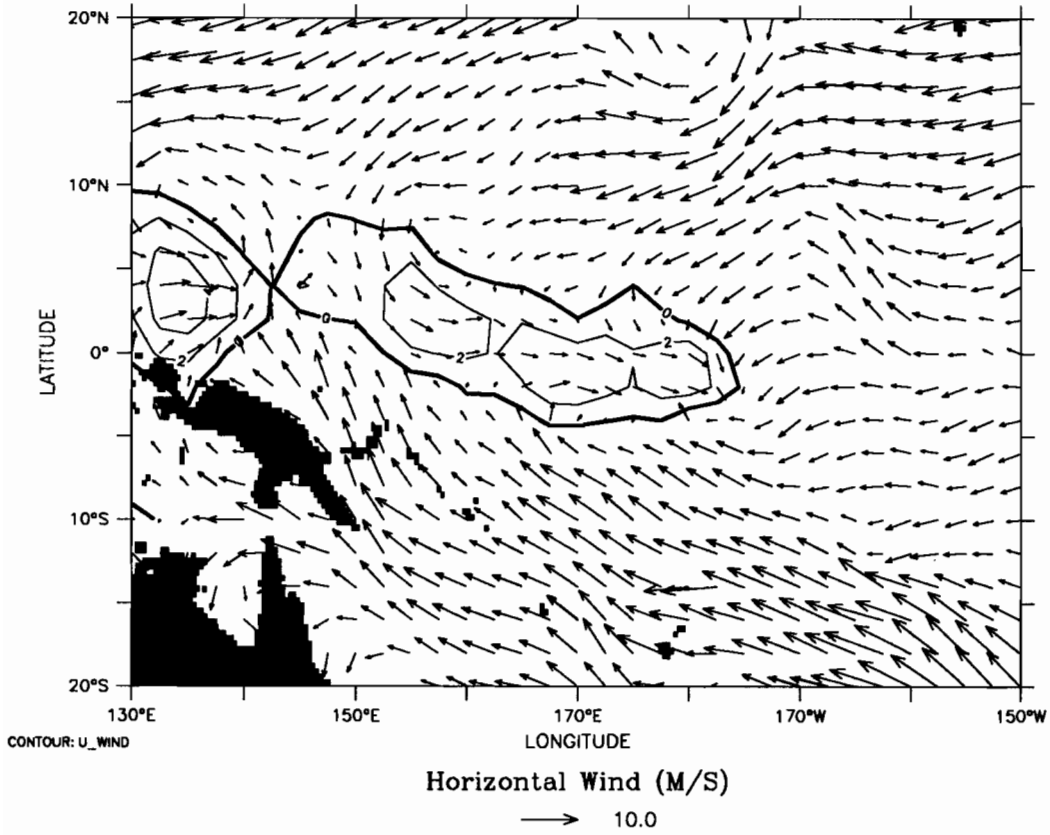
TIME : 05-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



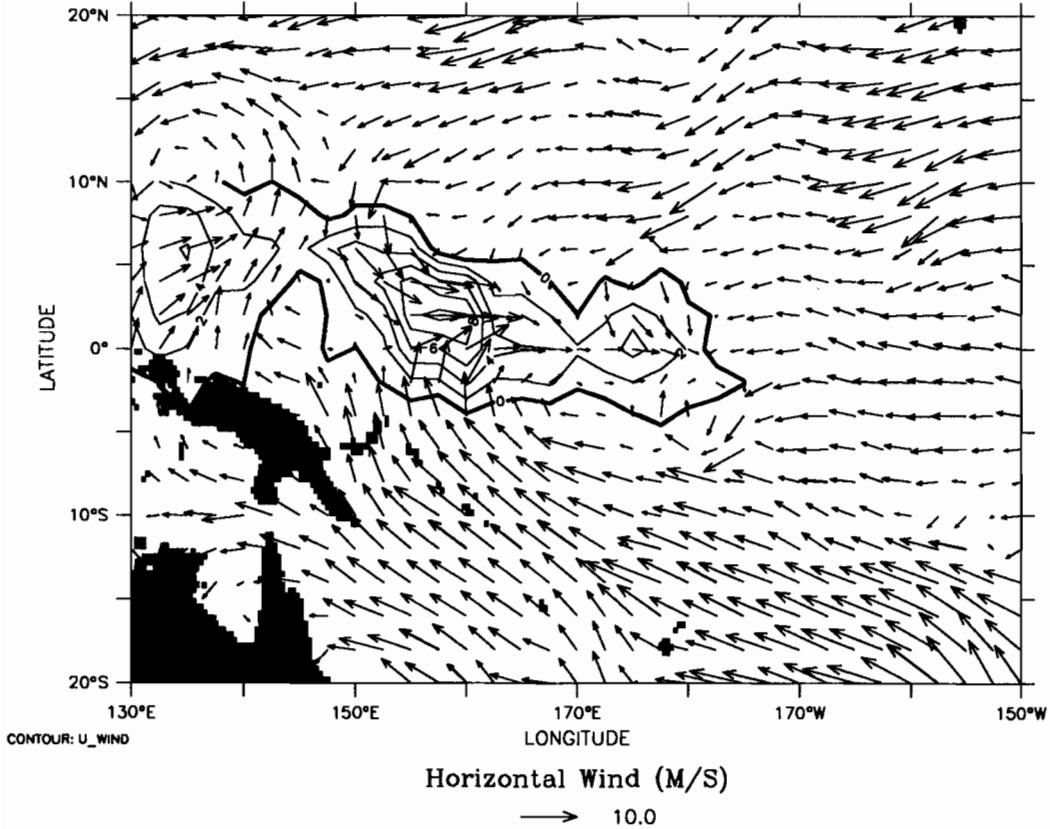
TIME : 08-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



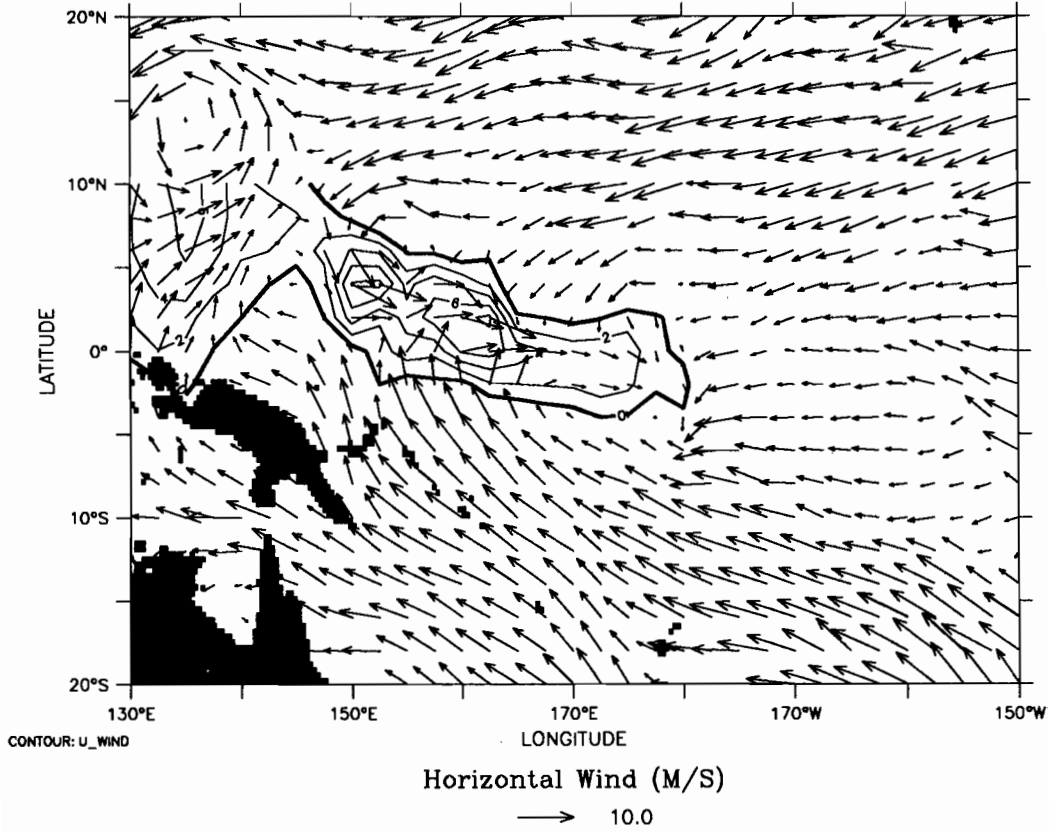
TIME : 09-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



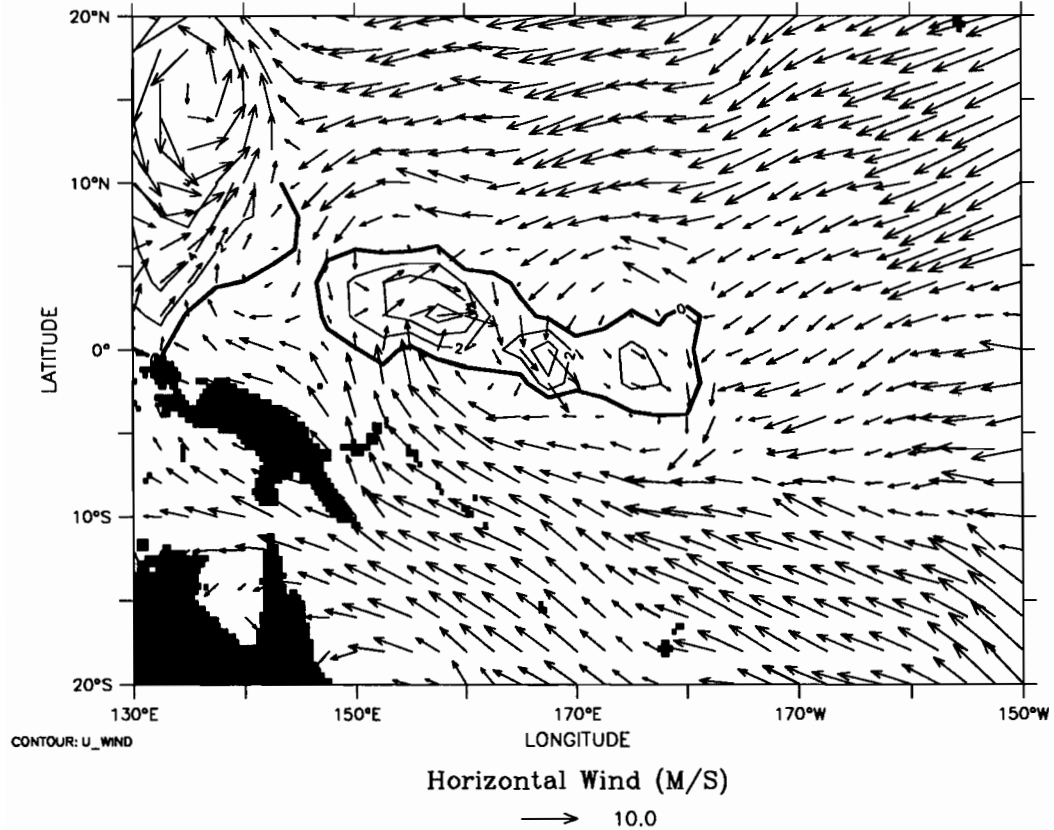
TIME : 10-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



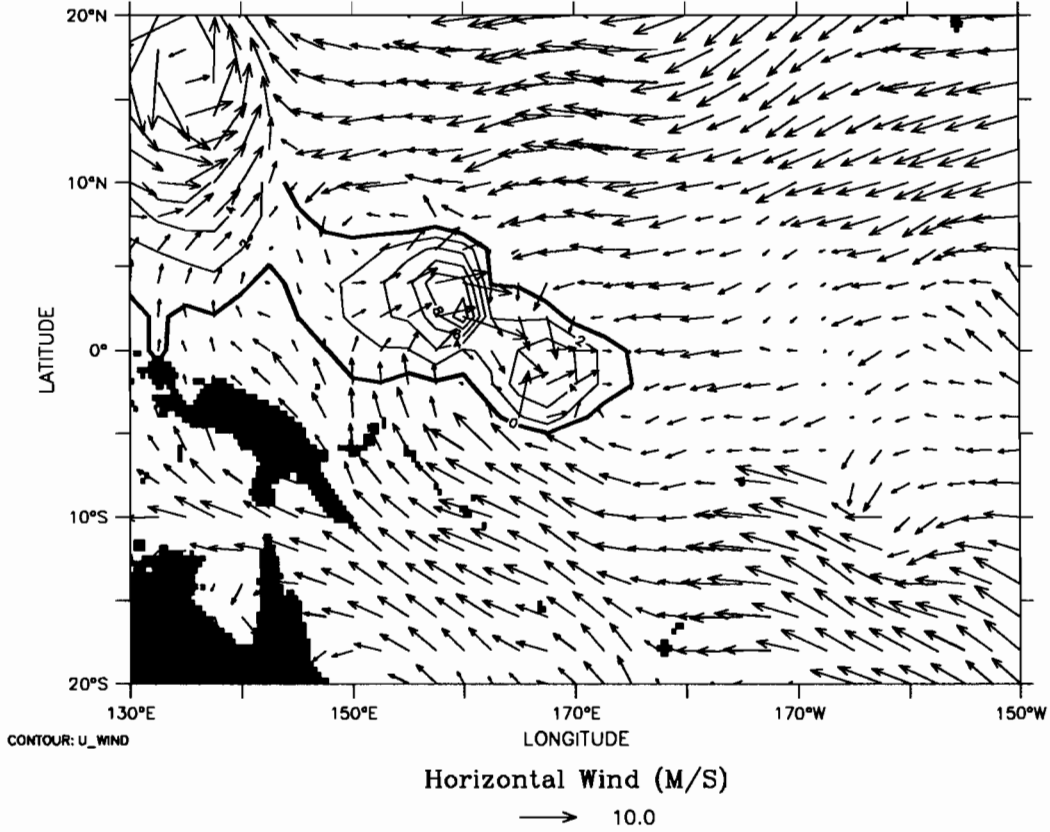
TIME : 11-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



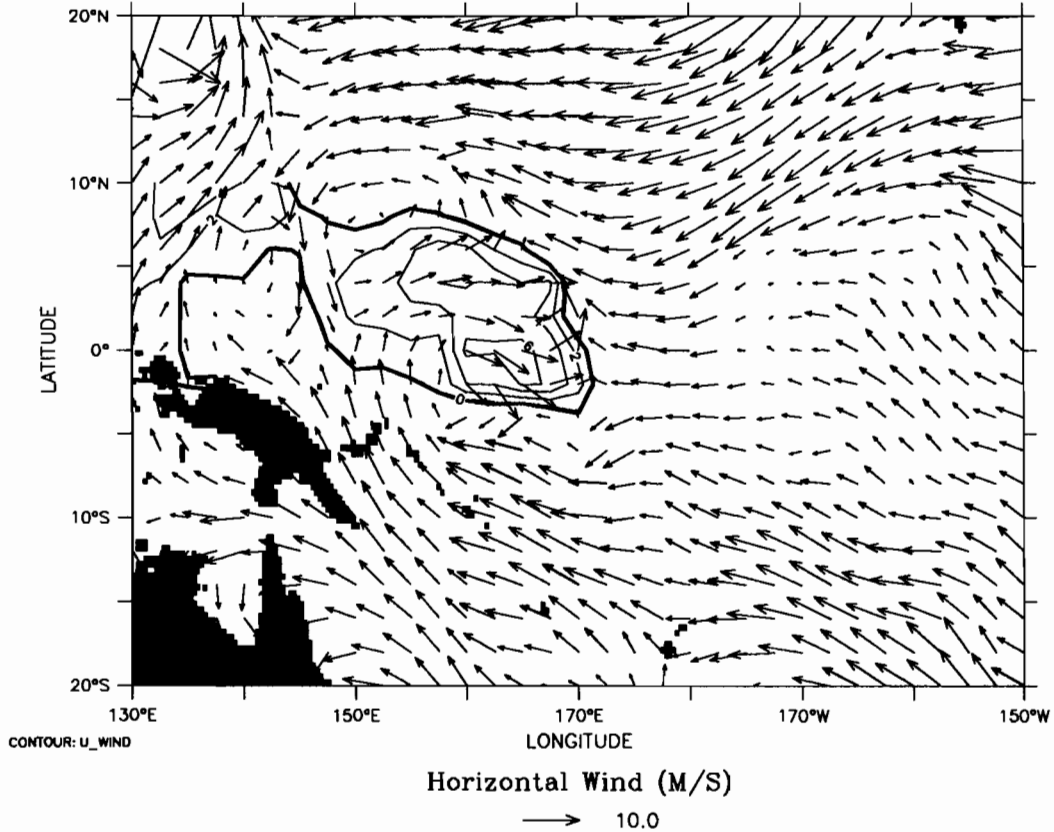
TIME : 12-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



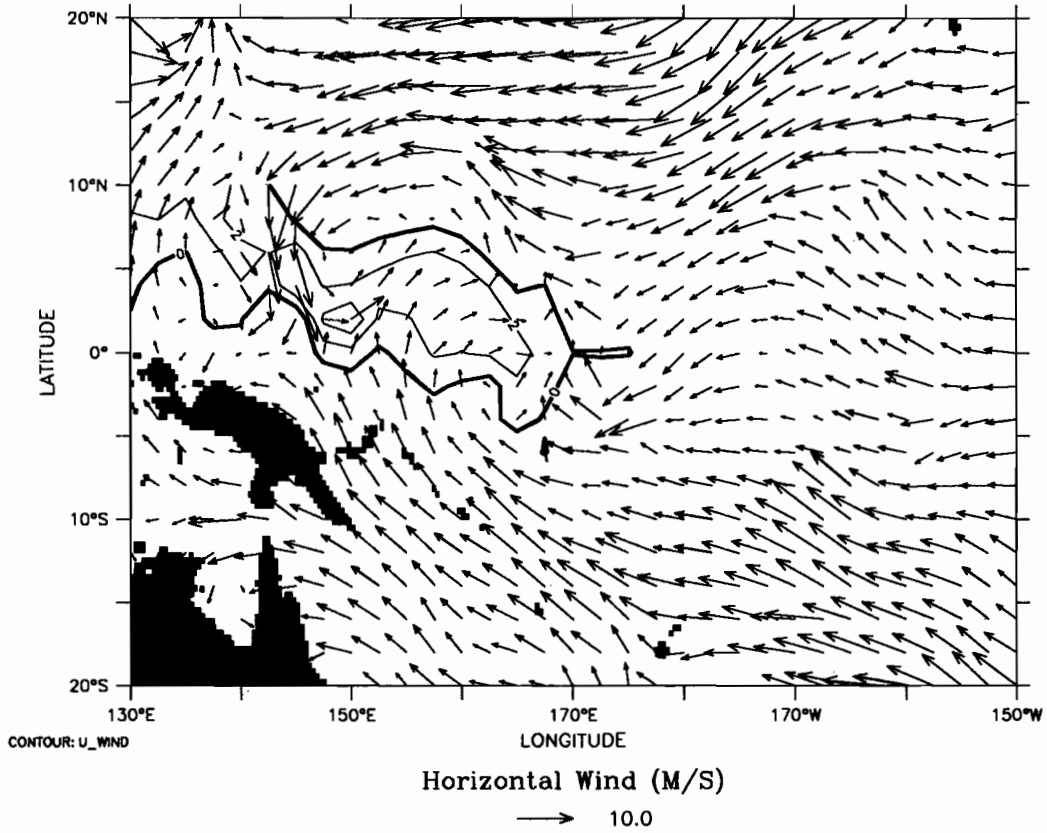
TIME : 13-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



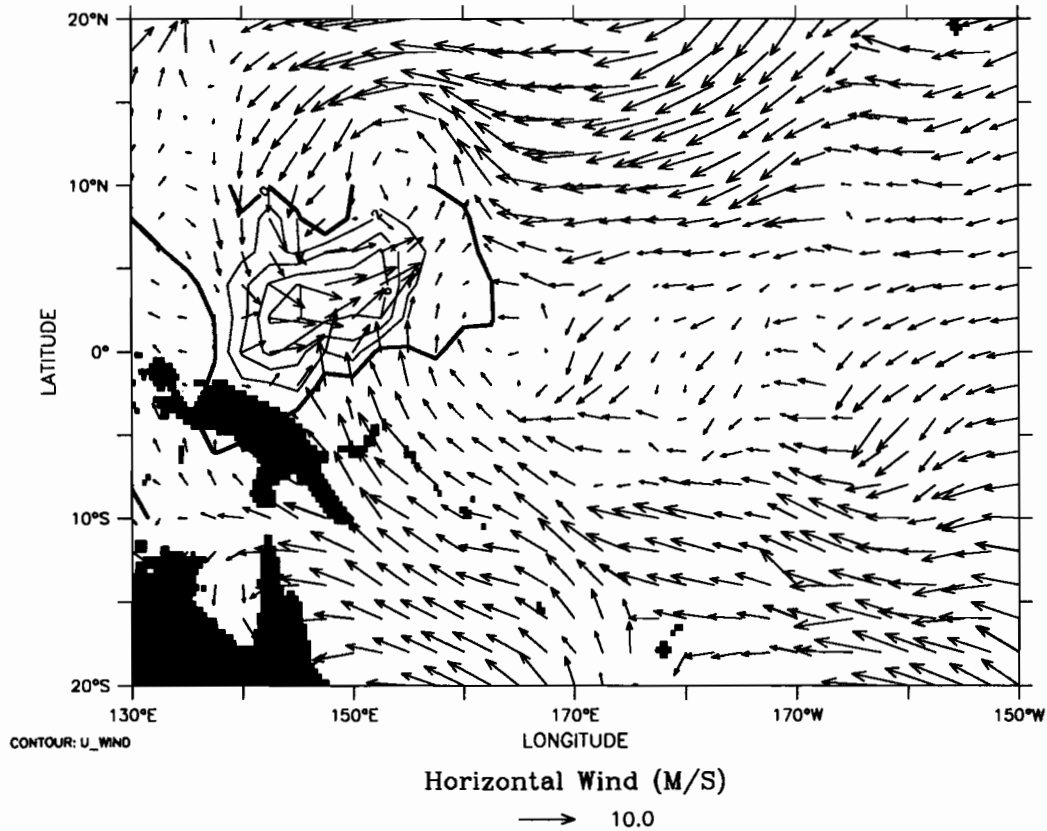
TIME : 14-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



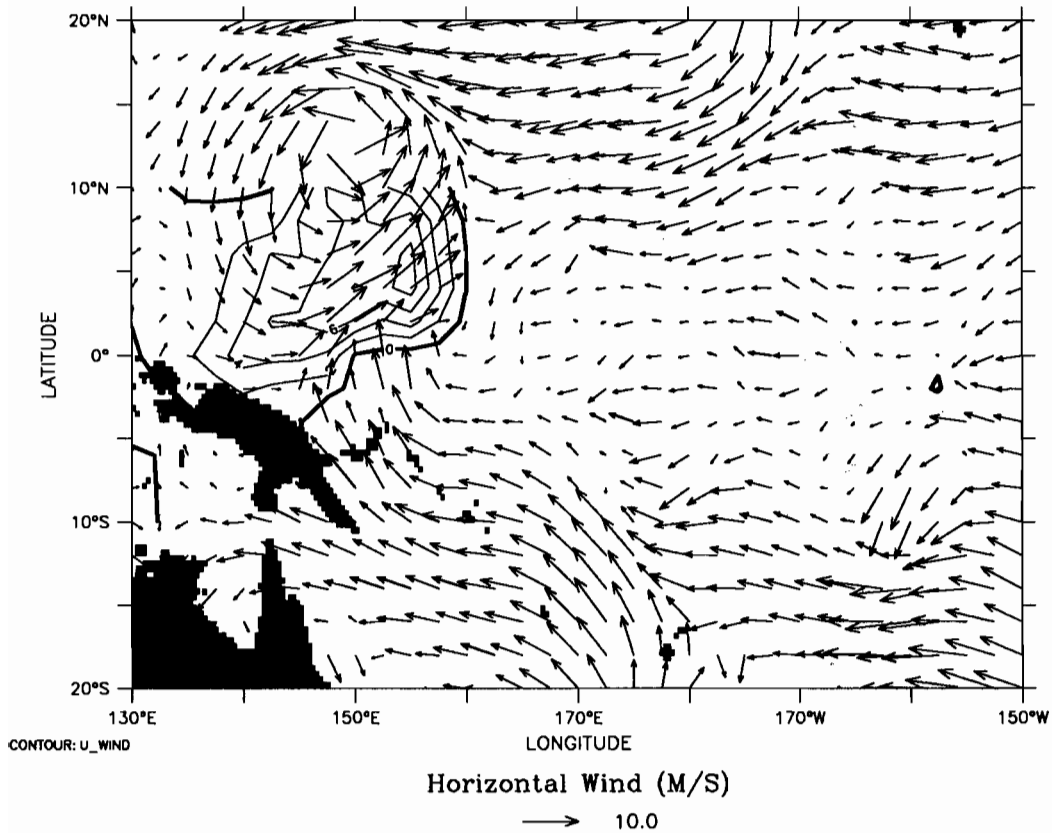
TIME : 15-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



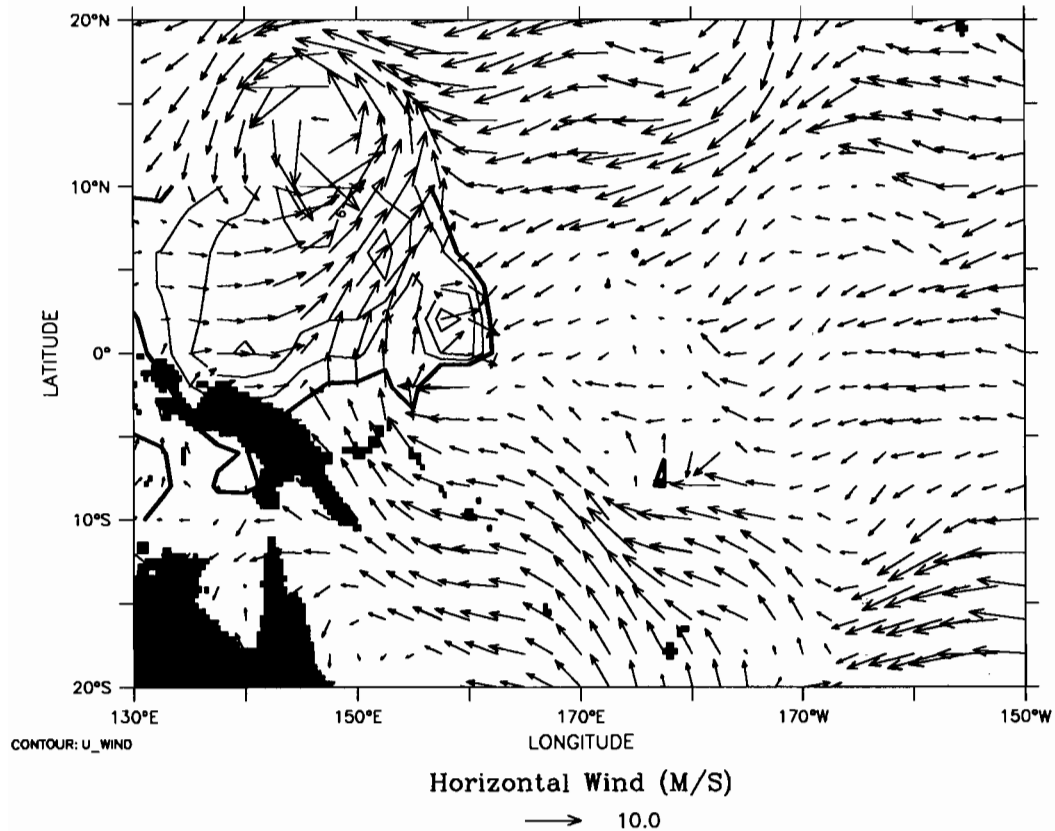
TIME : 16-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 17-OCT-1987 18:00

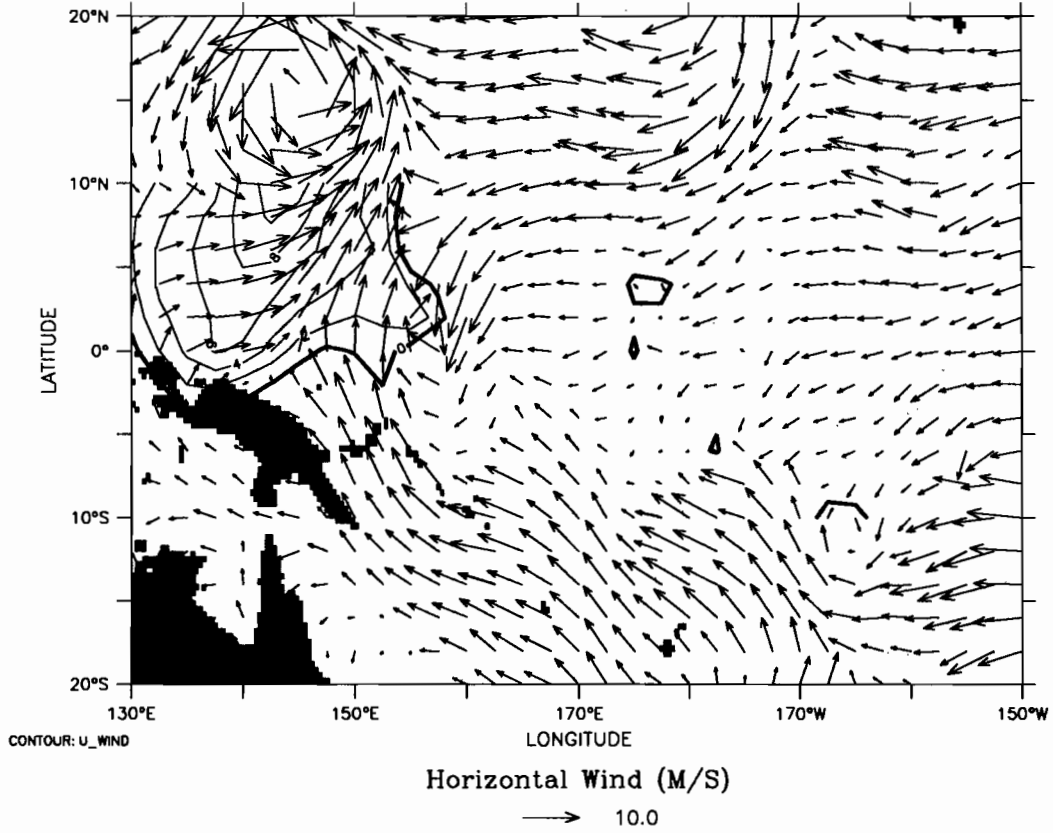
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





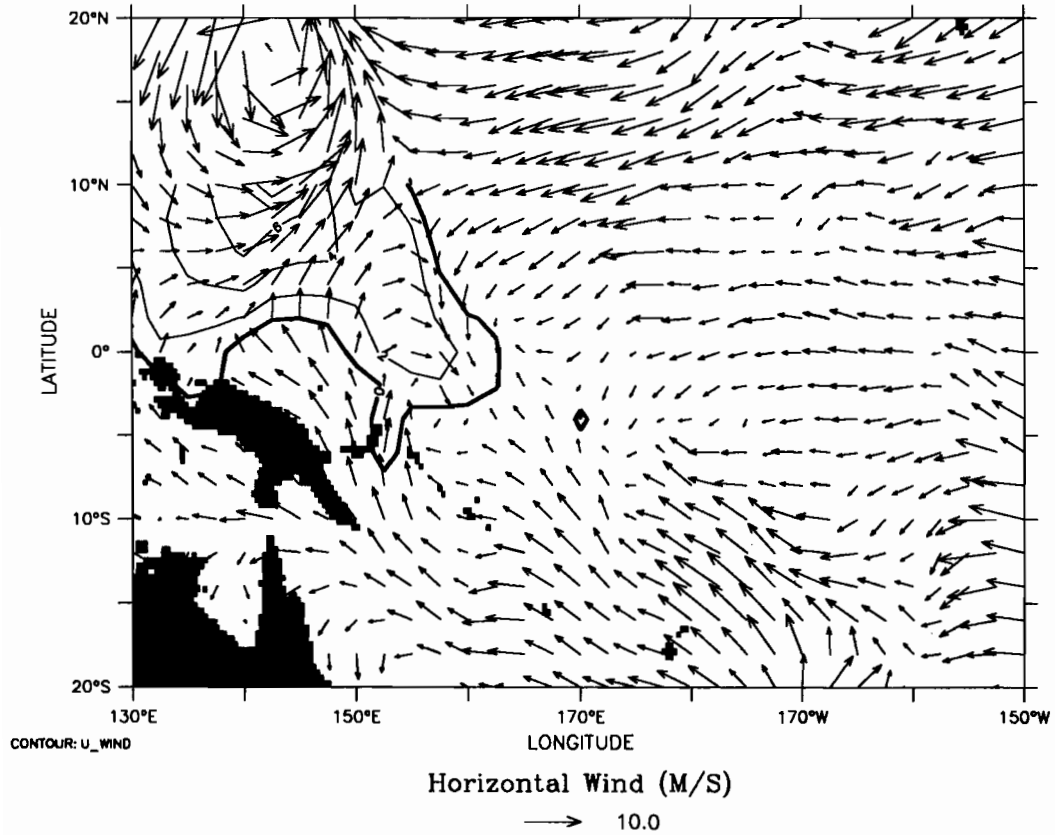
TIME : 18-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



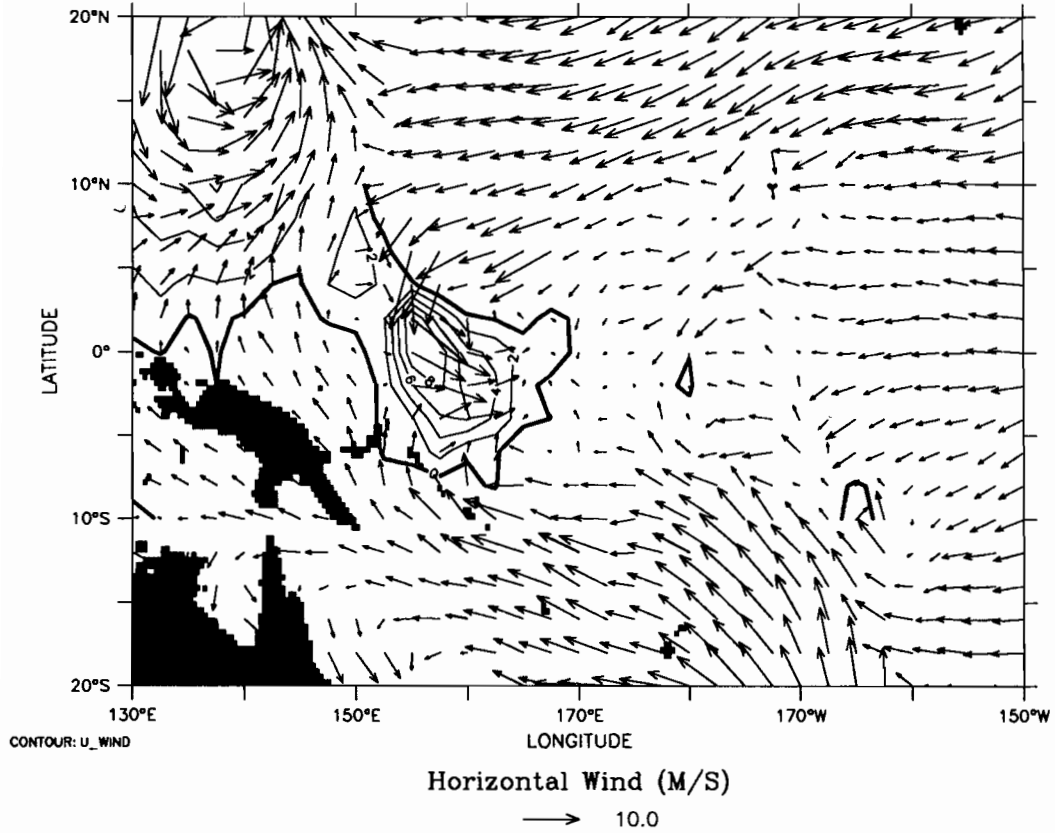
TIME : 19-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



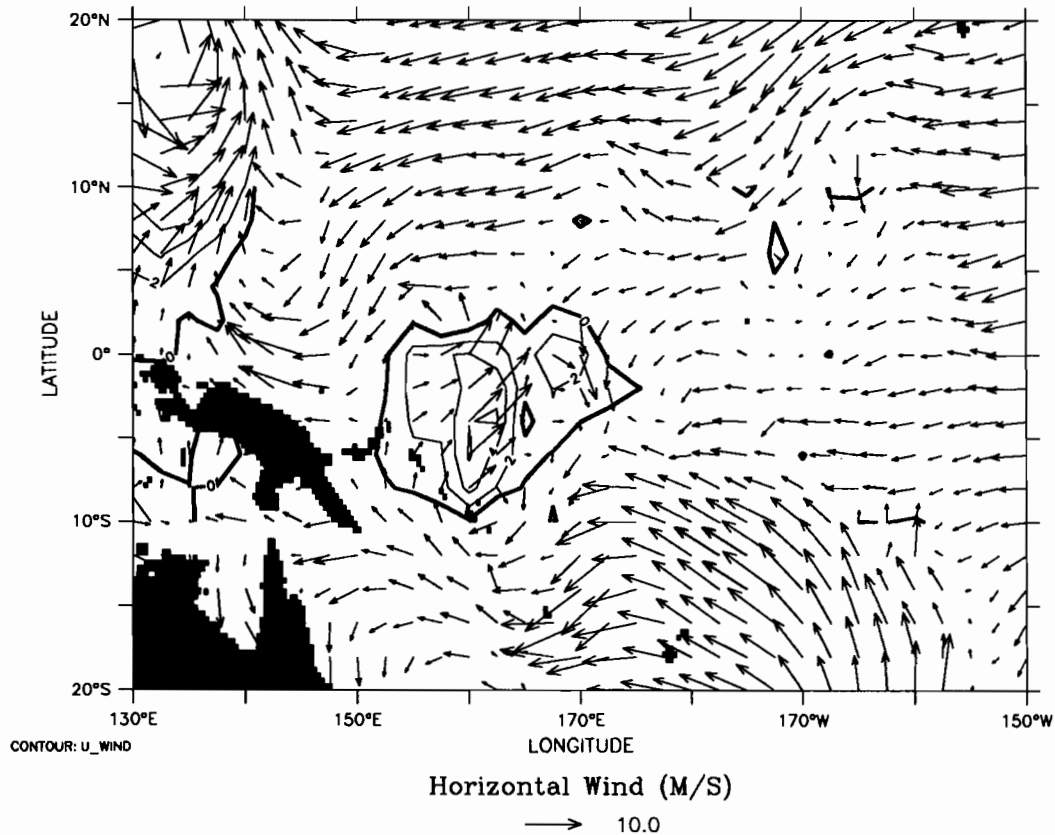
TIME : 20-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



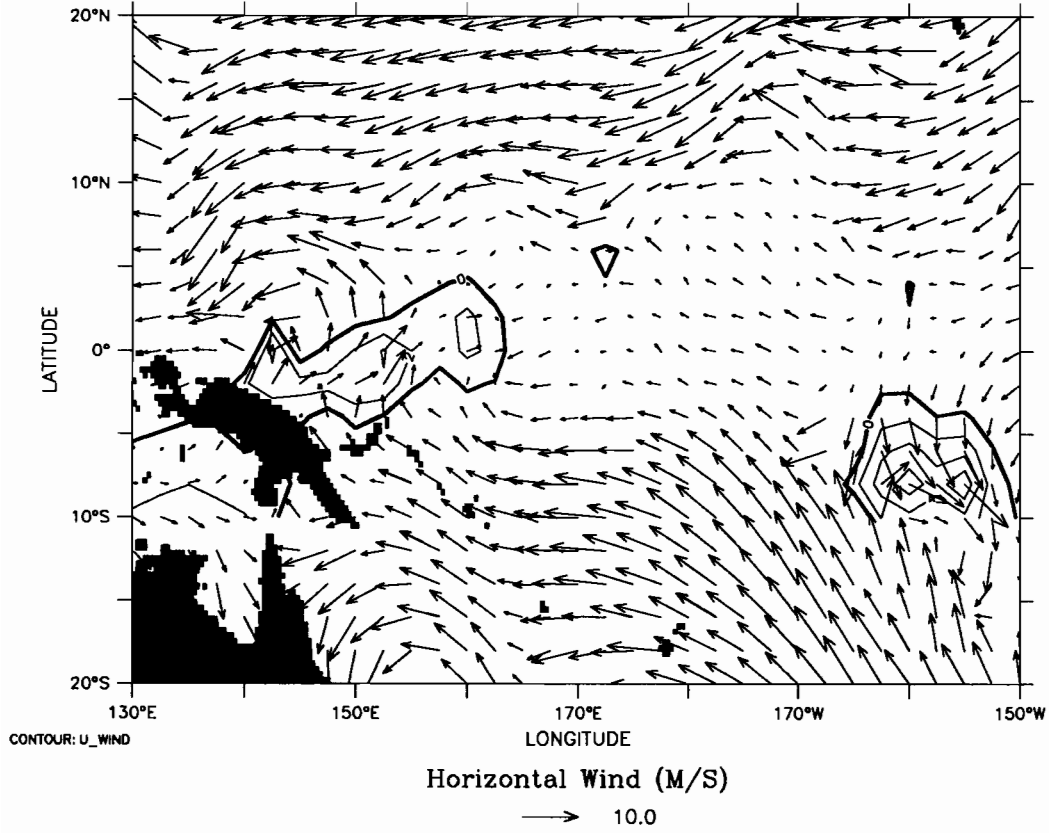
TIME : 21-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



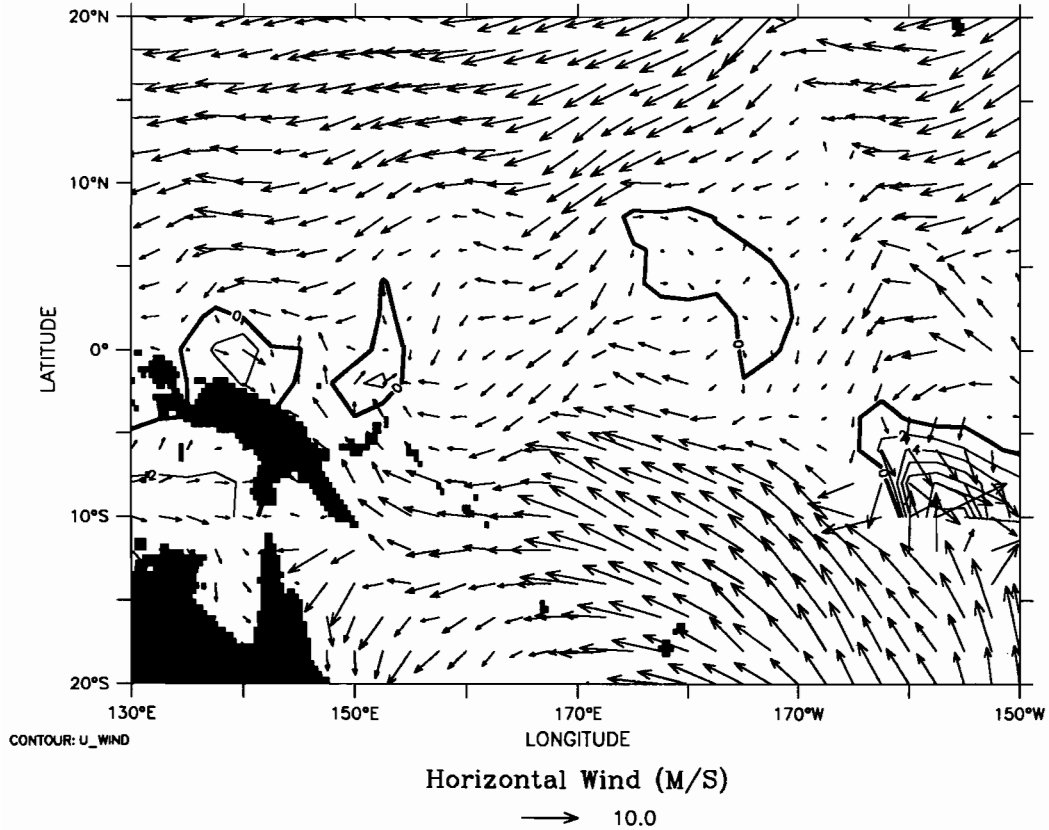
TIME : 23-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



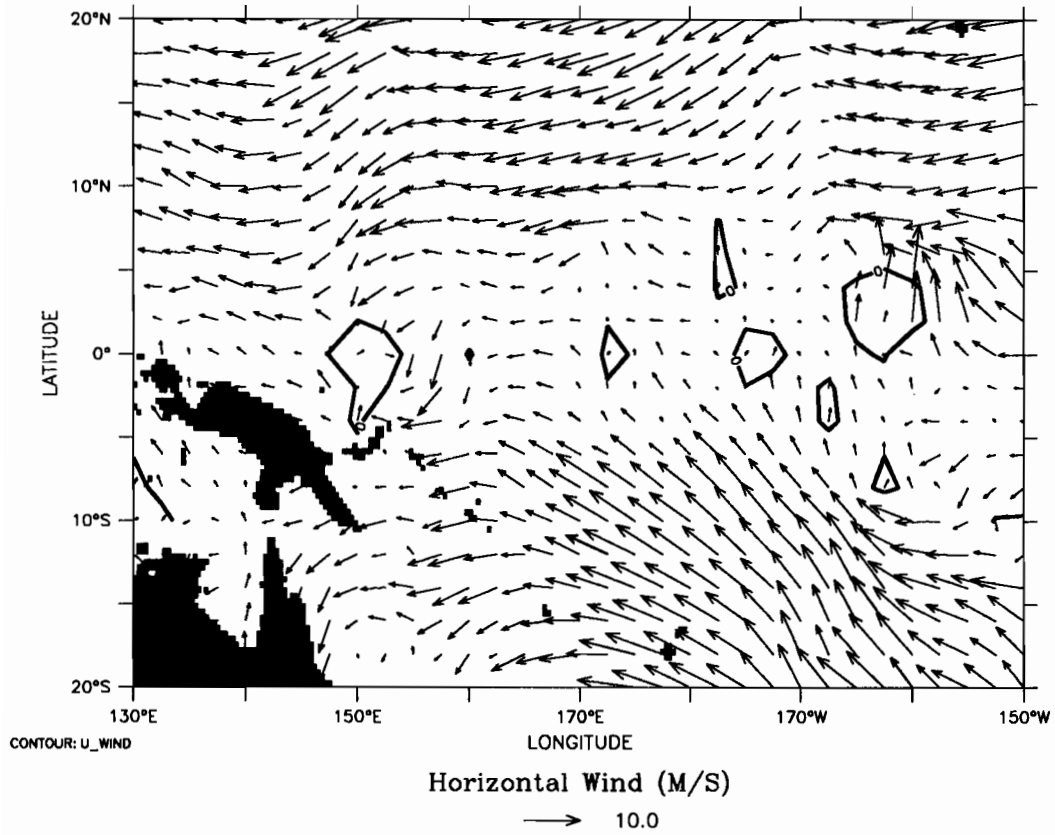
TIME : 24-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



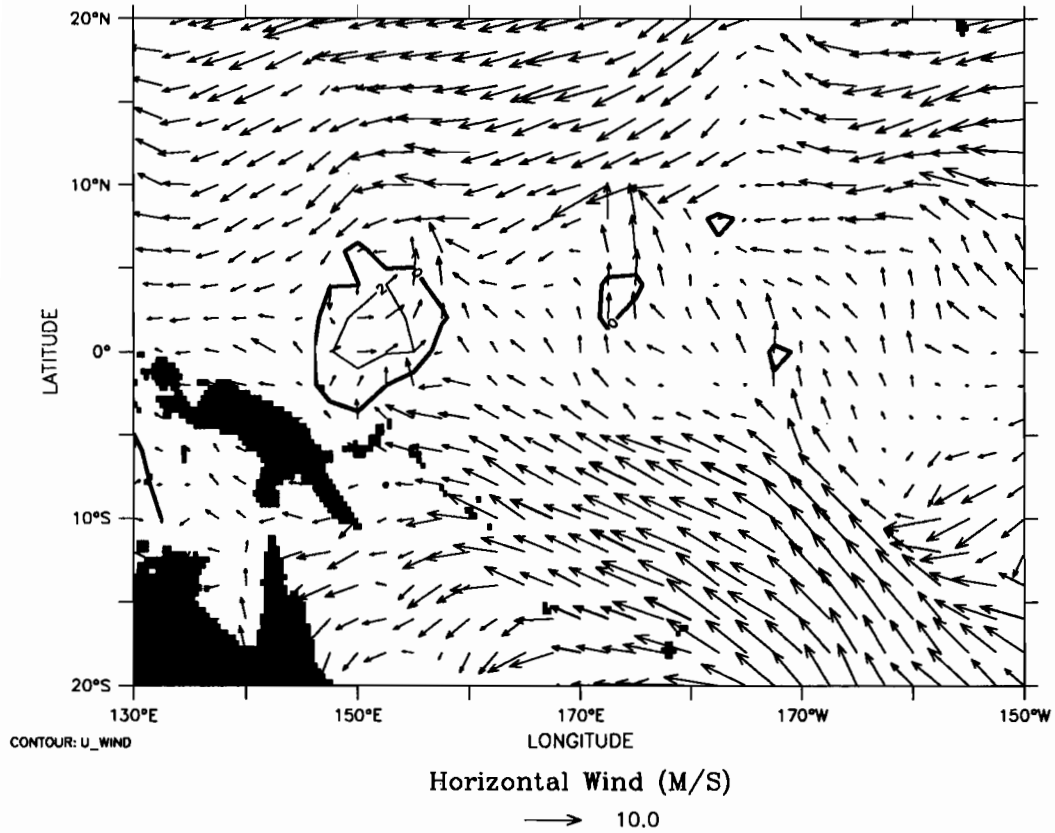
TIME : 25-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



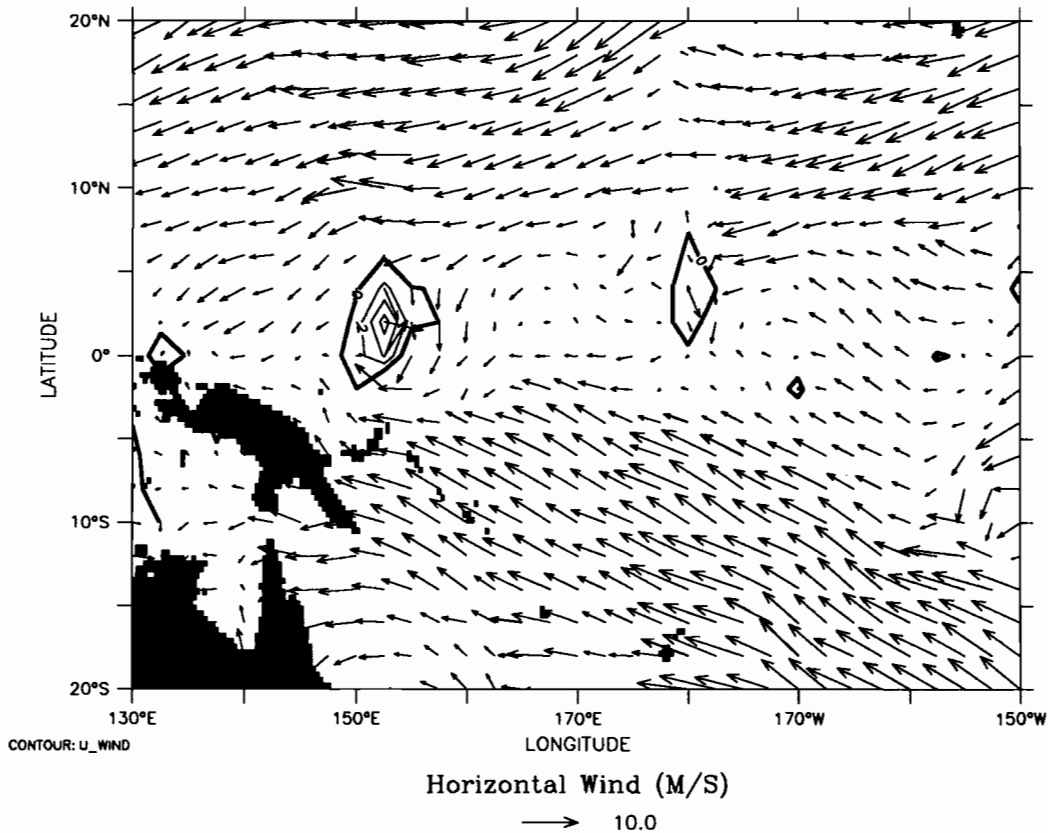
TIME : 26-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



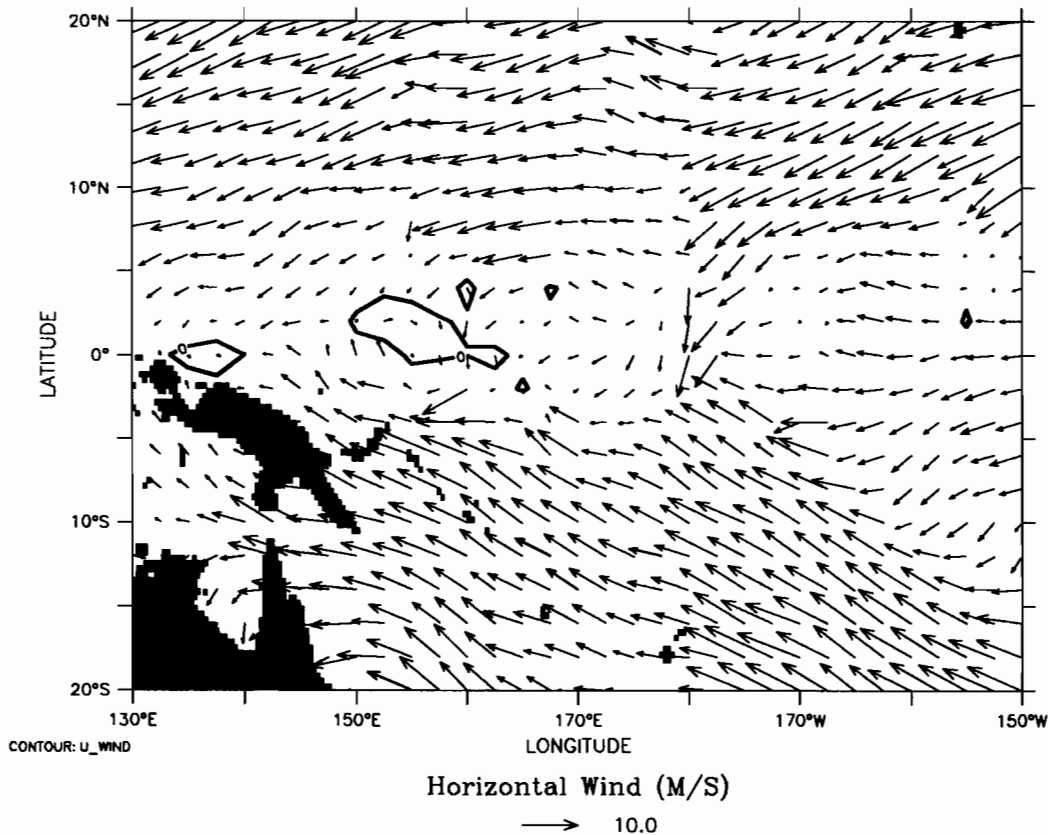
TIME : 27-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSML/Atlas gridded winds



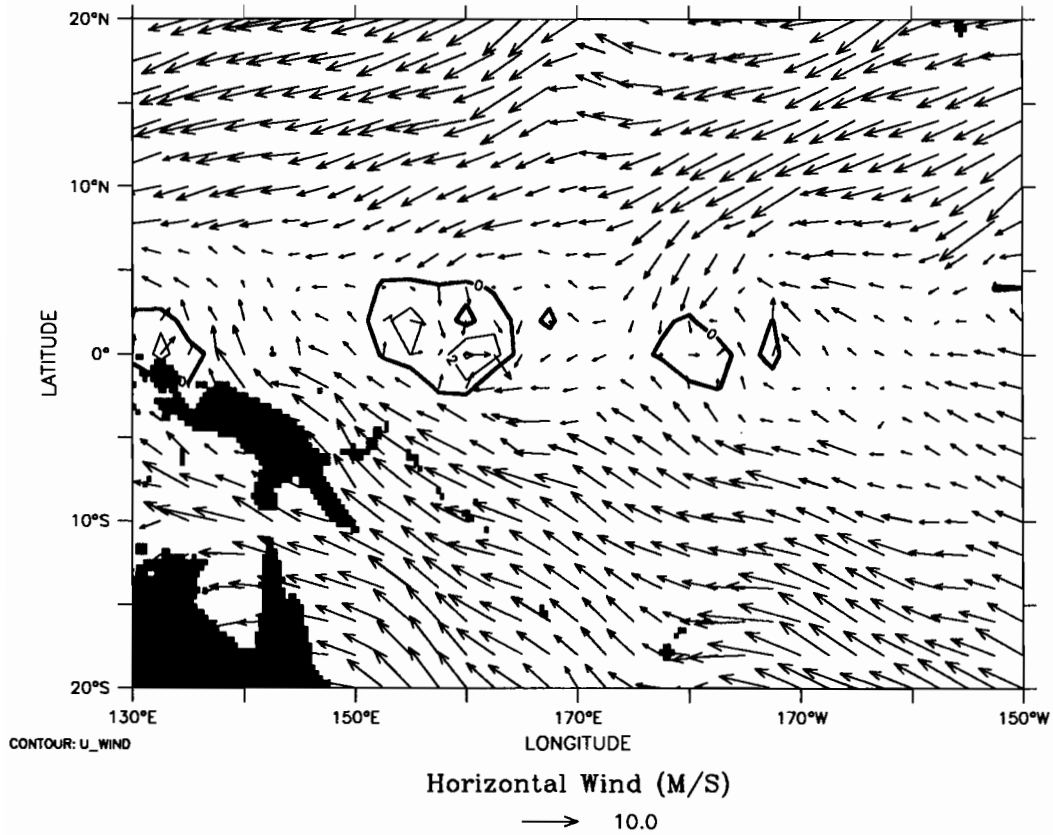
TIME : 28-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSML/Atlas gridded winds



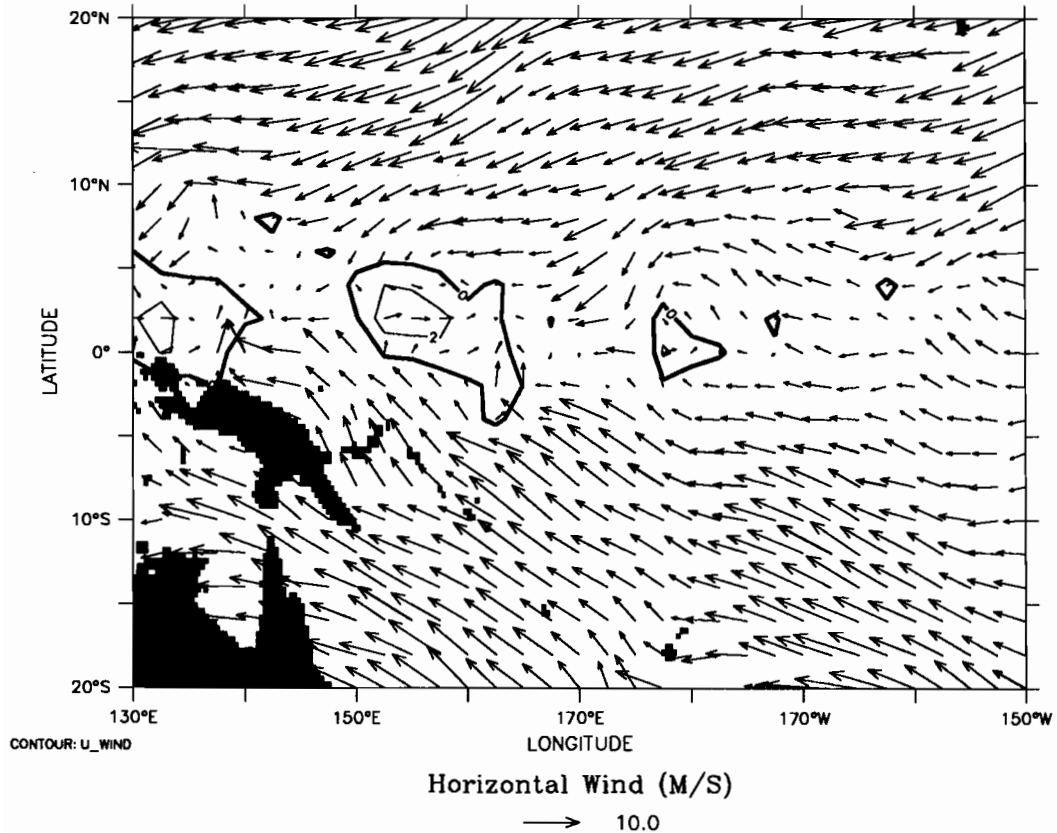
TIME : 29-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



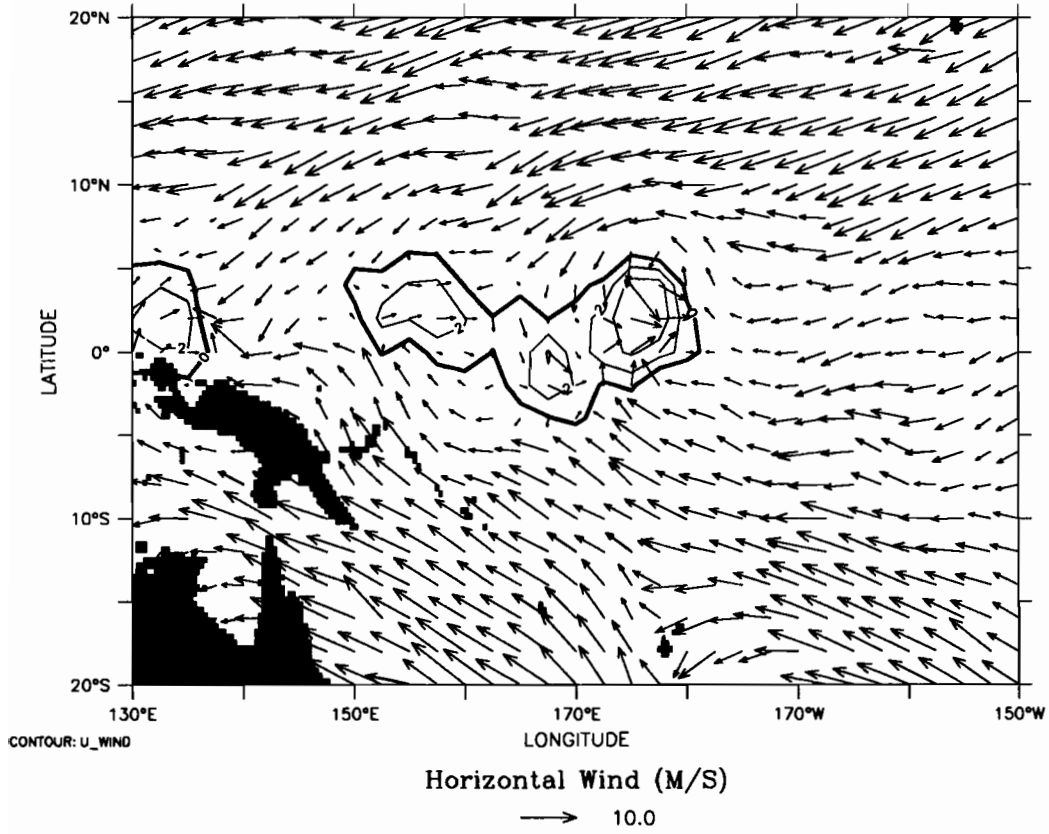
TIME : 30-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



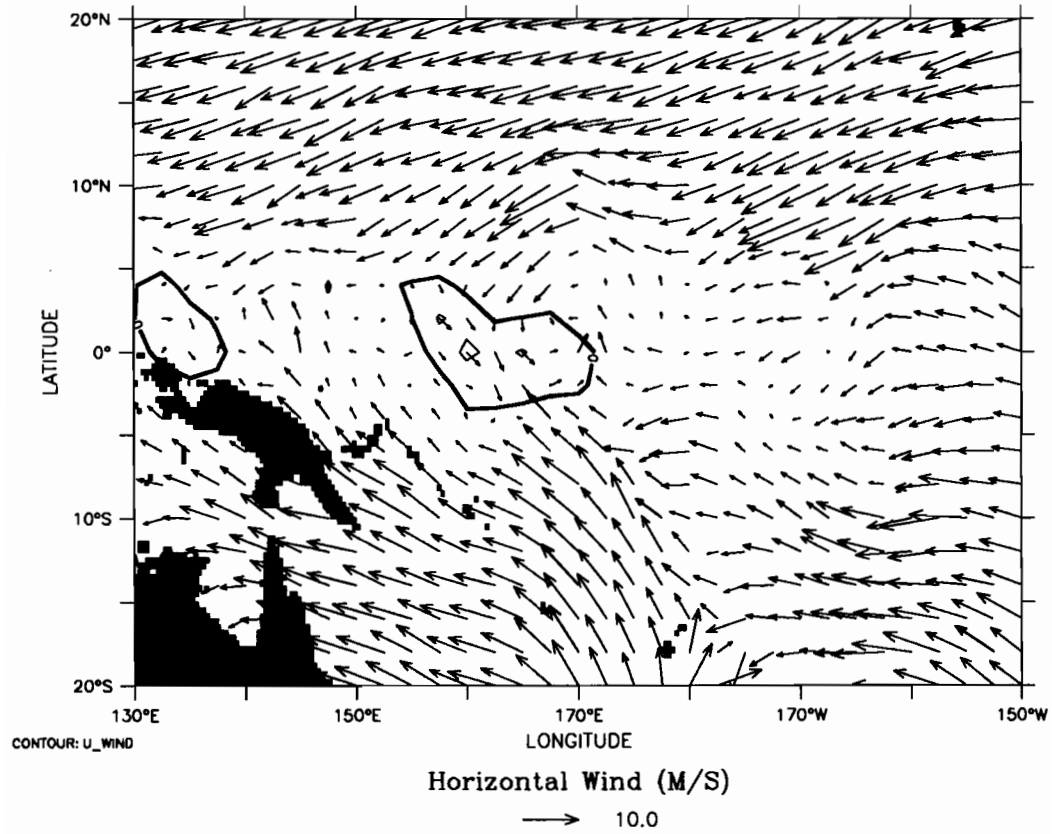
TIME : 31-OCT-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



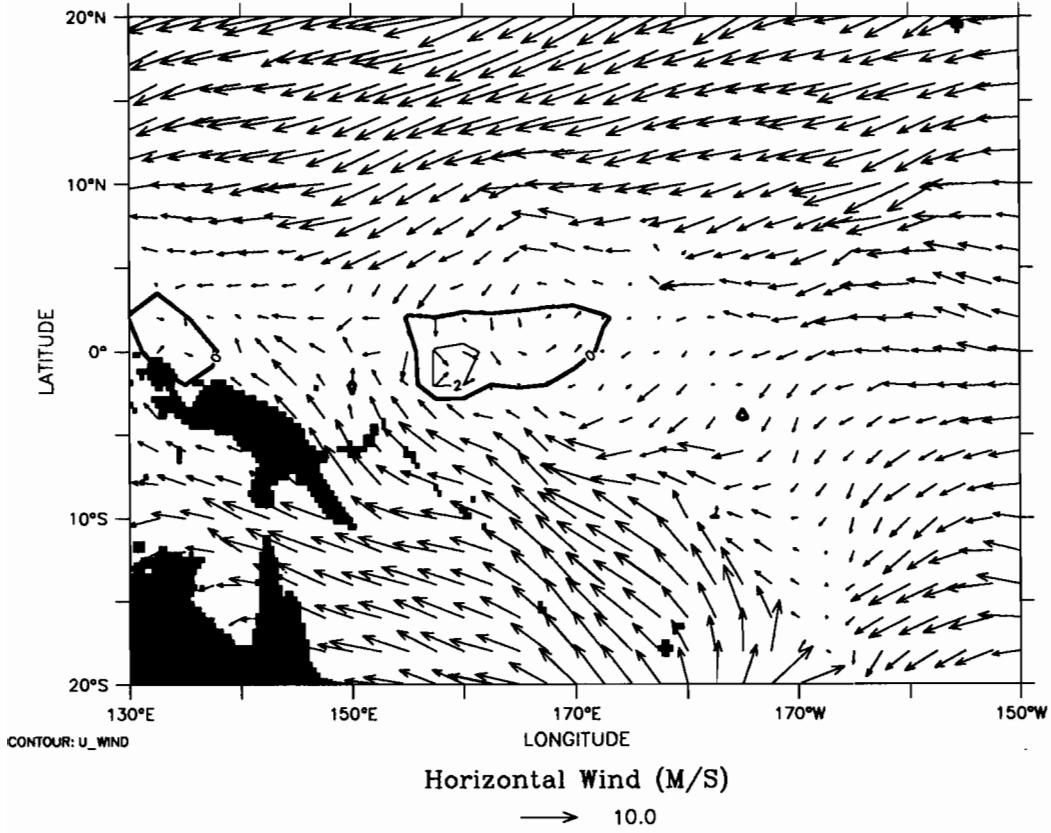
TIME : 01-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



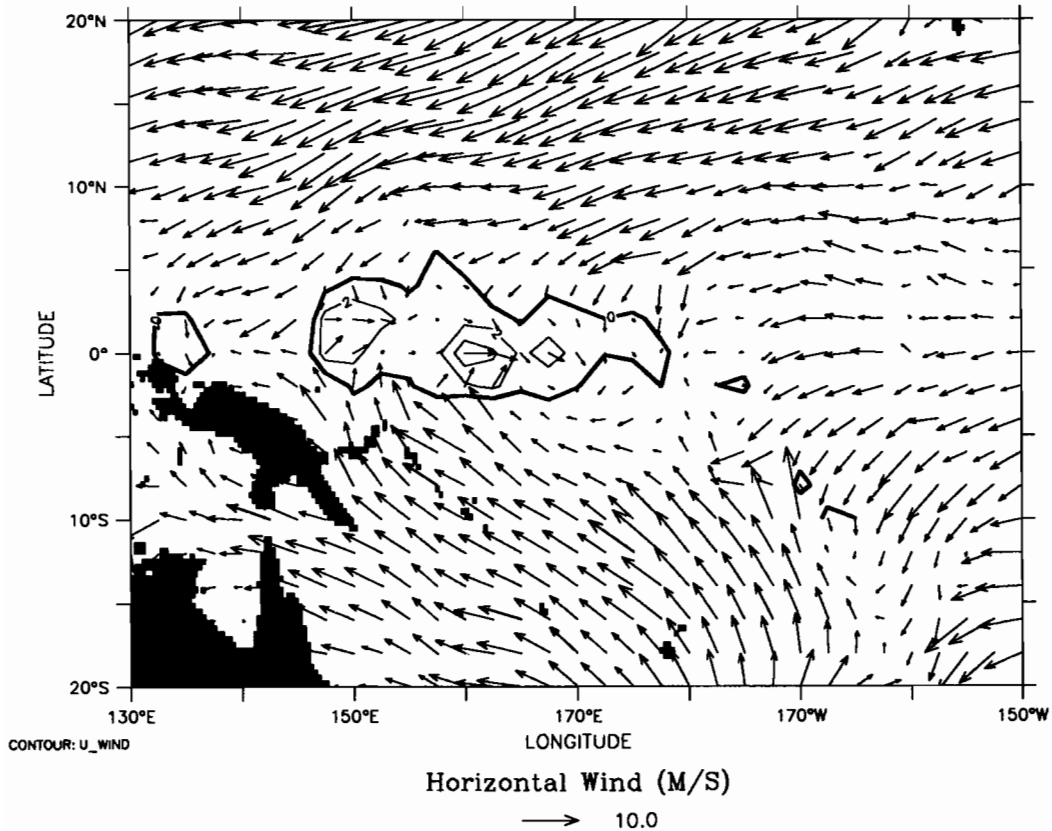
TIME : 02-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 03-NOV-1987 18:00

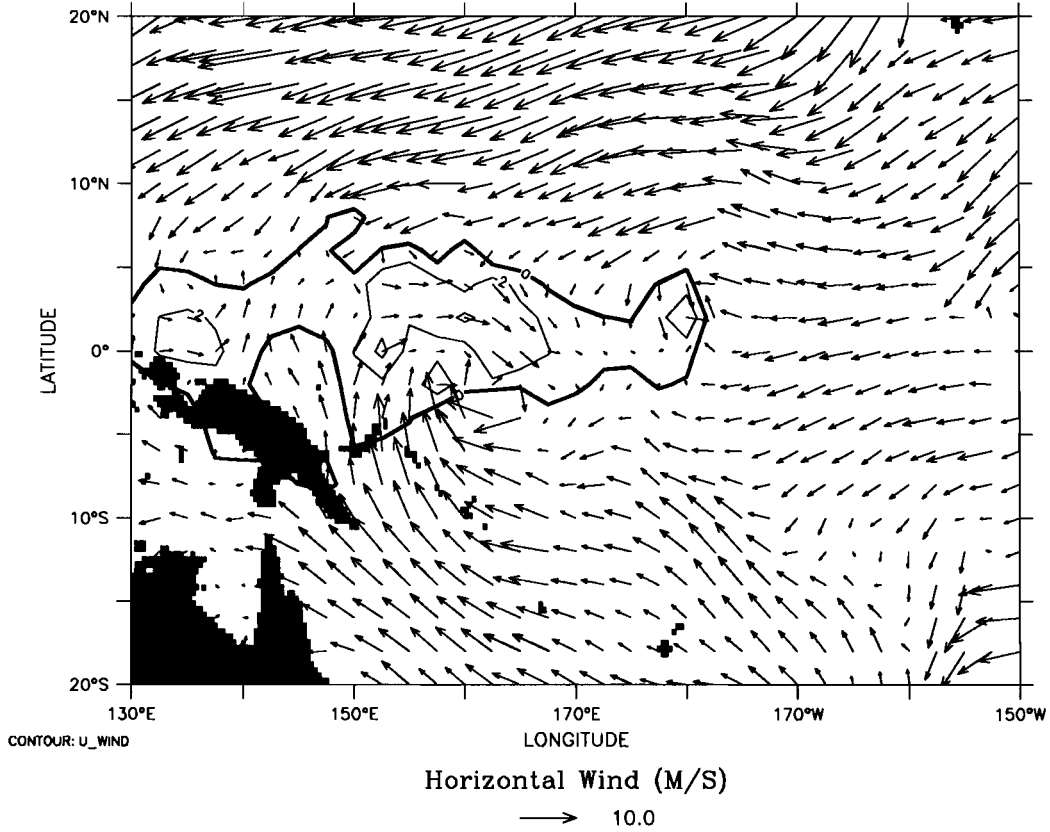
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





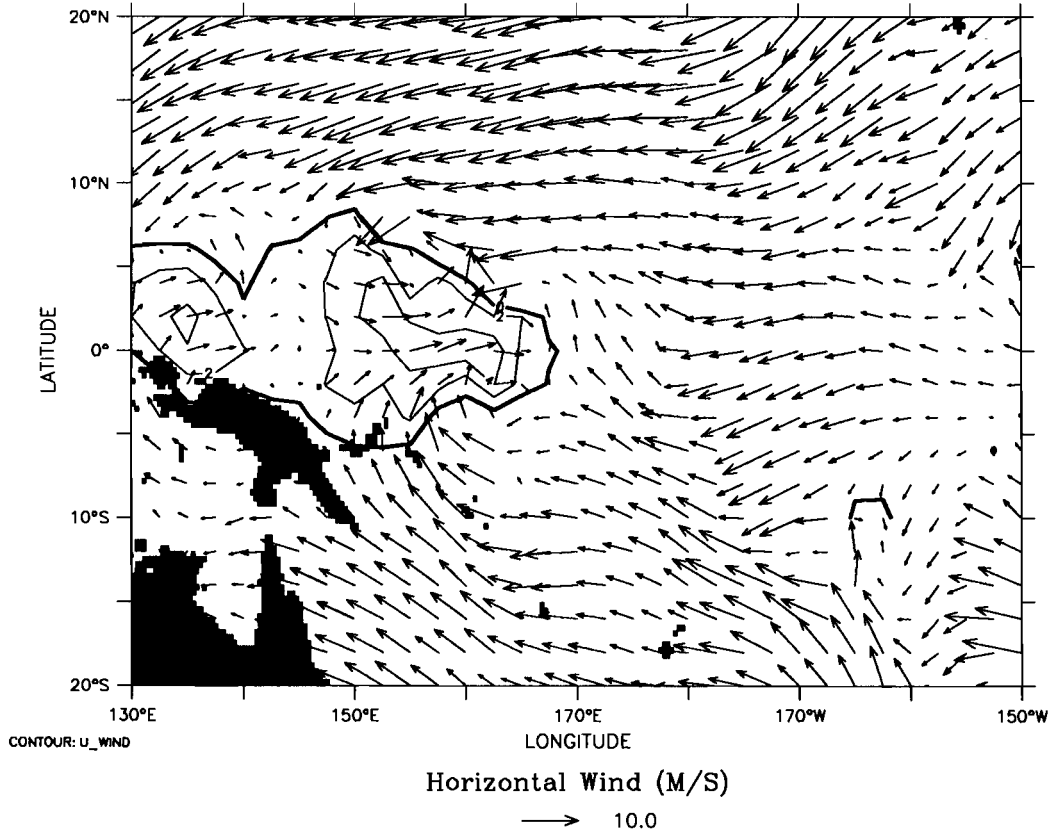
TIME : 04-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSML/Atlas gridded winds



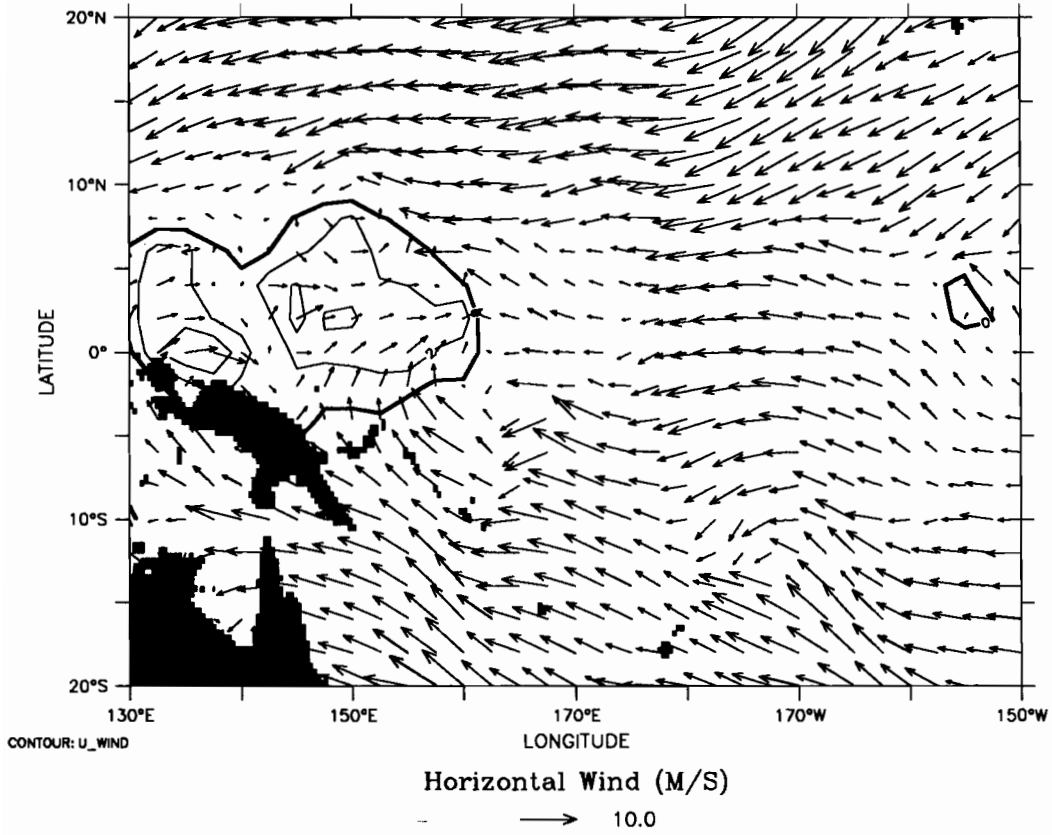
TIME : 05-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSML/Atlas gridded winds



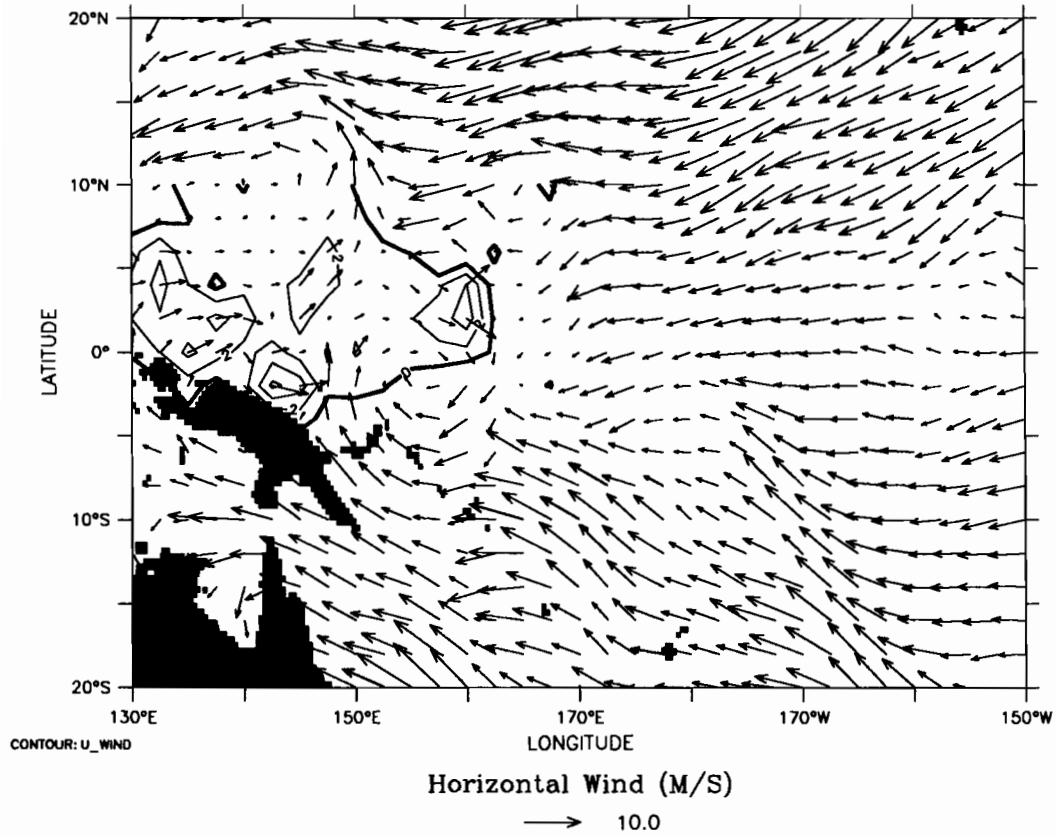
TIME : 06-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



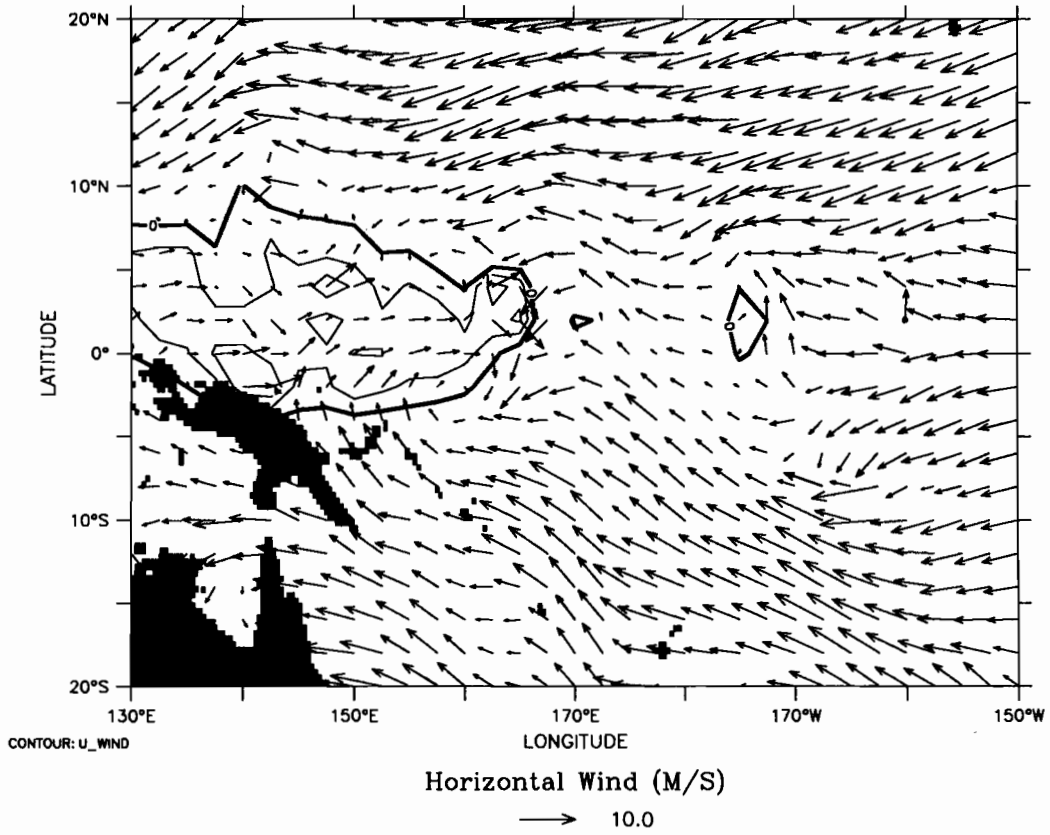
TIME : 07-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



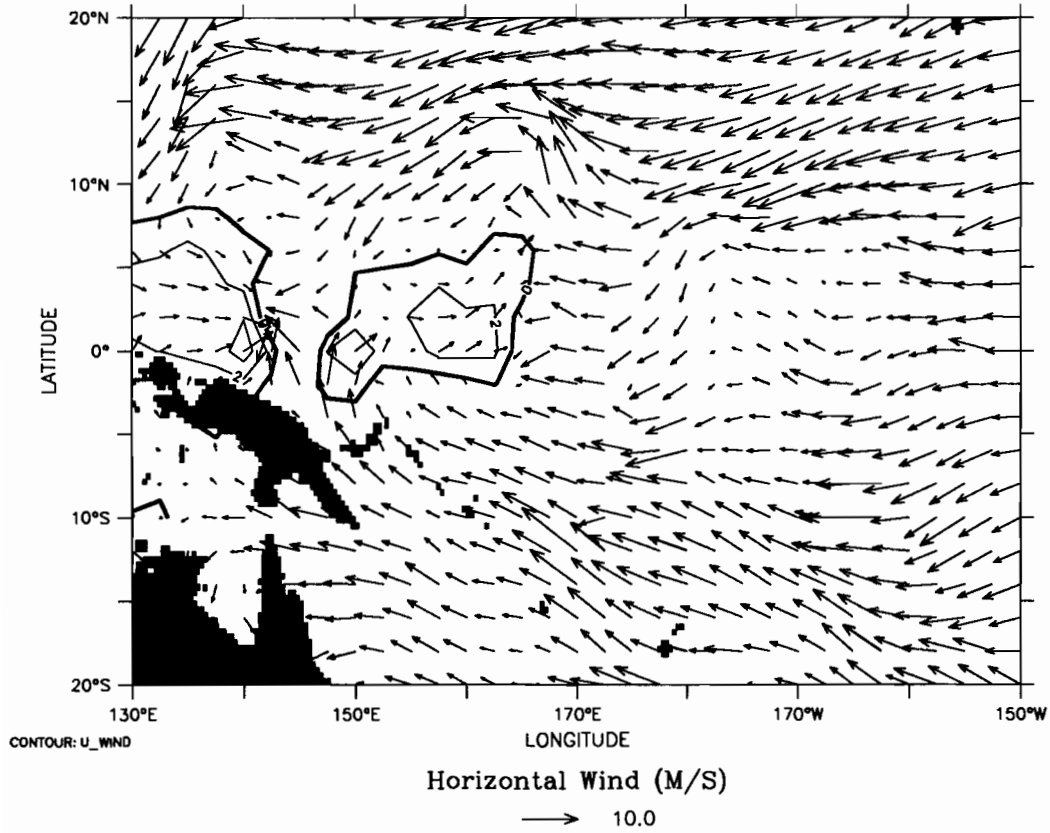
TIME : 08-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



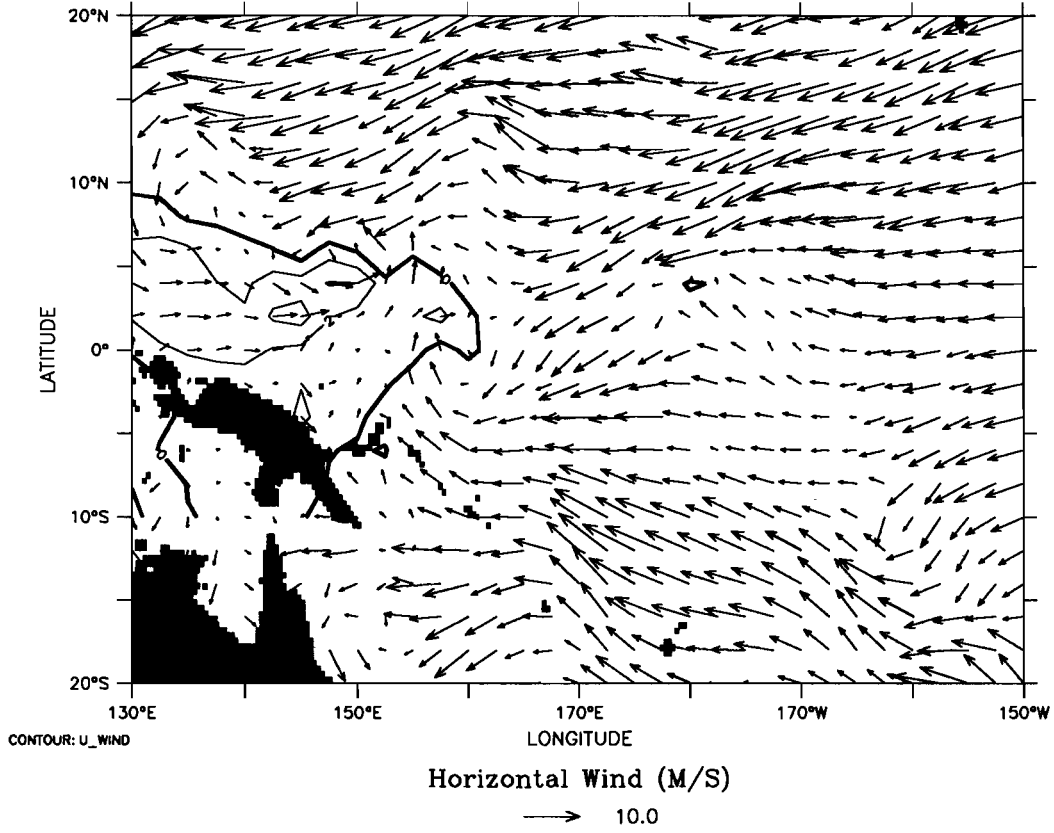
TIME : 09-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



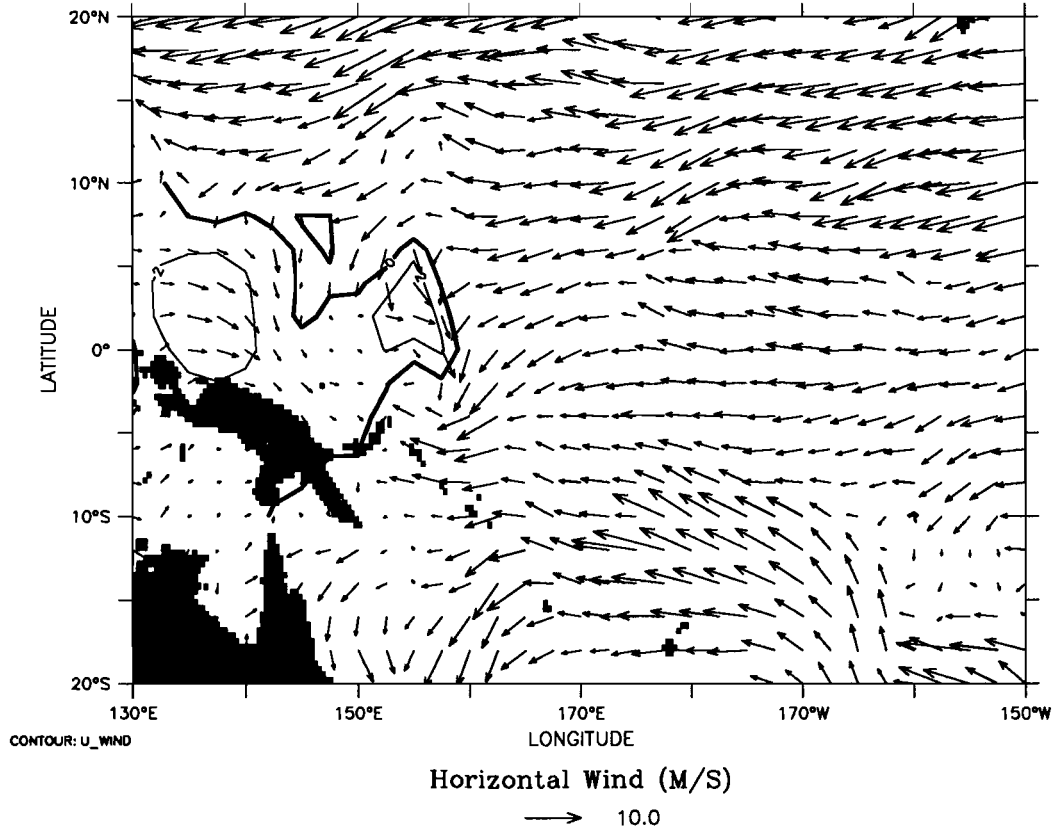
TIME : 10-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



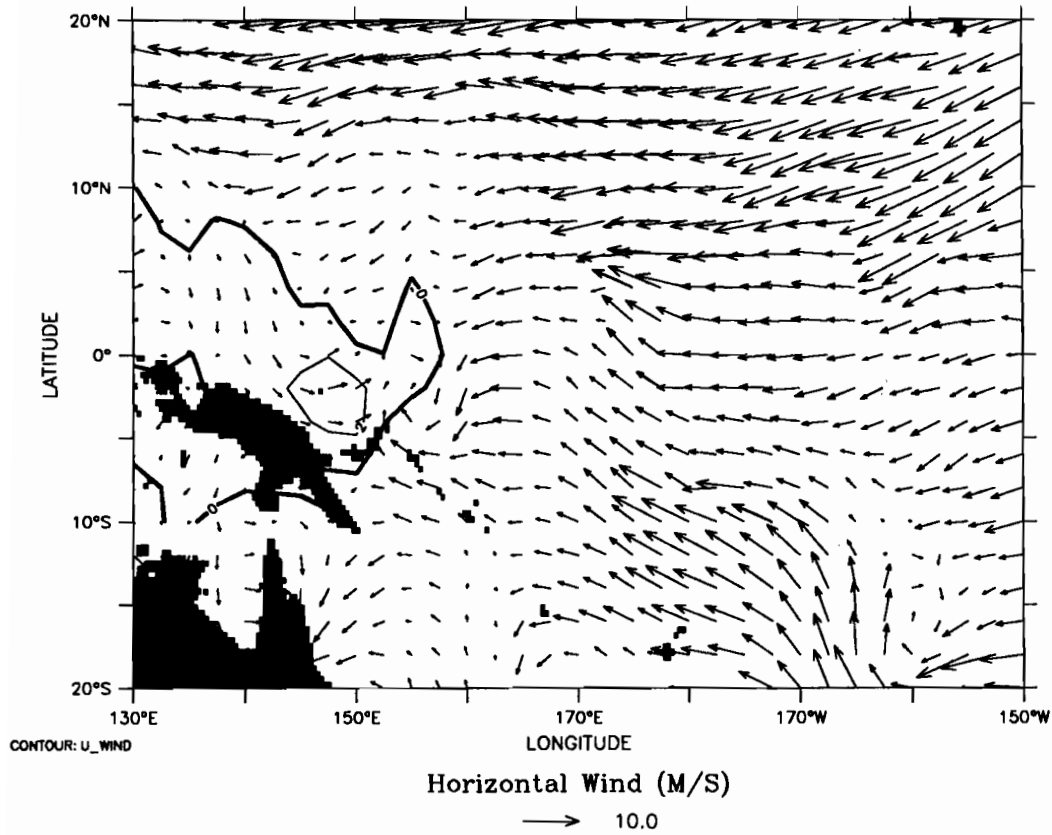
TIME : 11-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



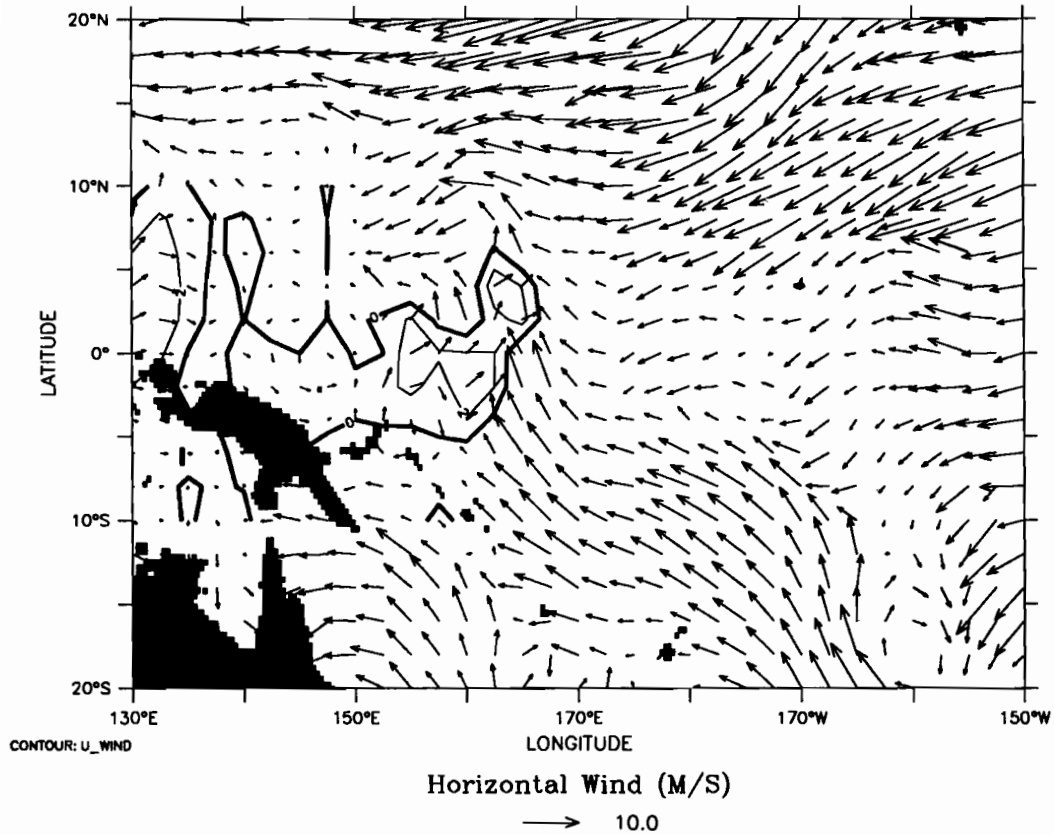
TIME : 12-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



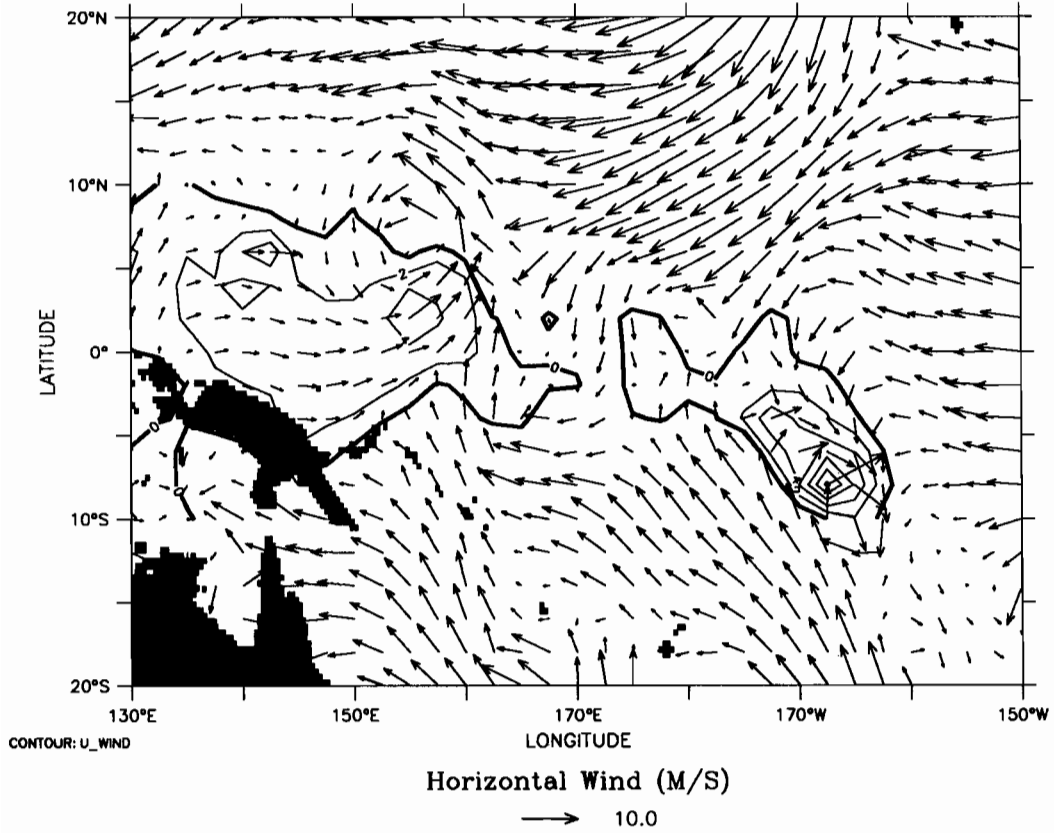
TIME : 13-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



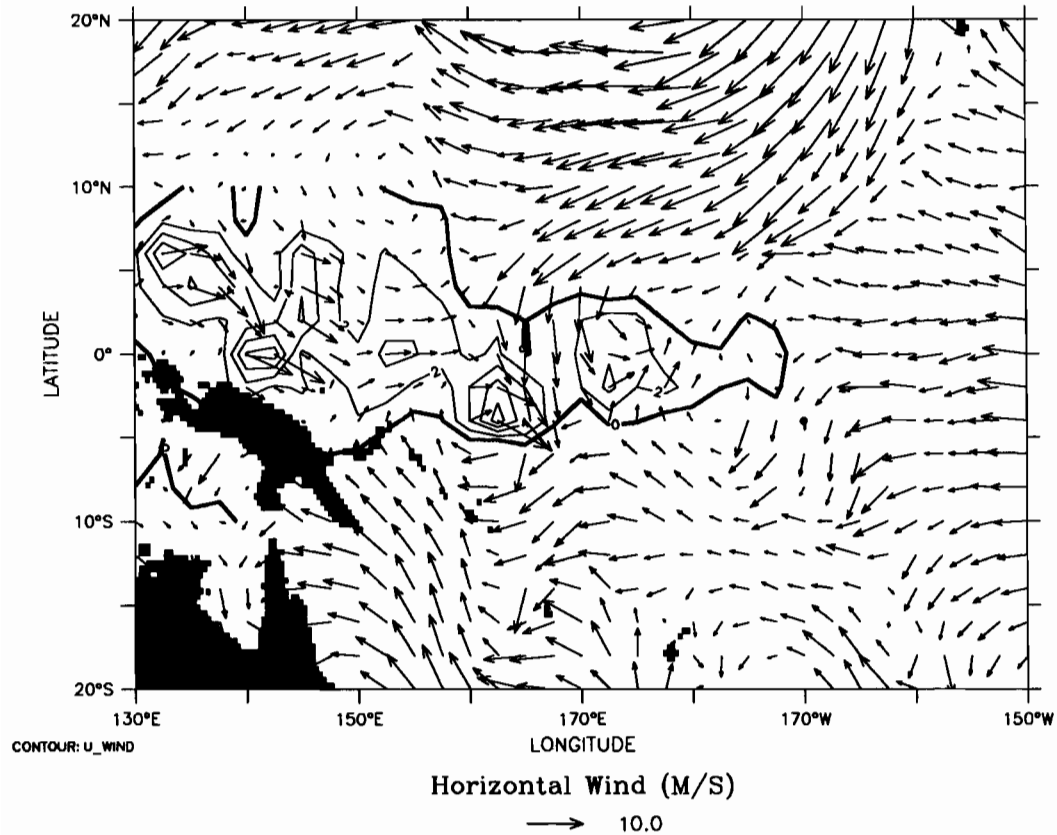
TIME : 14-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



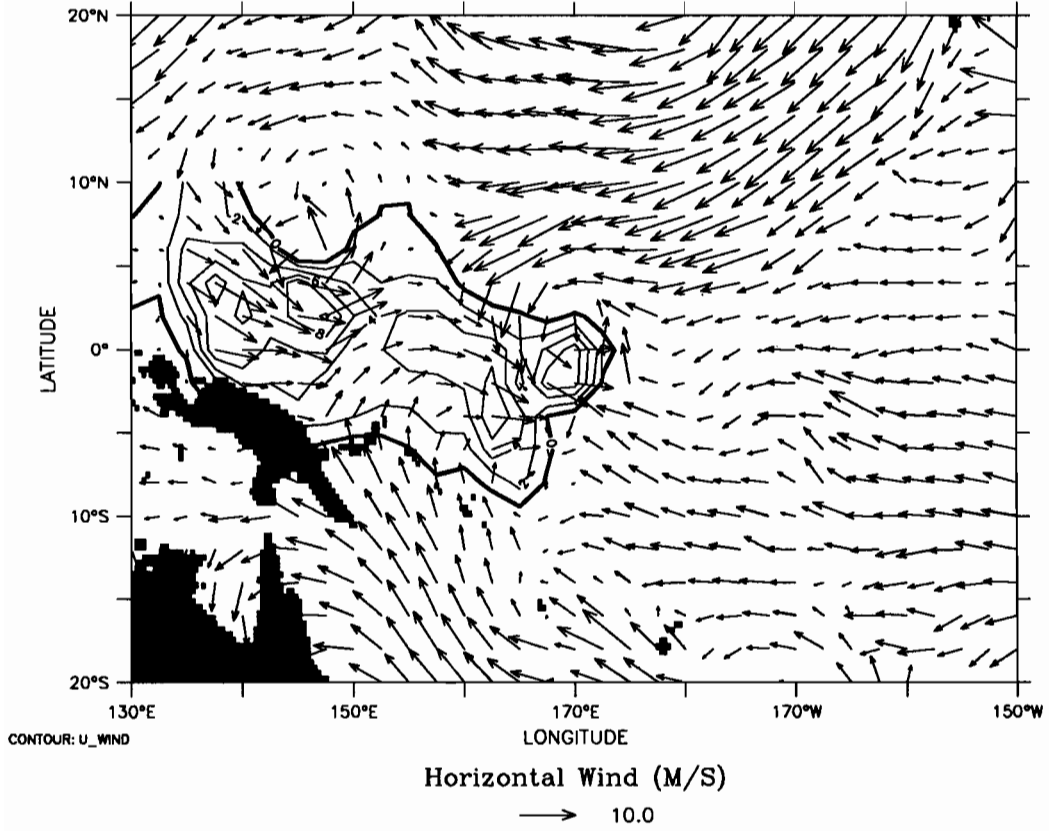
TIME : 15-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



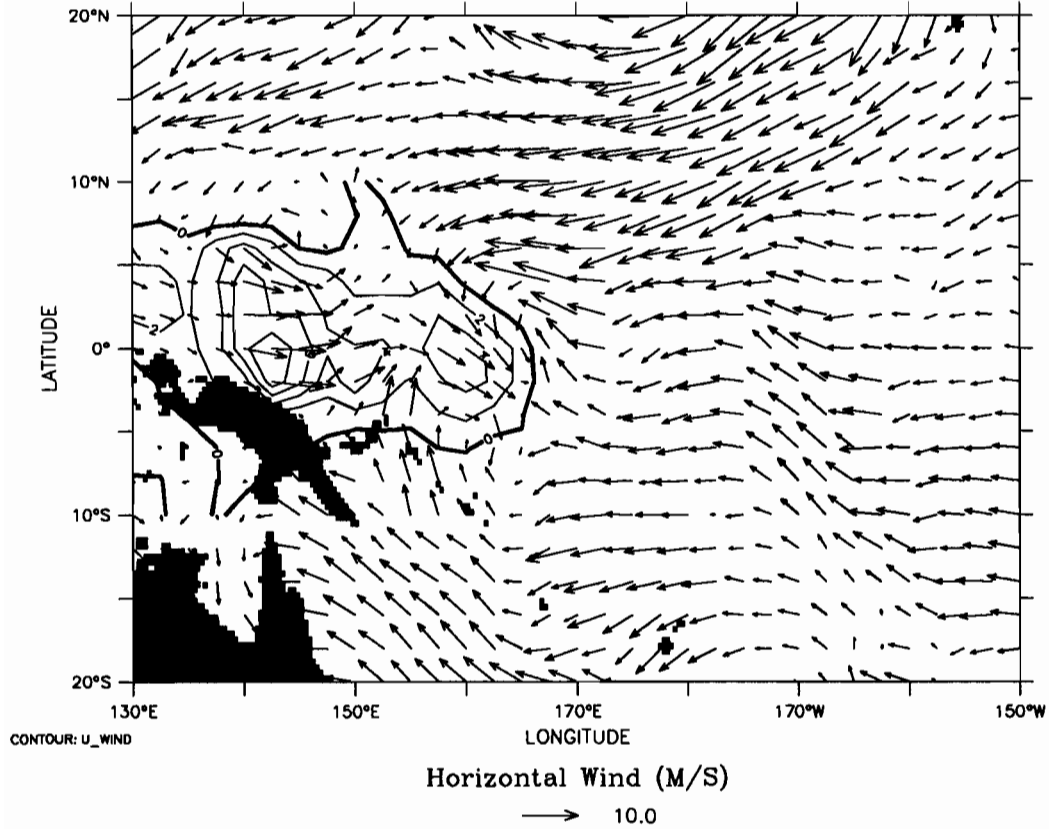
TIME : 16-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



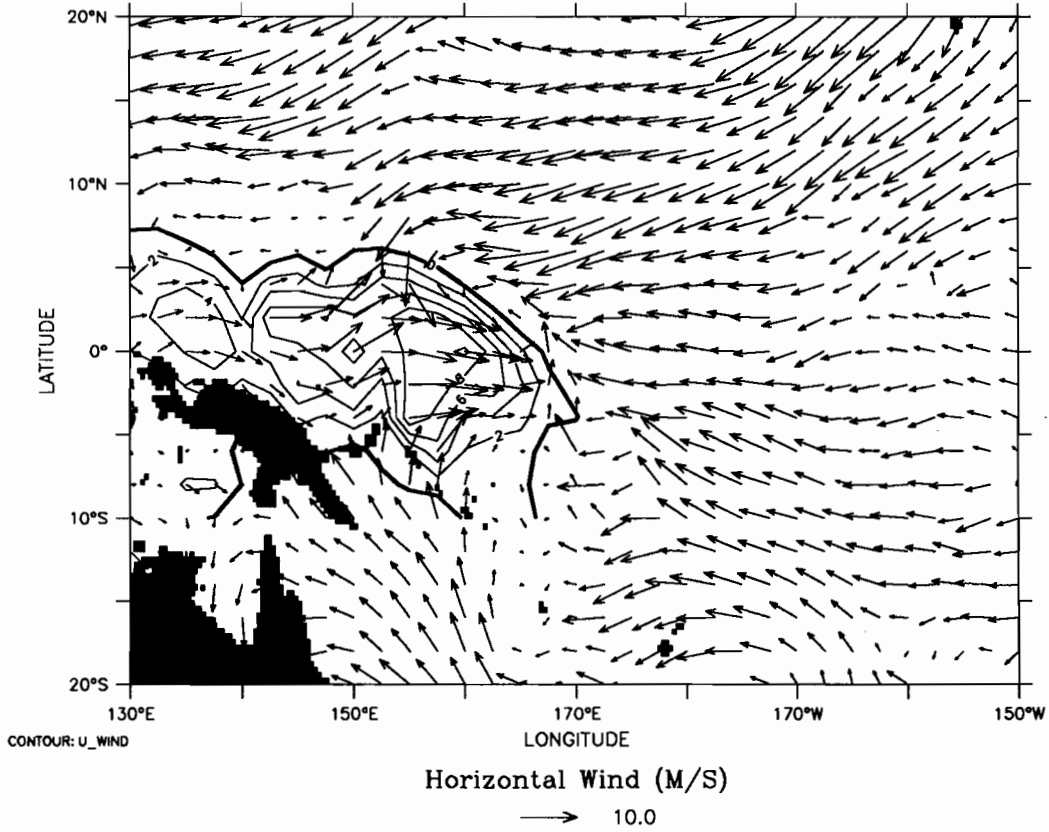
TIME : 17-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



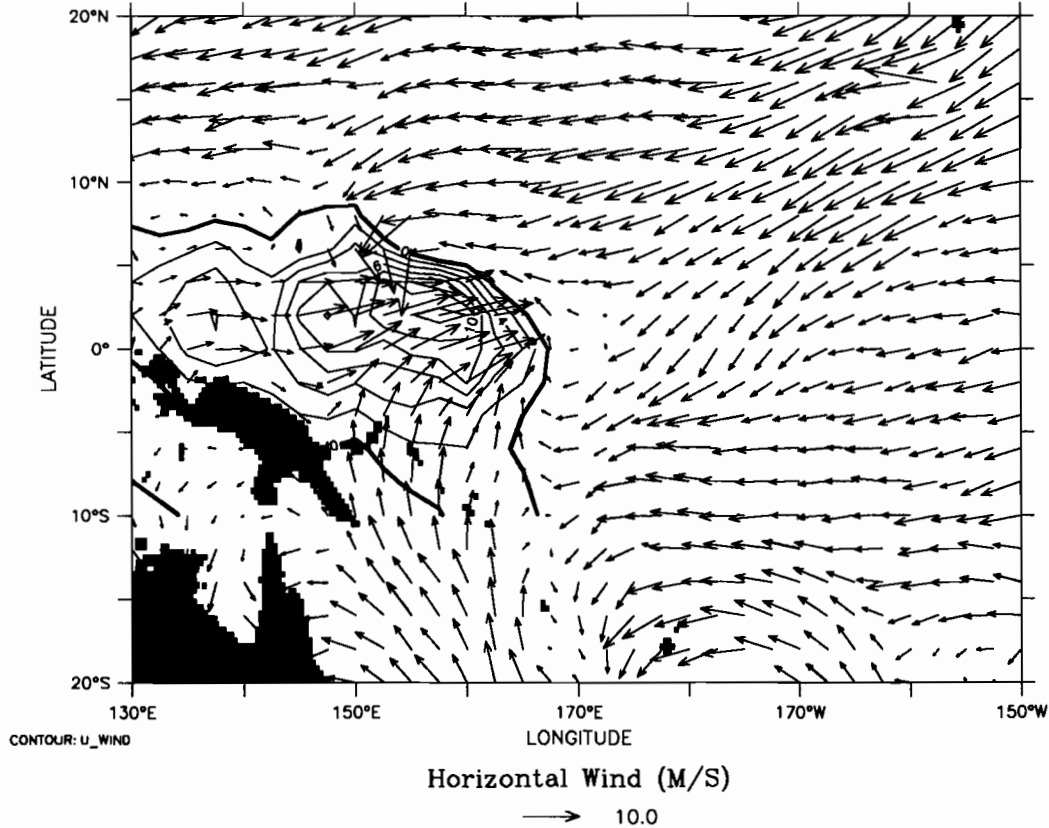
TIME : 18-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 19-NOV-1987 18:00

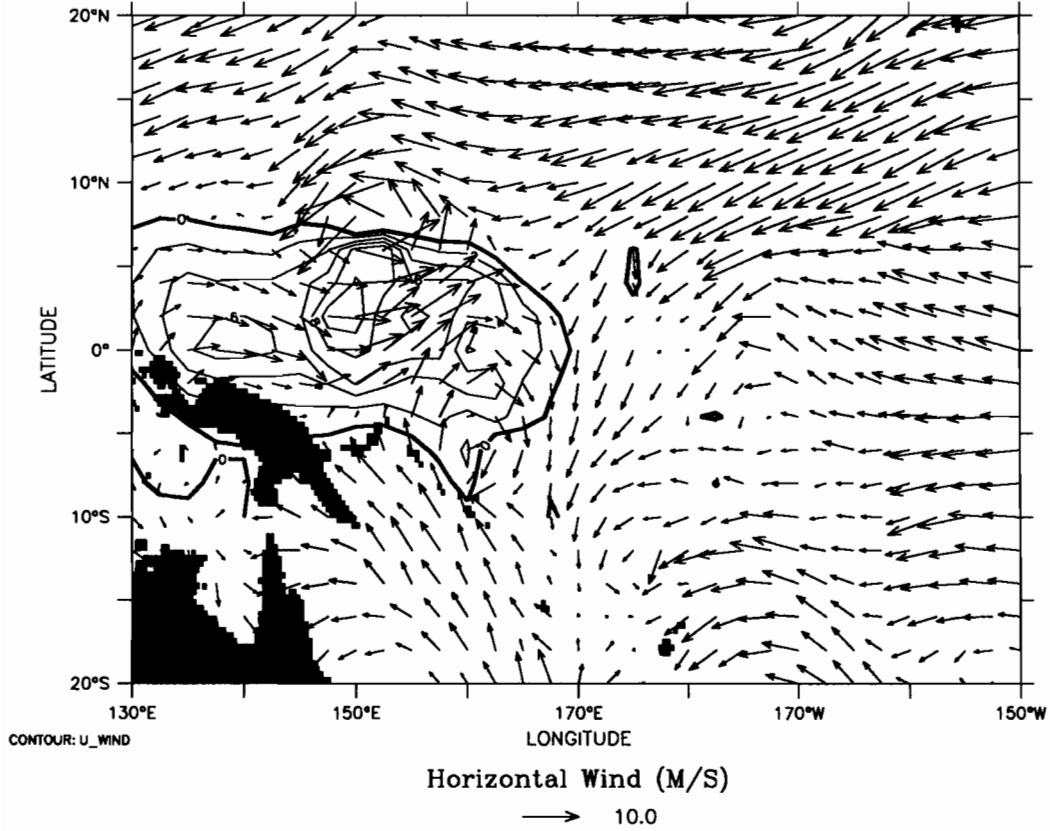
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





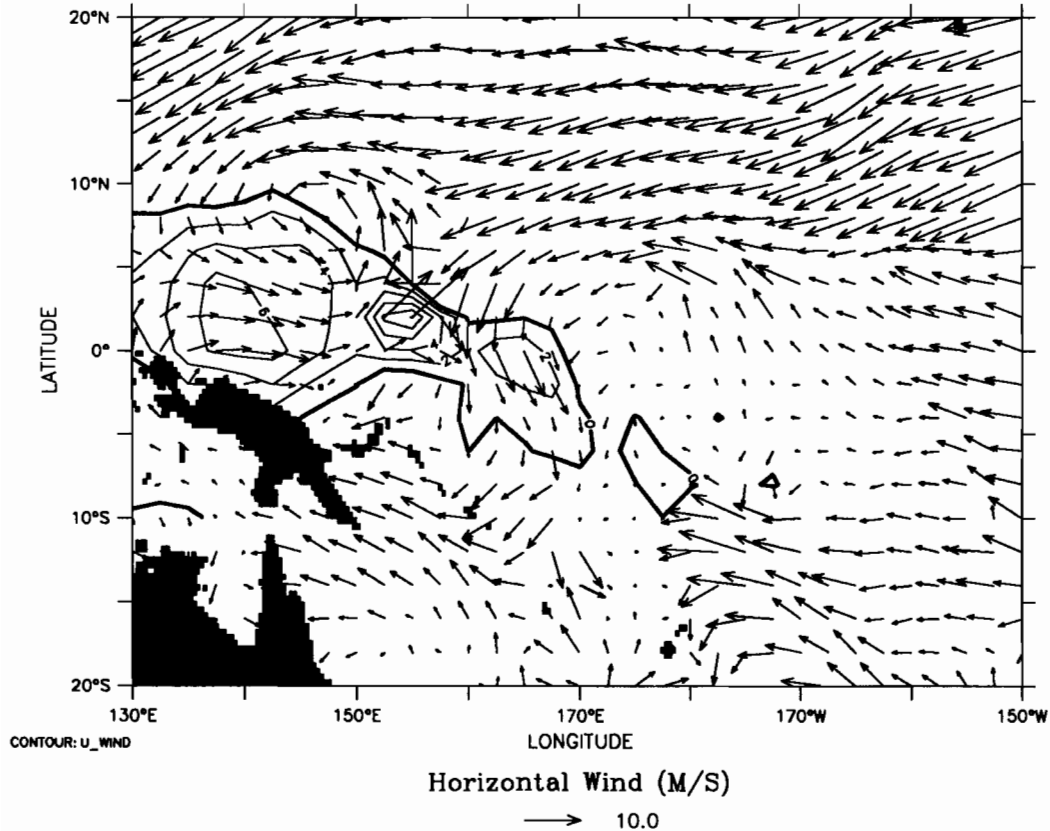
TIME : 20-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



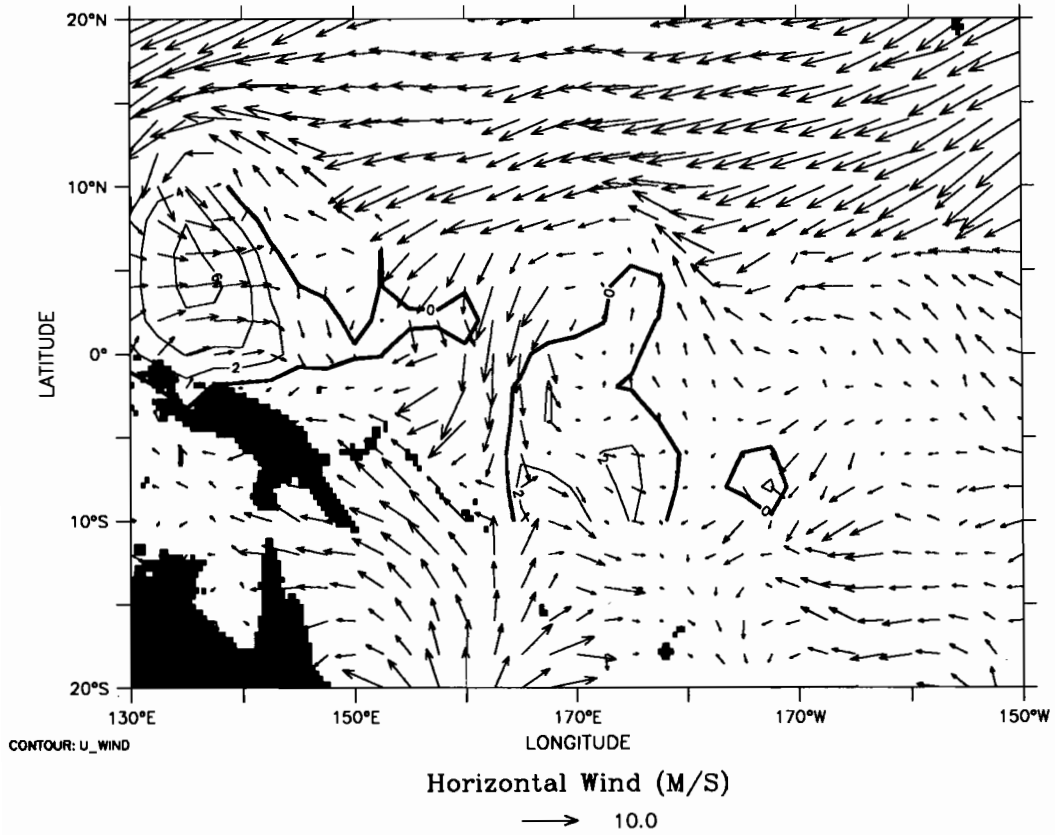
TIME : 21-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



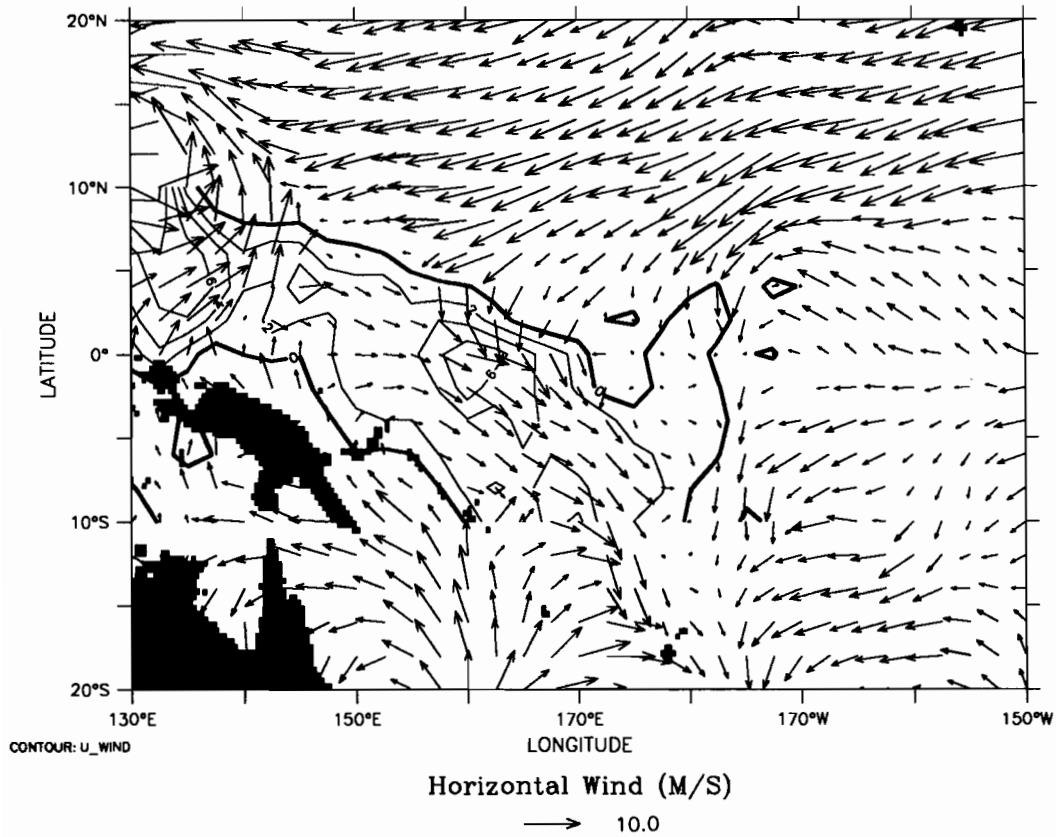
TIME : 22-NOV-1987 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



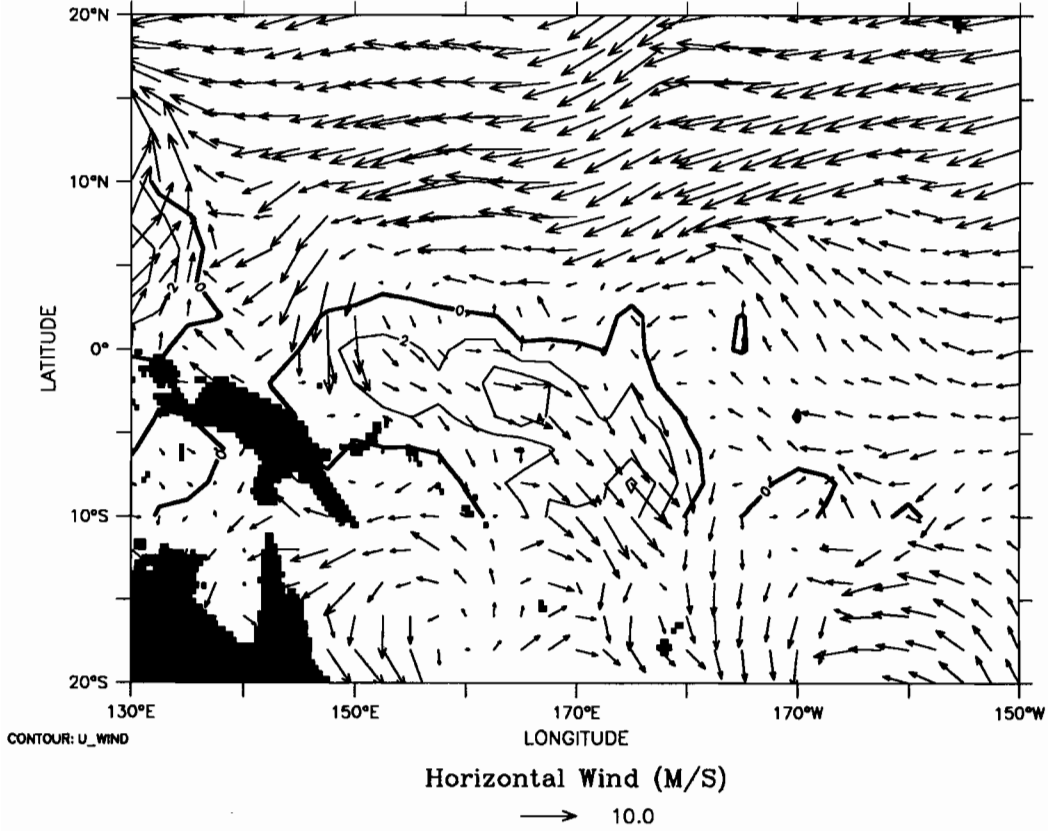
TIME : 23-NOV-1987 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



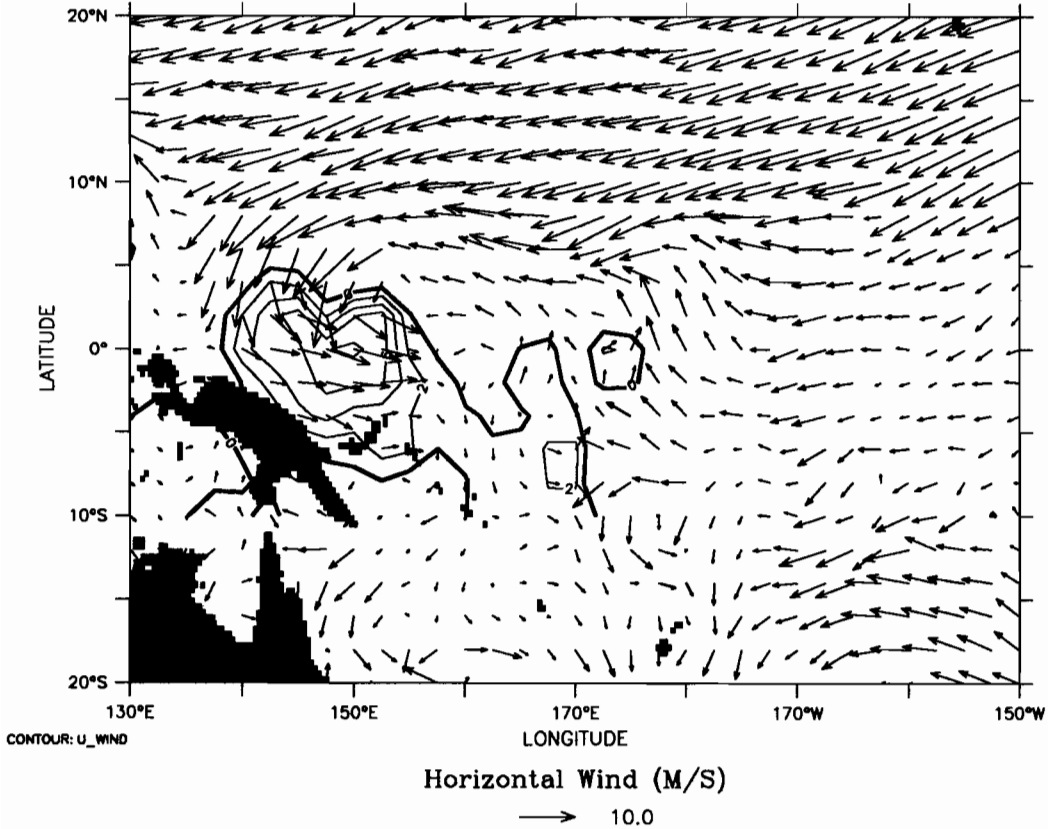
TIME : 24-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



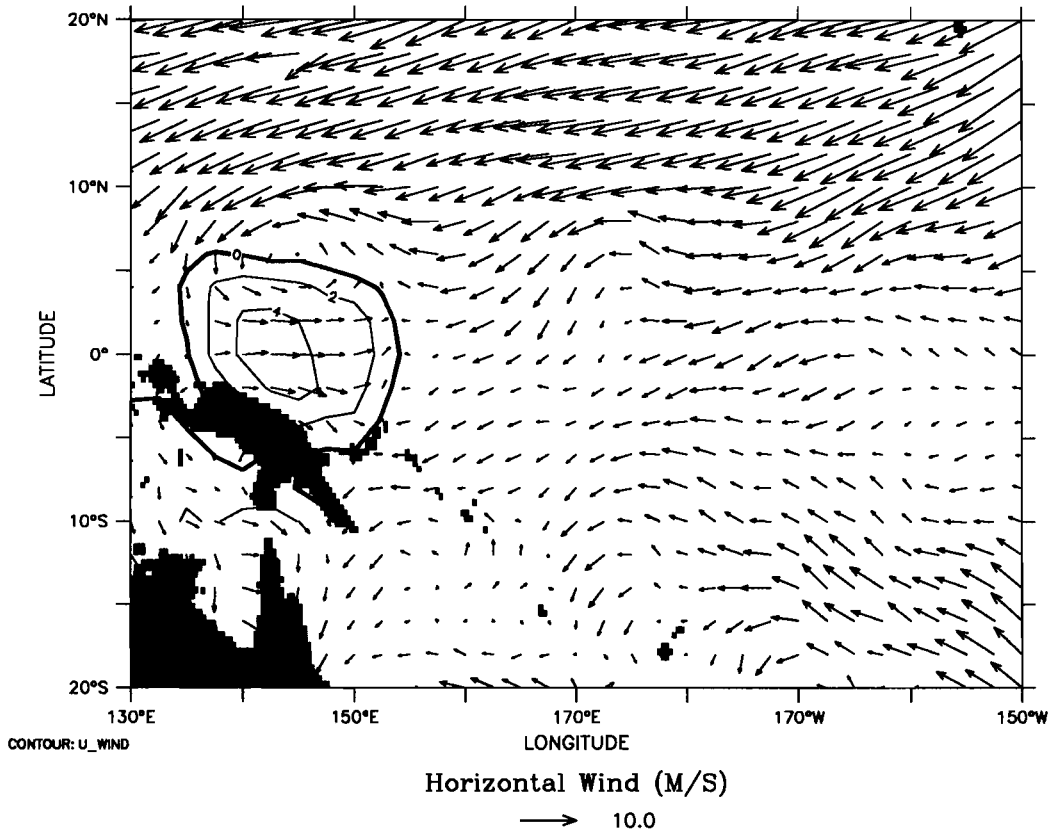
TIME : 25-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



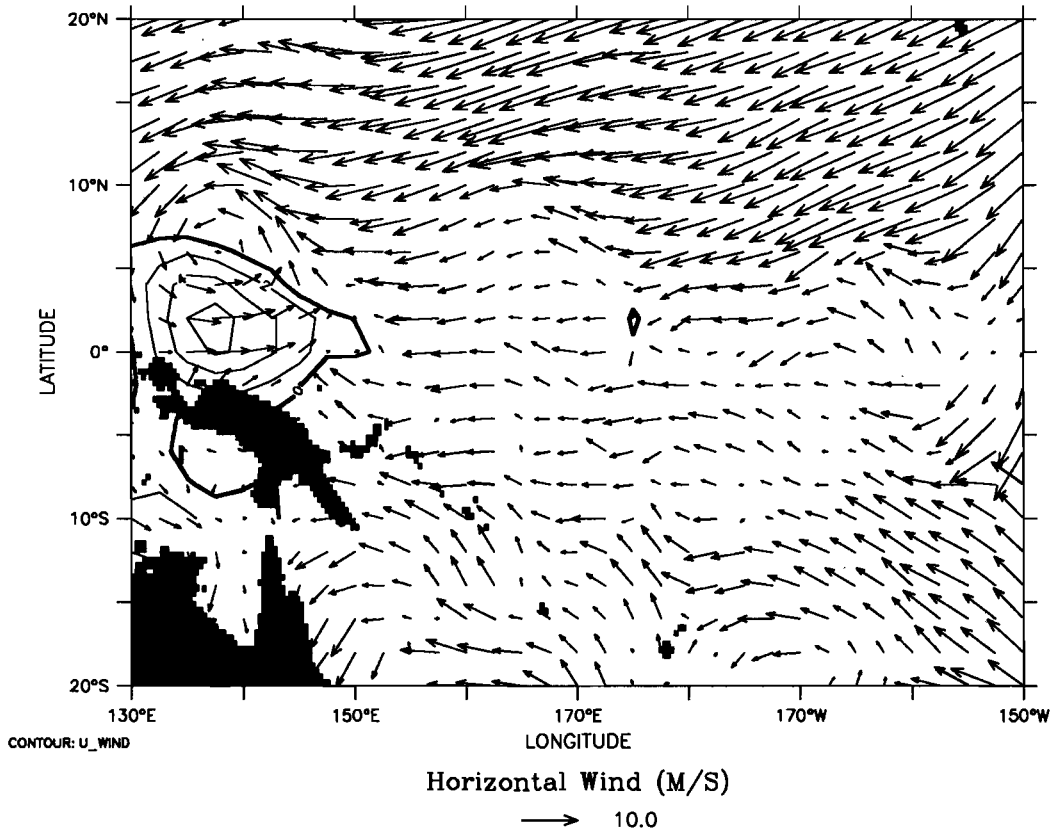
TIME : 26-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



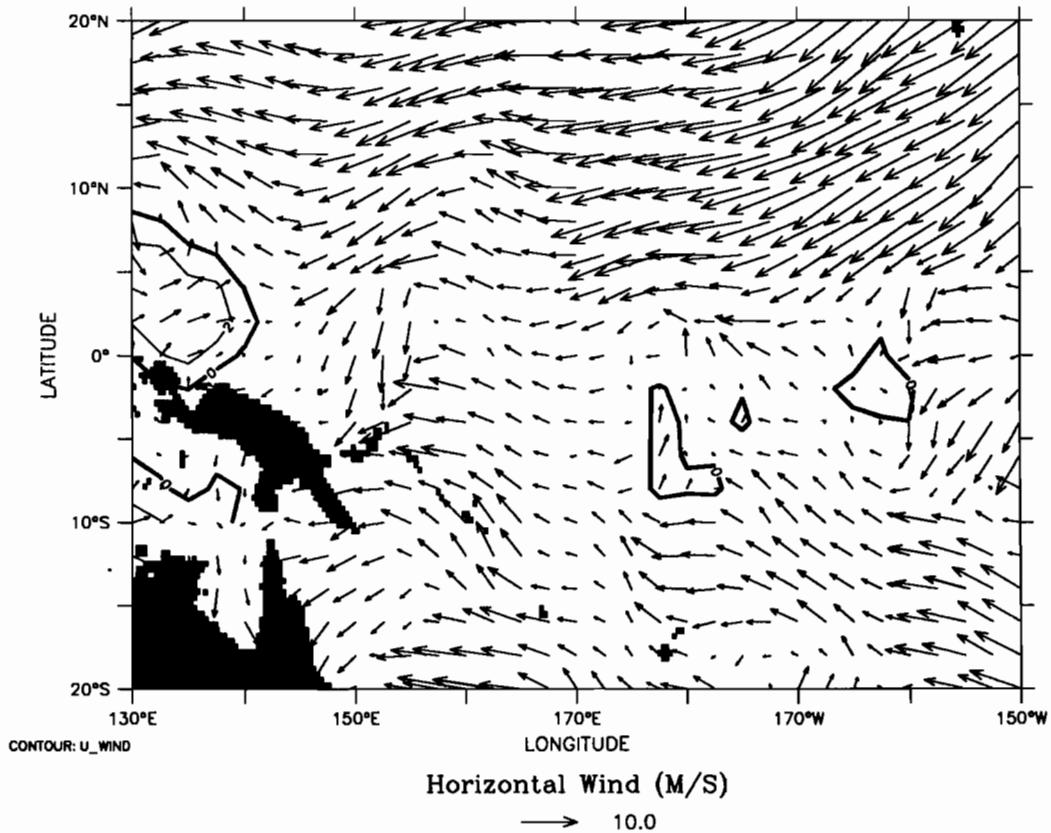
TIME : 27-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



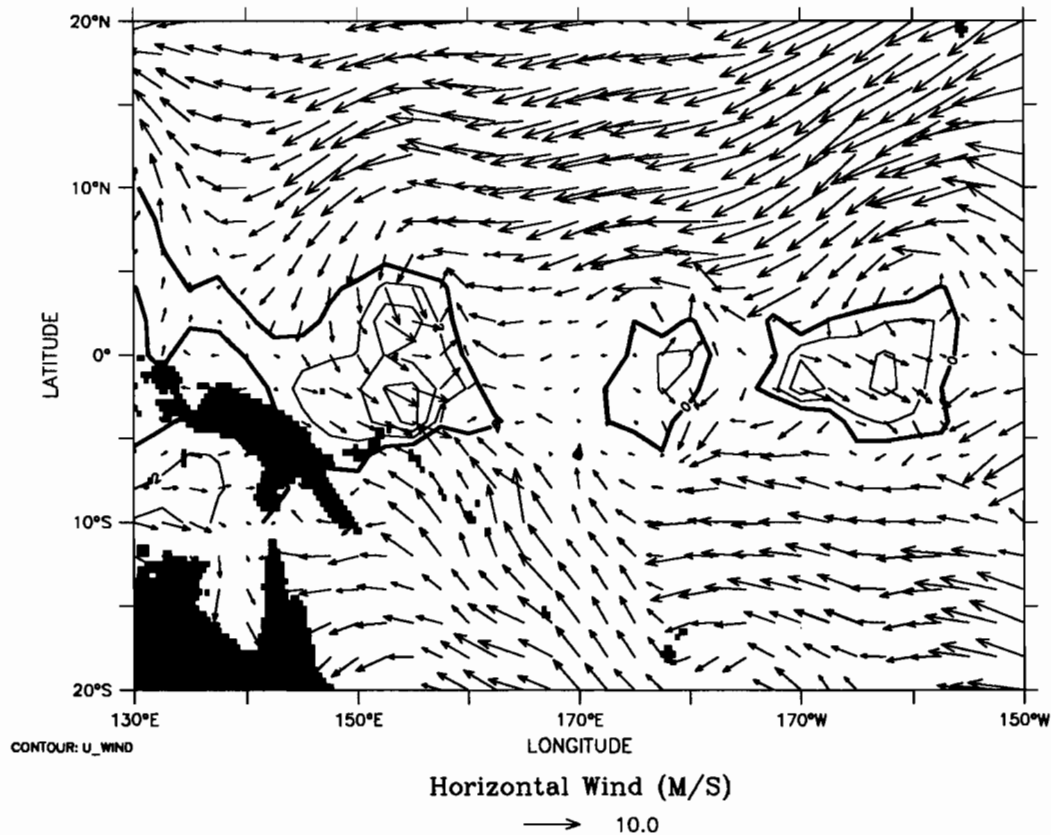
TIME : 28-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



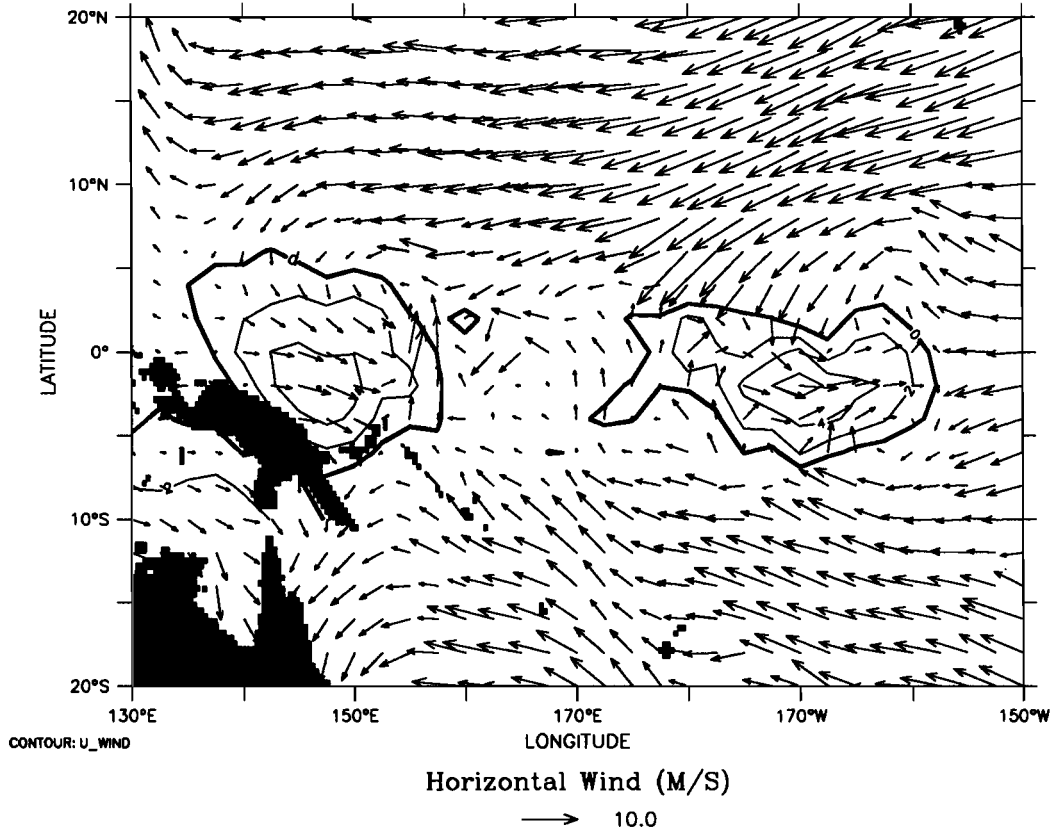
TIME : 29-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



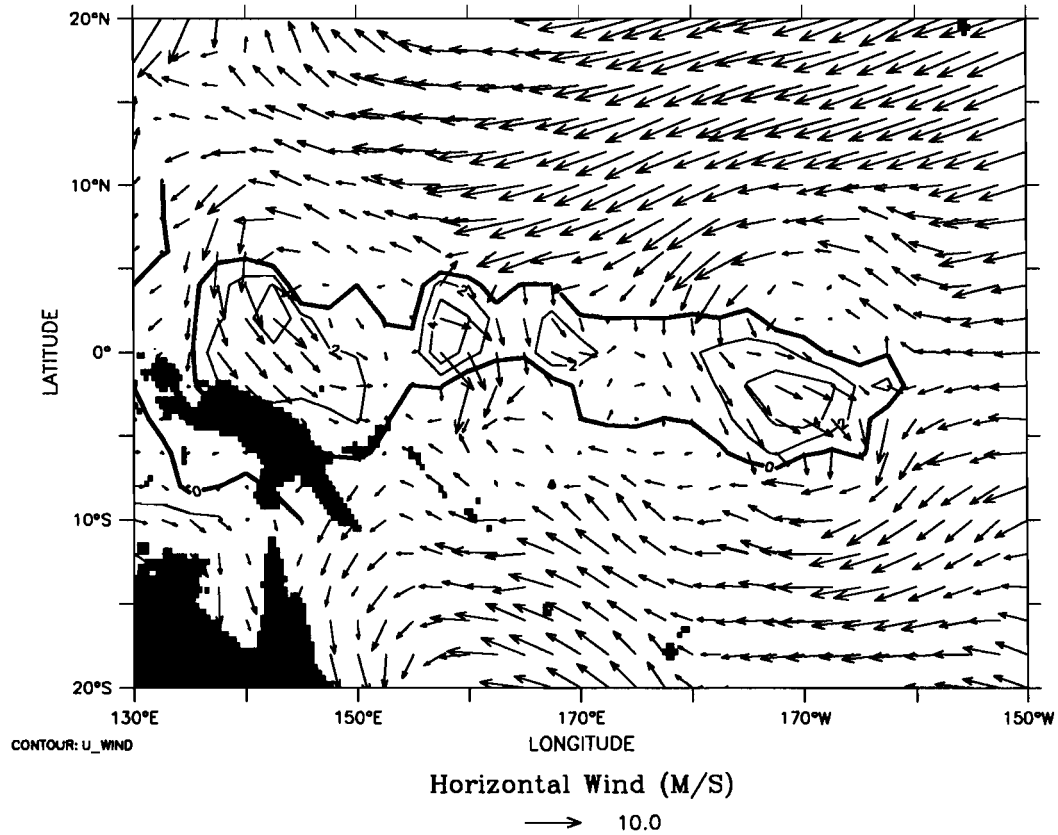
TIME : 30-NOV-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



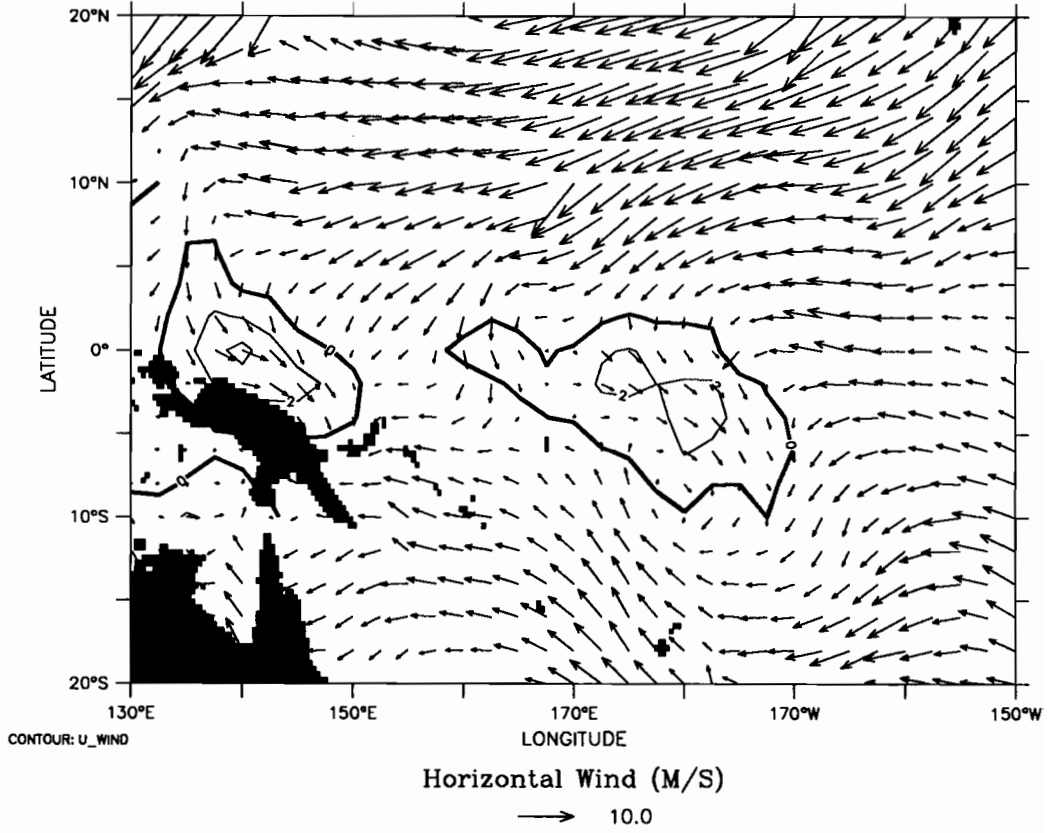
TIME : 01-DEC-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



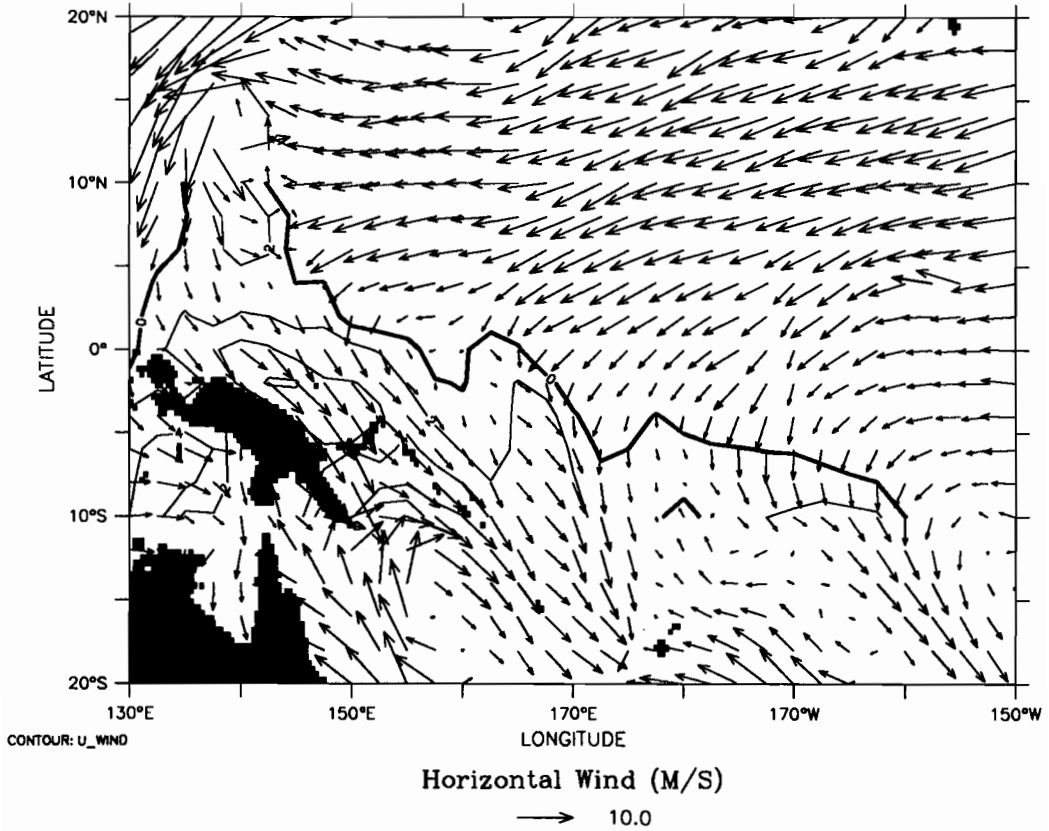
TIME : 02-DEC-1987 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



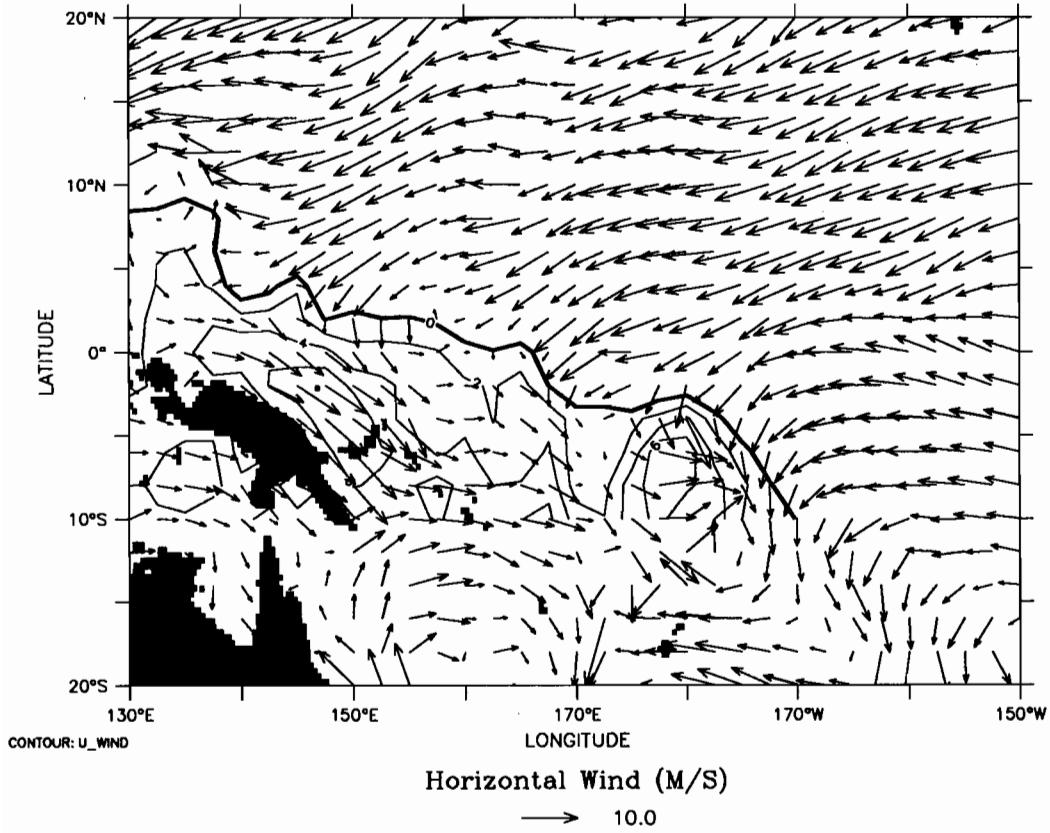
TIME : 13-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



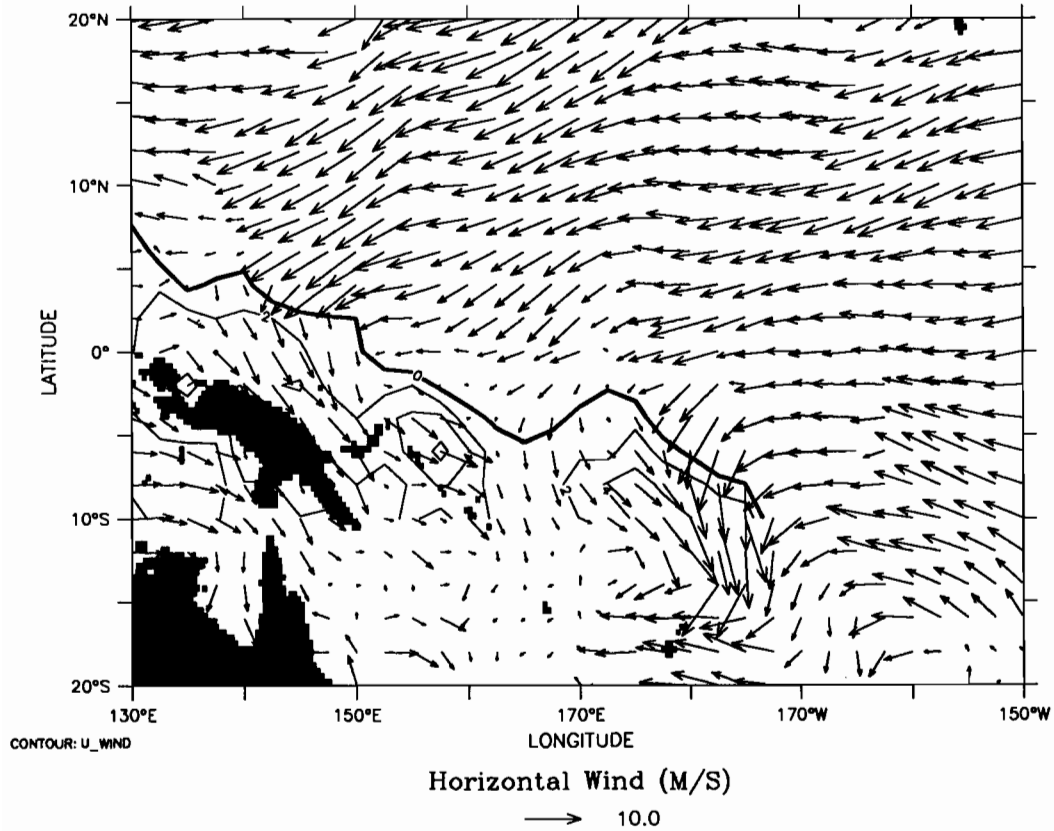
TIME : 14-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 15-JAN-1988 18:00

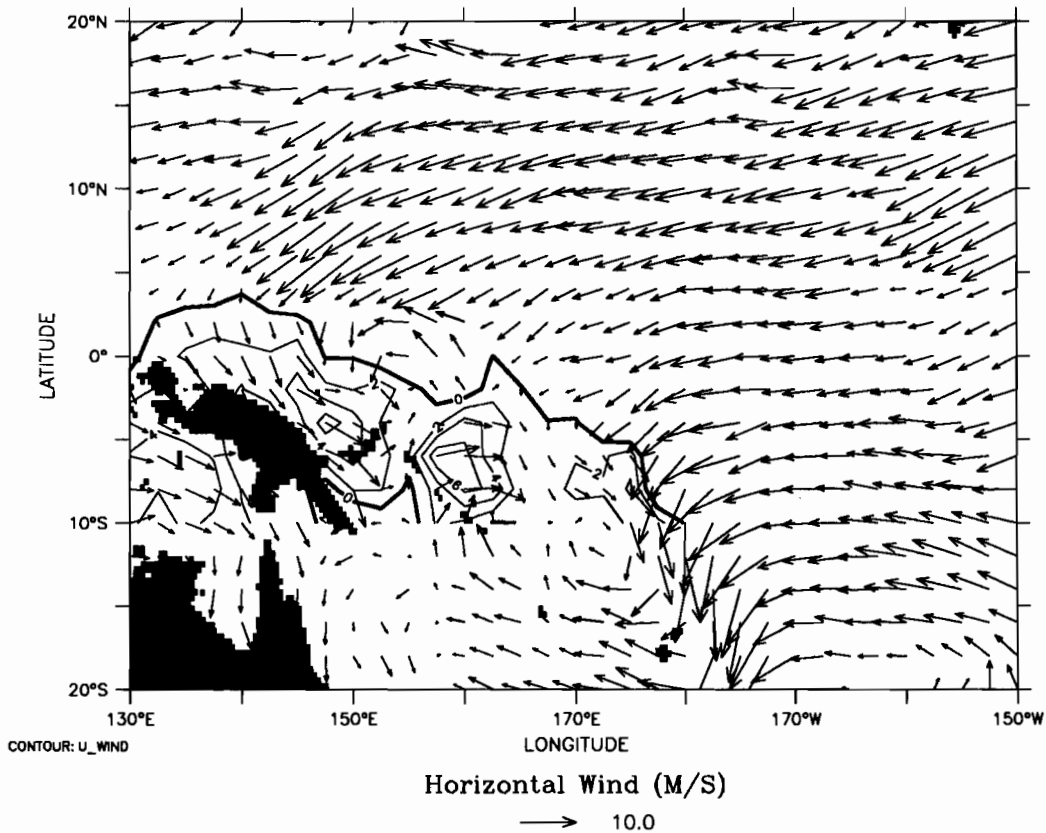
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





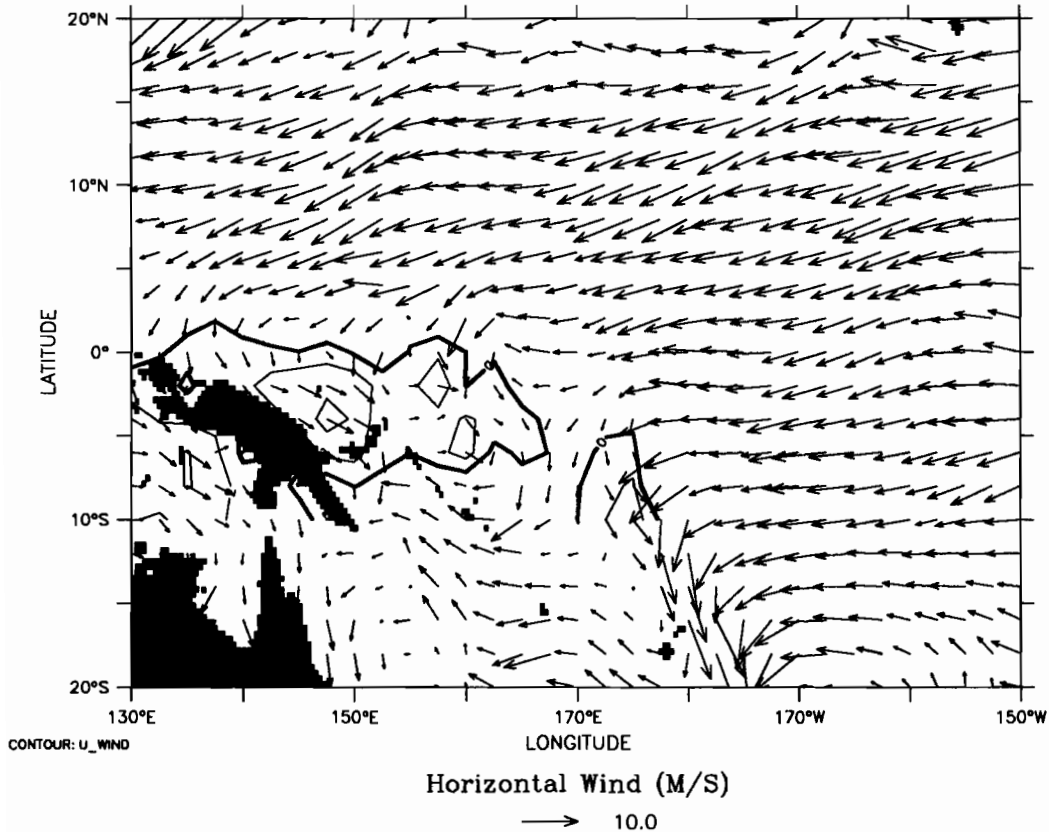
TIME : 16-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



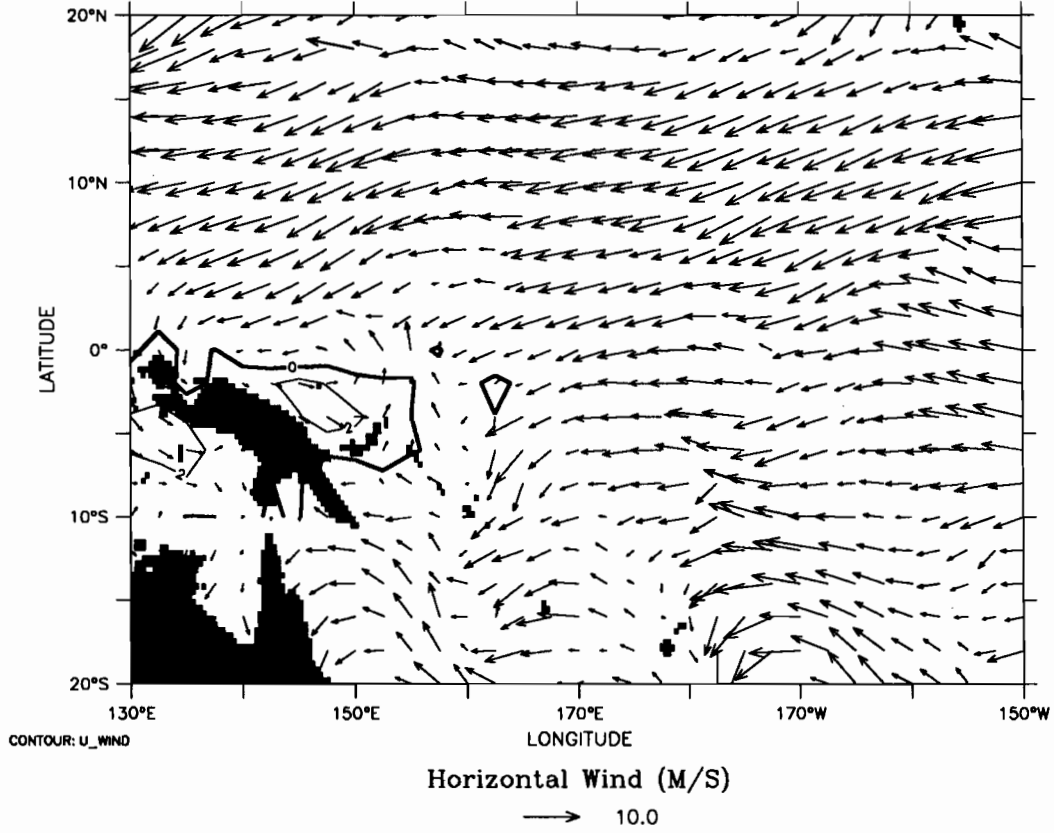
TIME : 17-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



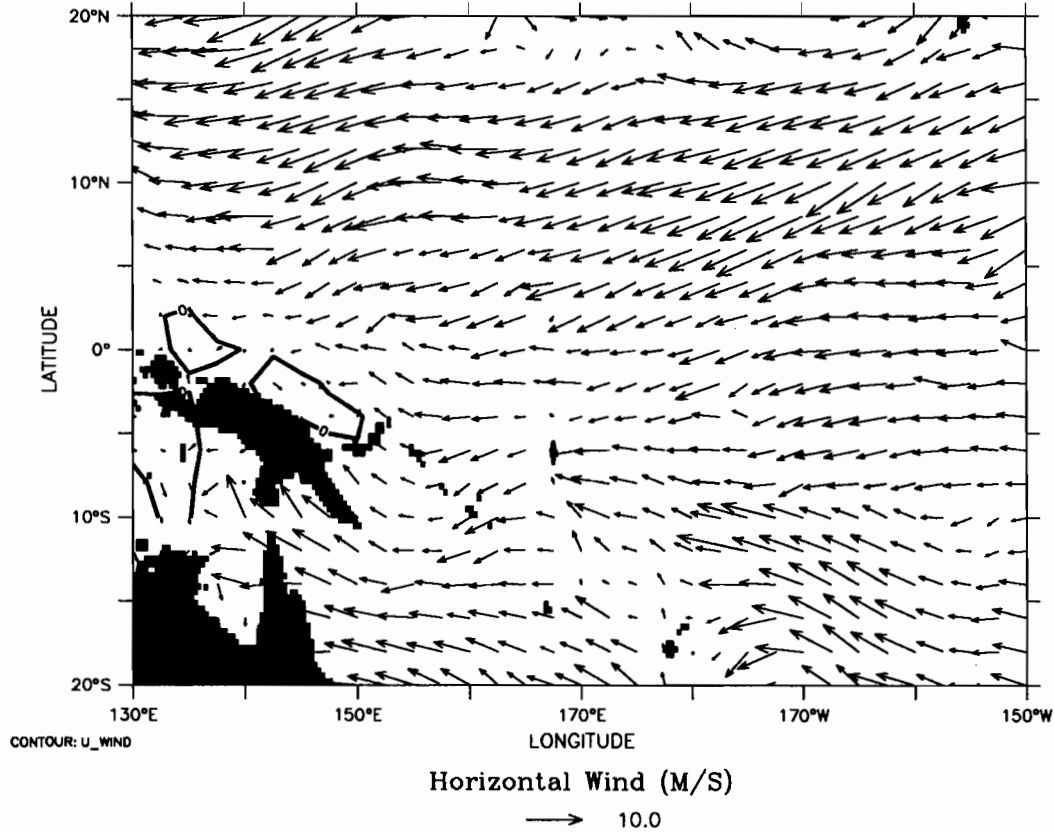
TIME : 18-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



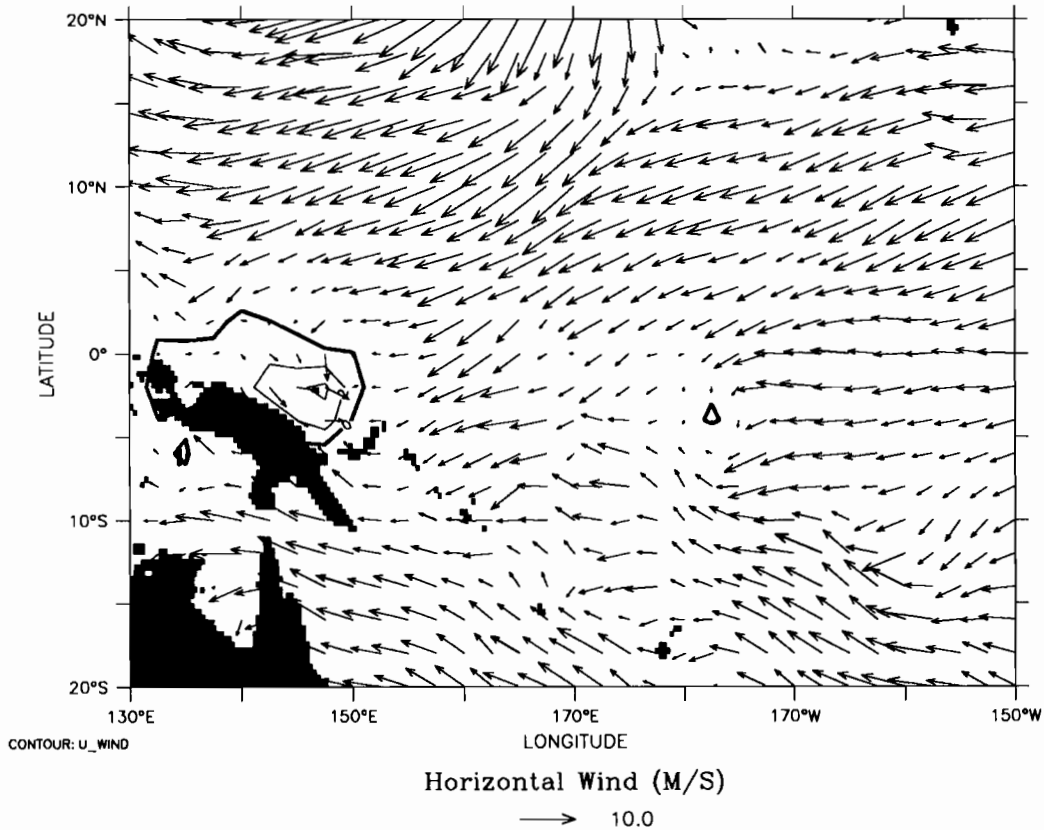
TIME : 19-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



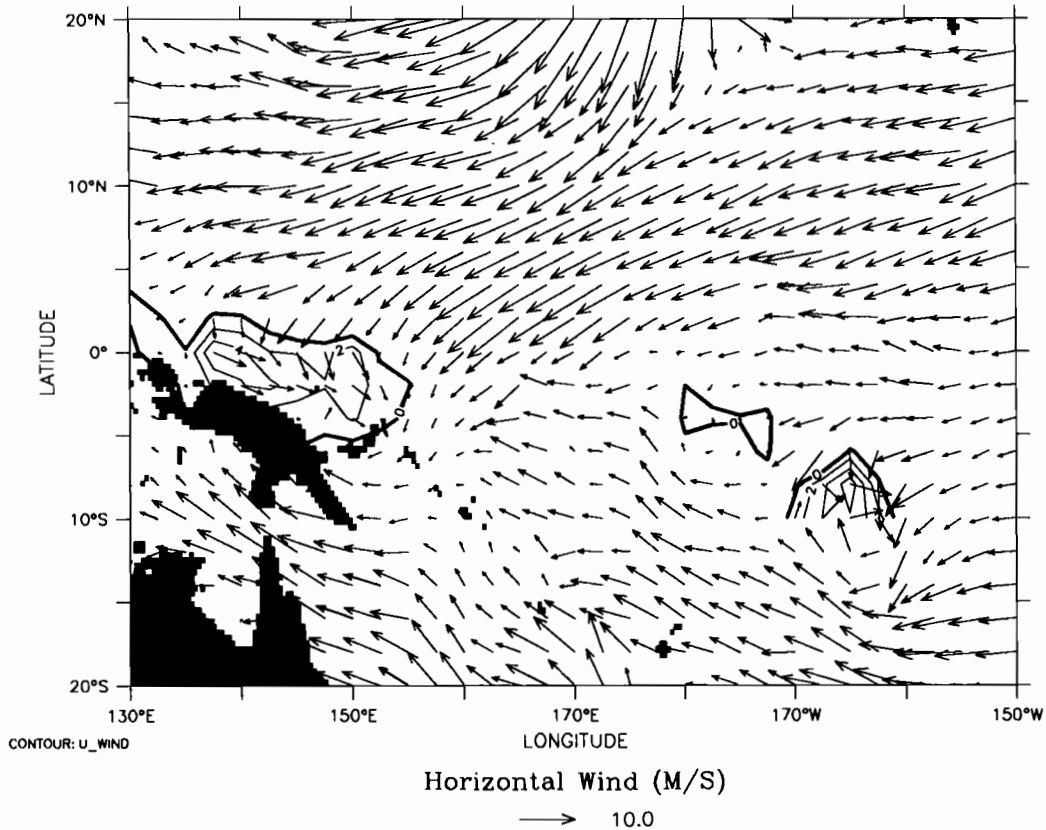
TIME : 20-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



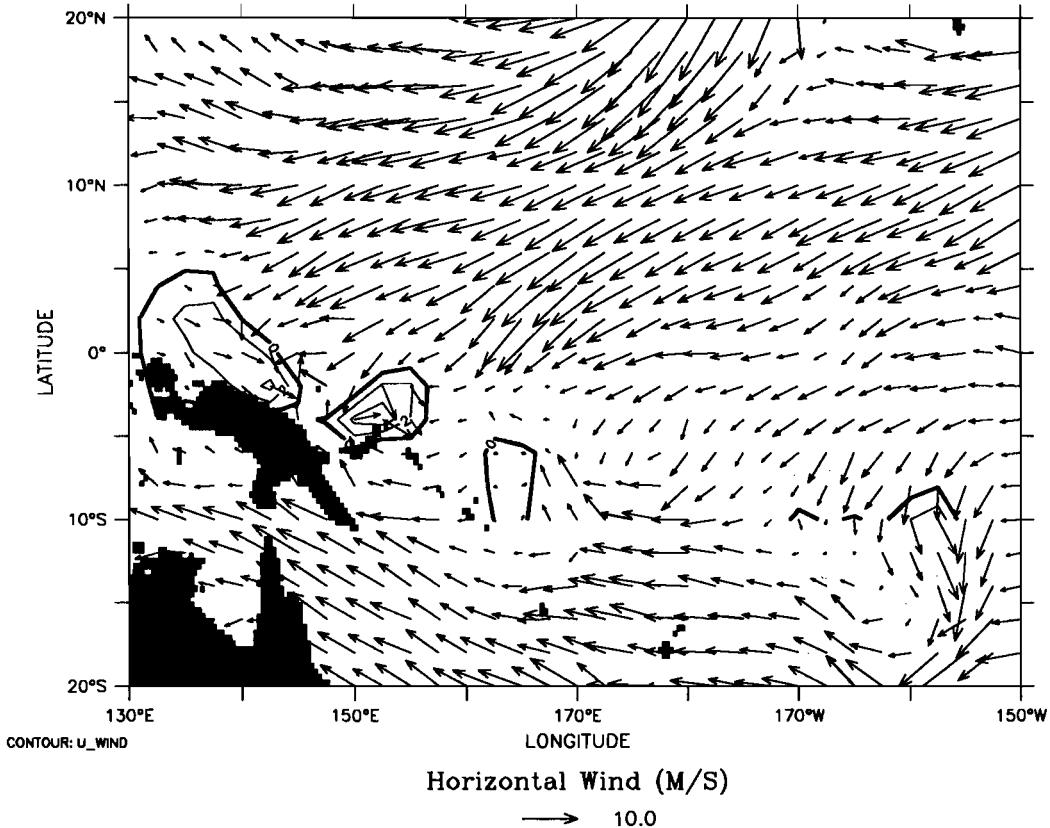
TIME : 21-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



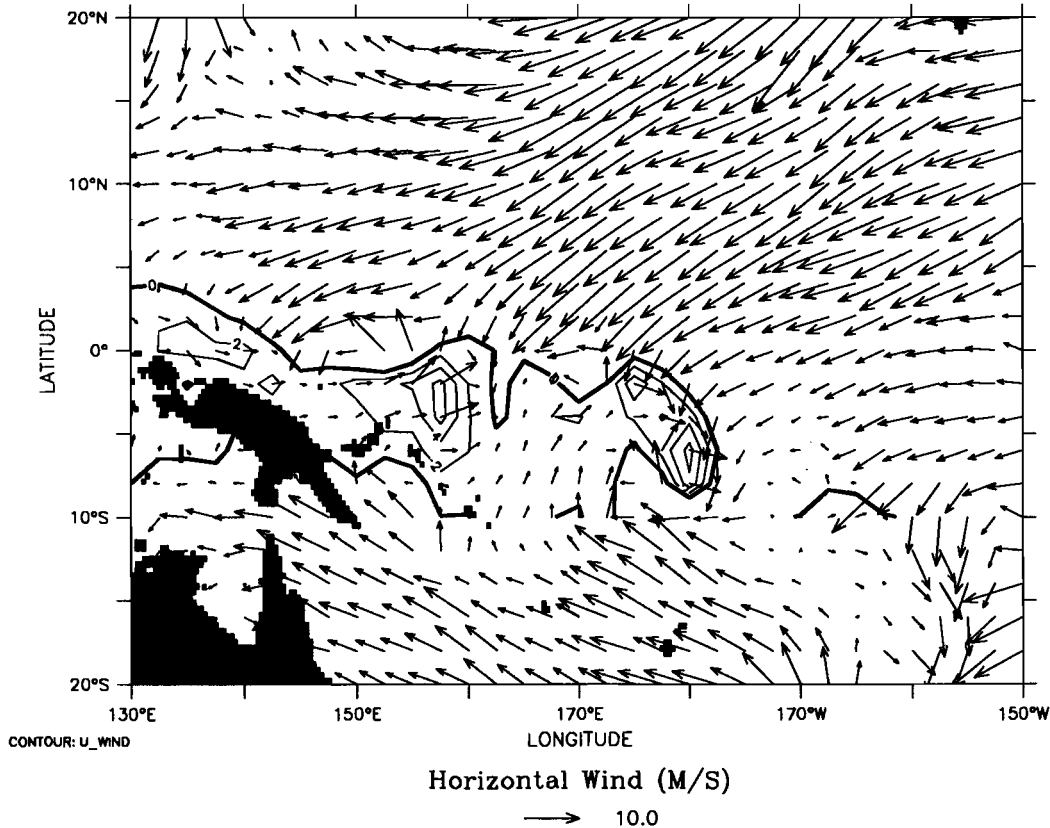
TIME : 22-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



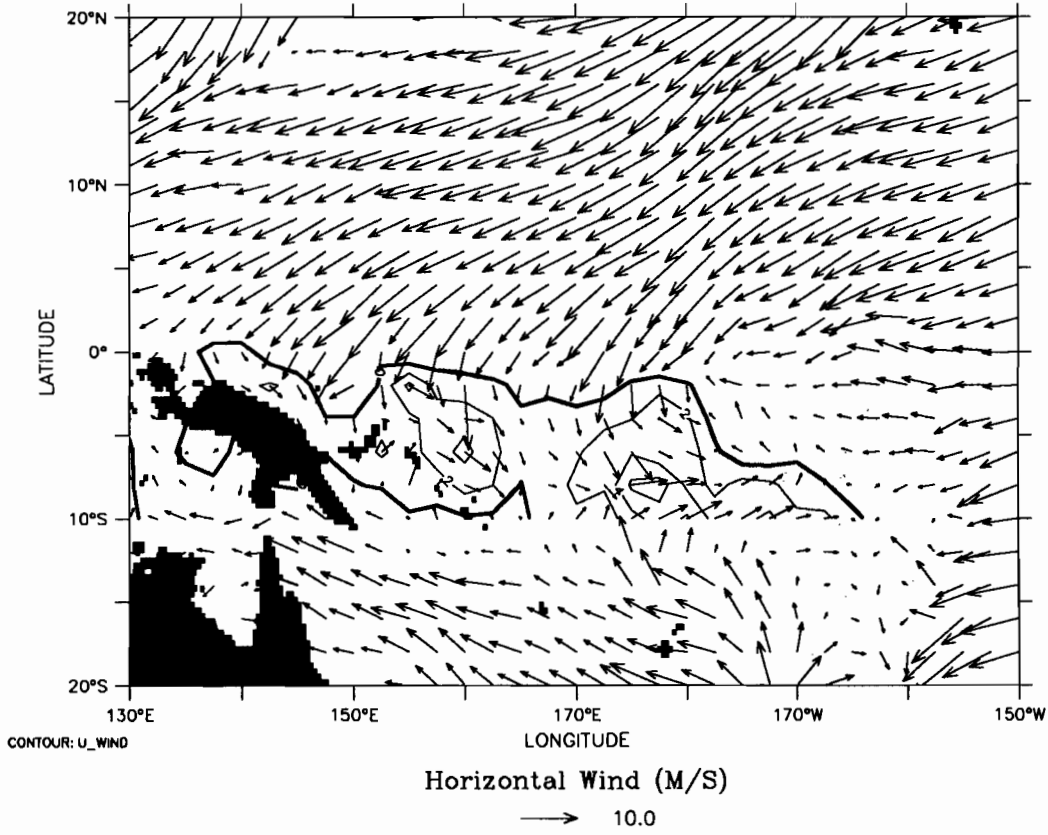
TIME : 23-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



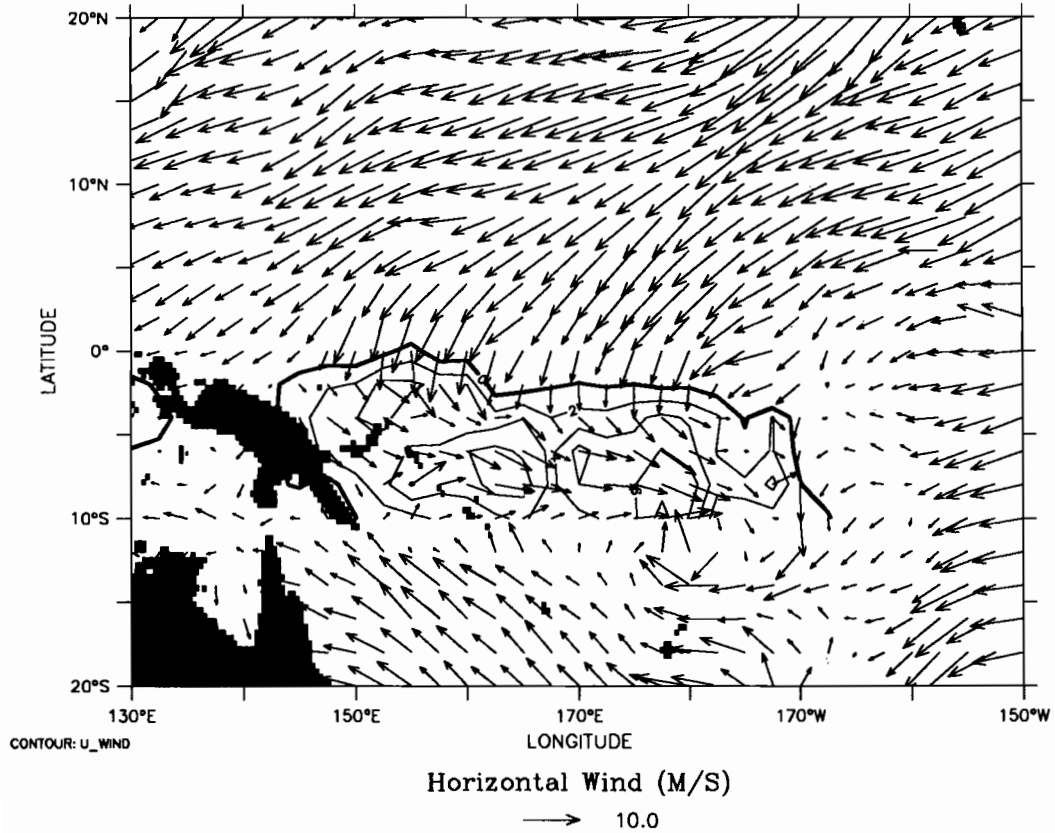
TIME : 24-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



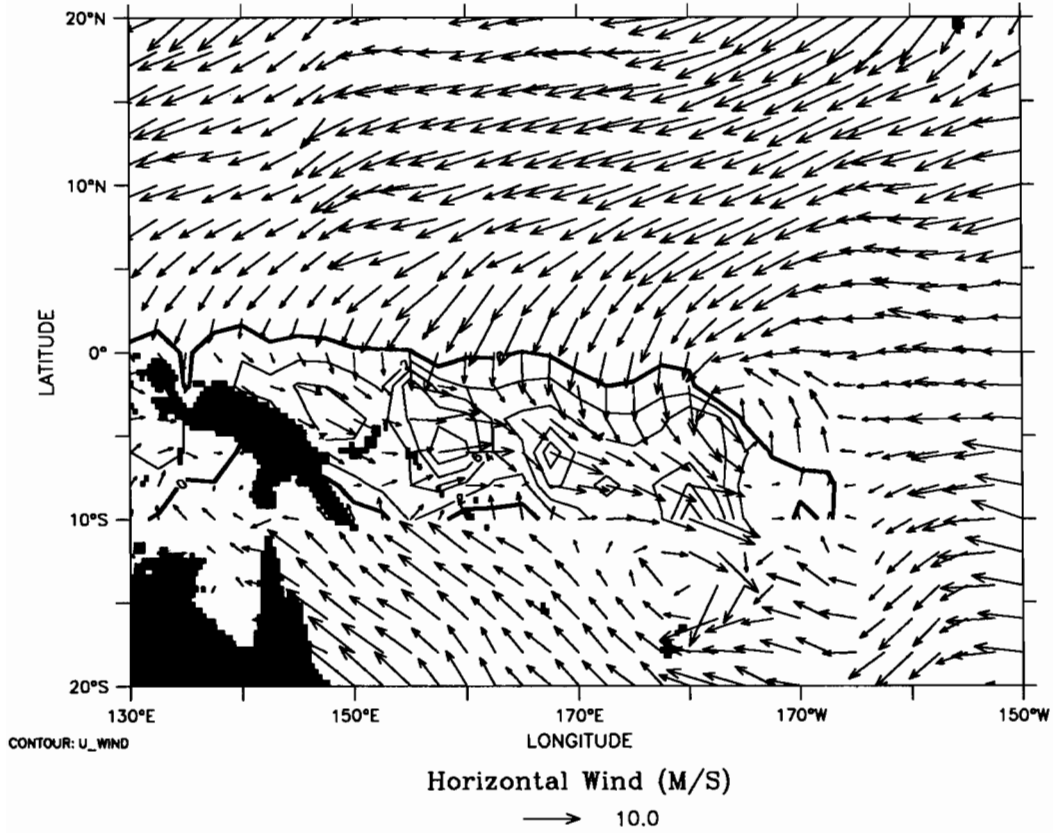
TIME : 25-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



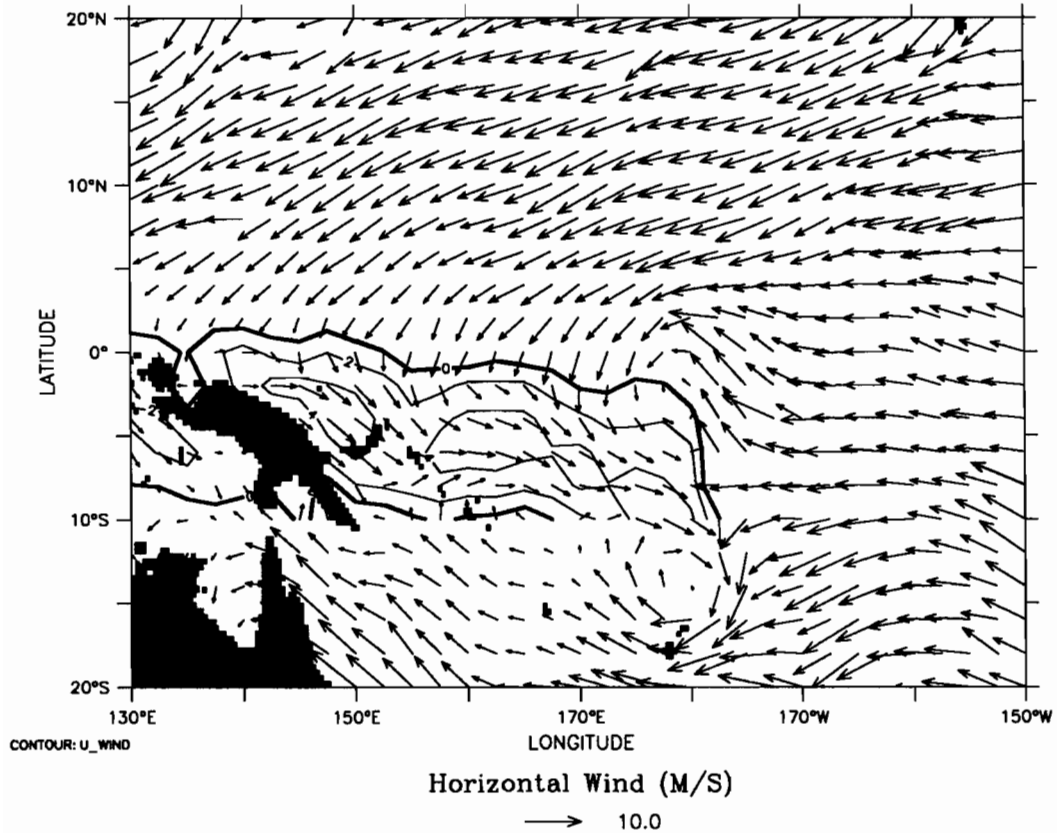
TIME : 26-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



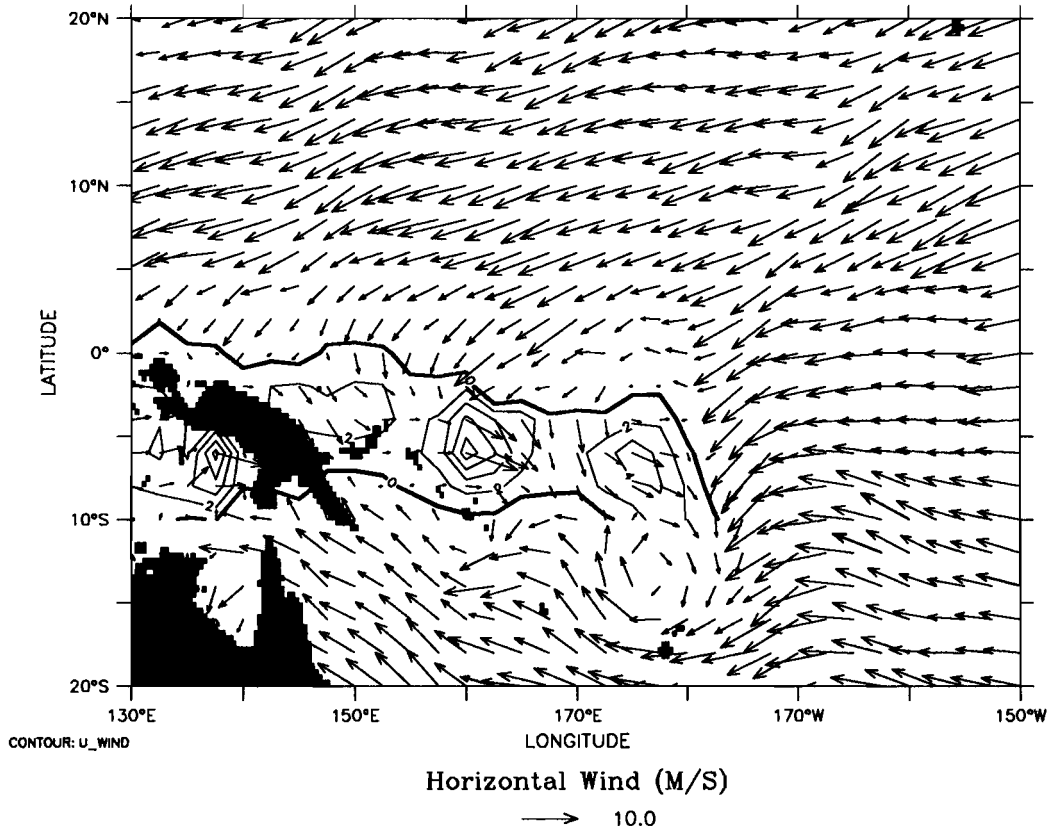
TIME : 27-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



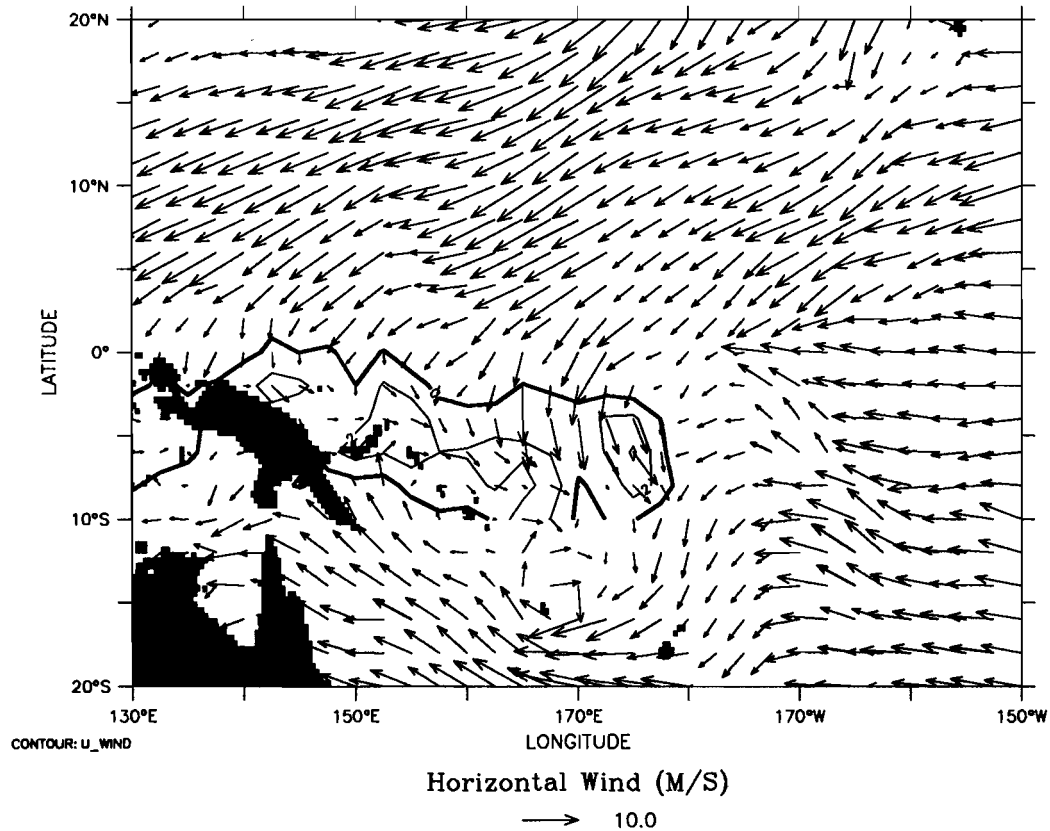
TIME : 28-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



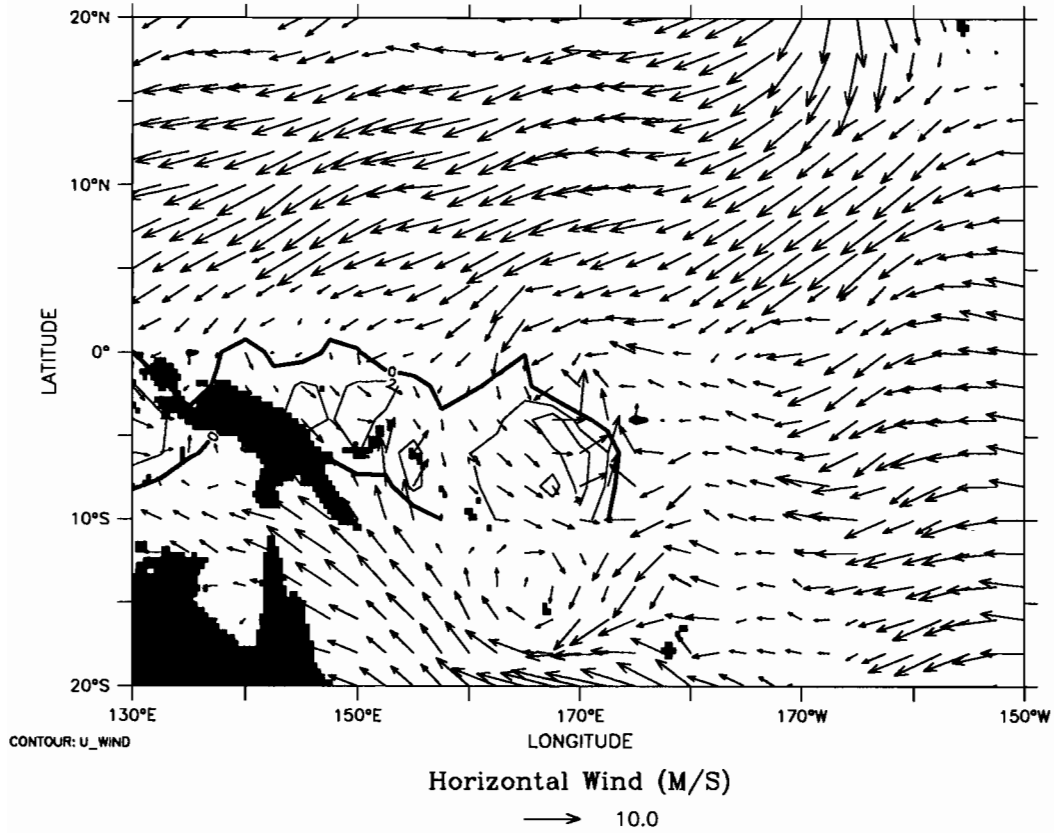
TIME : 29-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



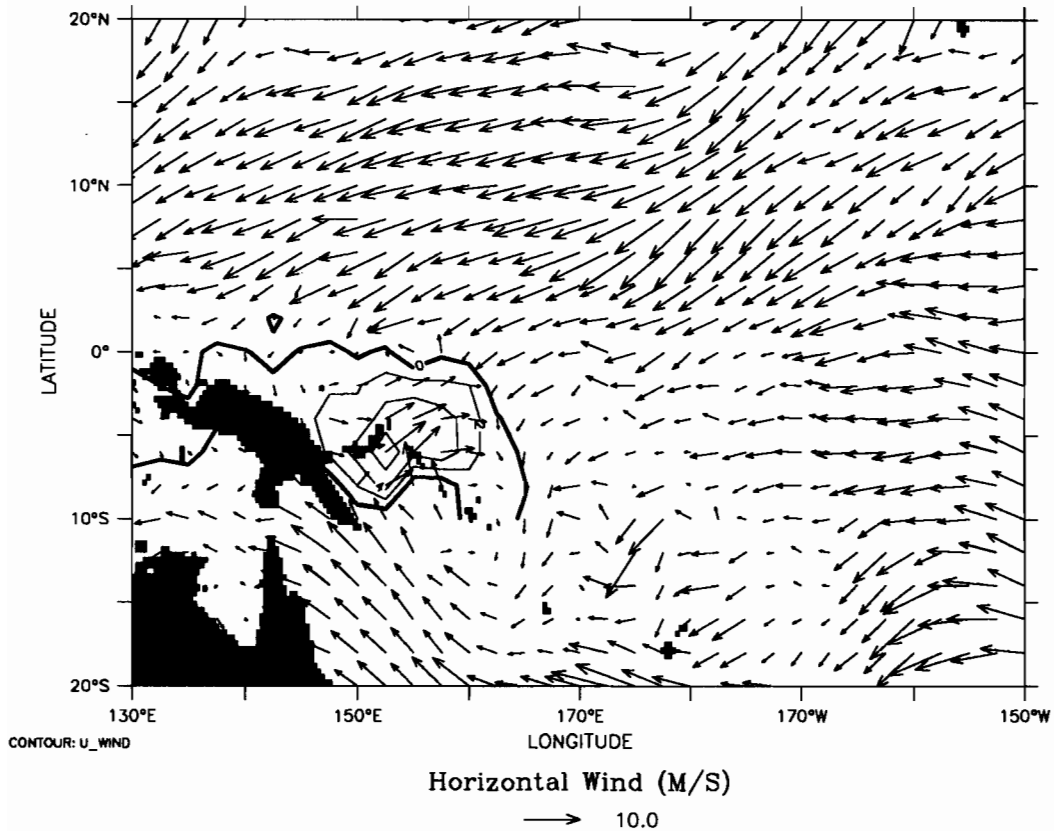
TIME : 30-JAN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 31-JAN-1988 18:00

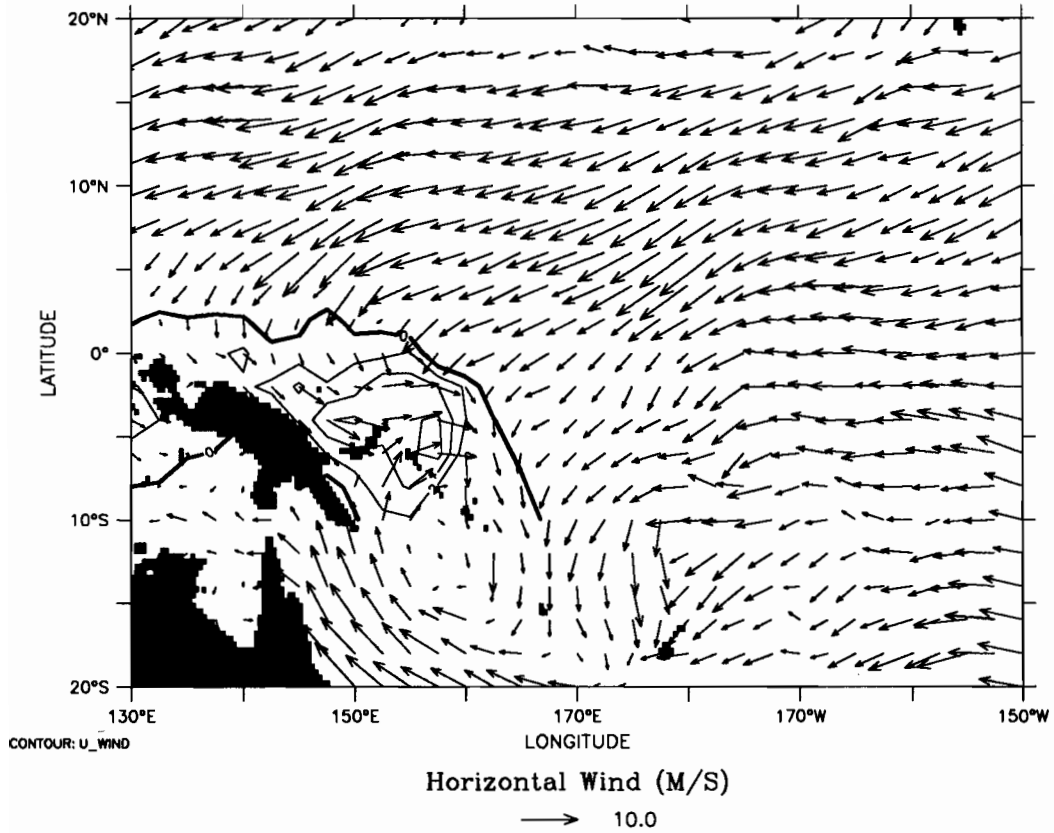
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





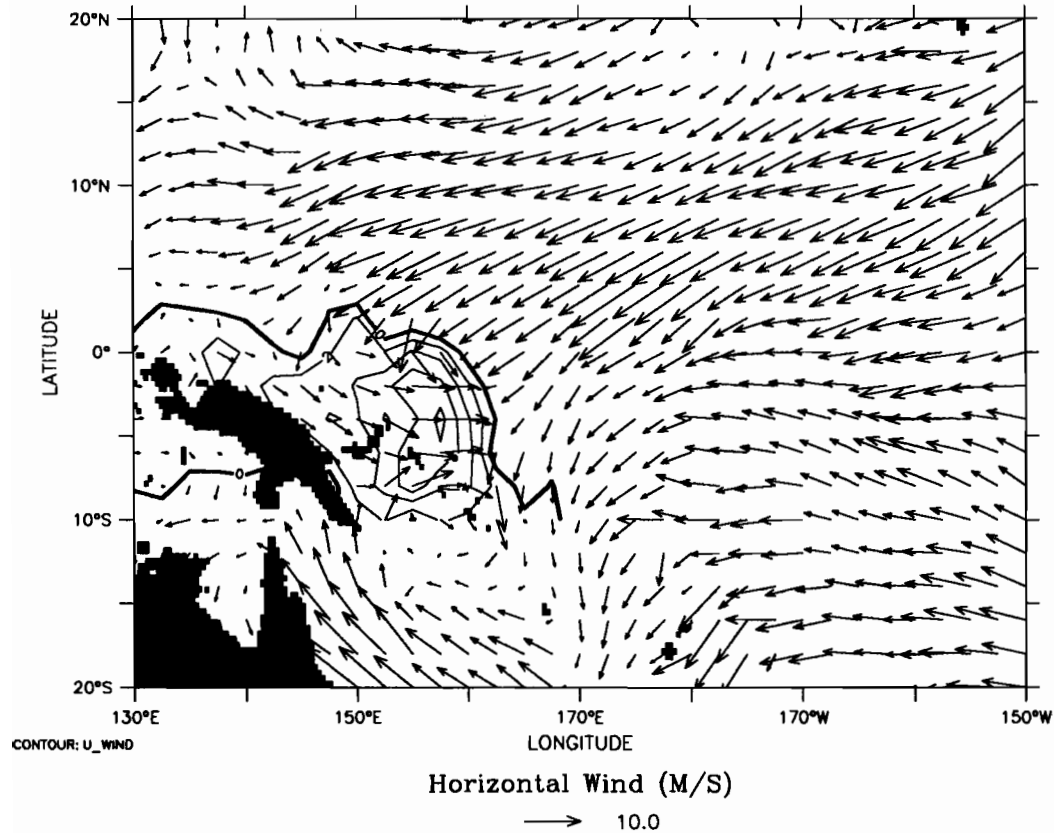
TIME : 01-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



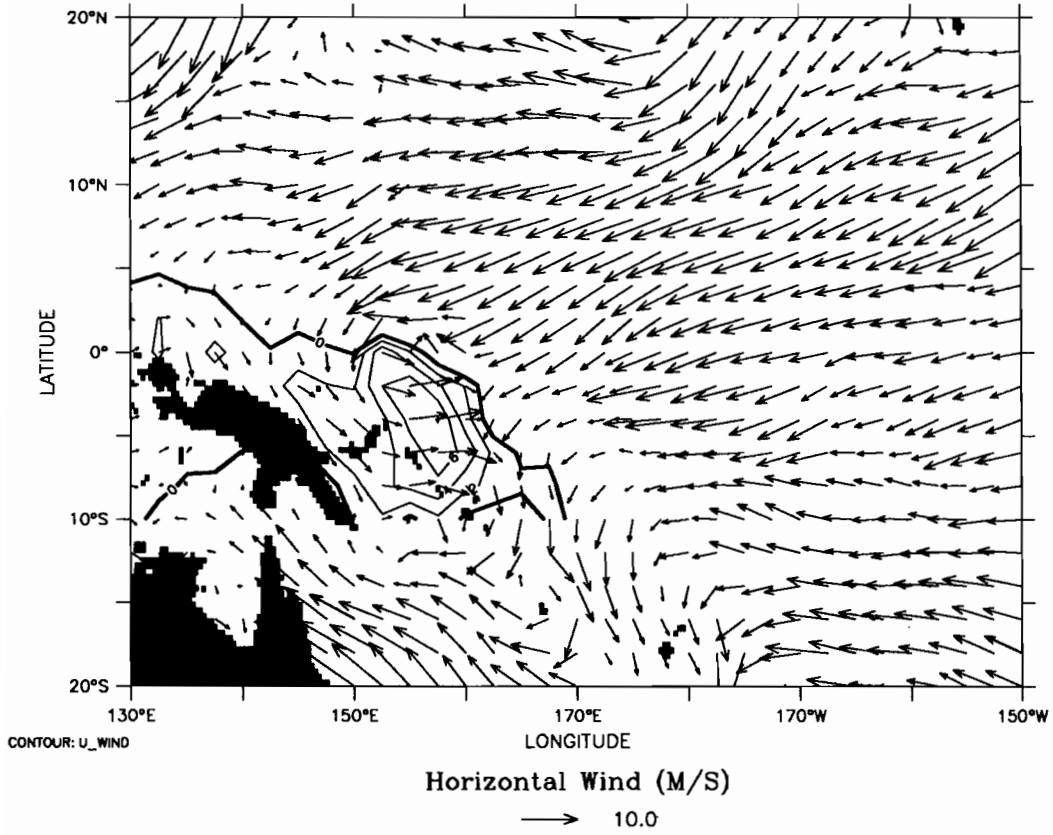
TIME : 02-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



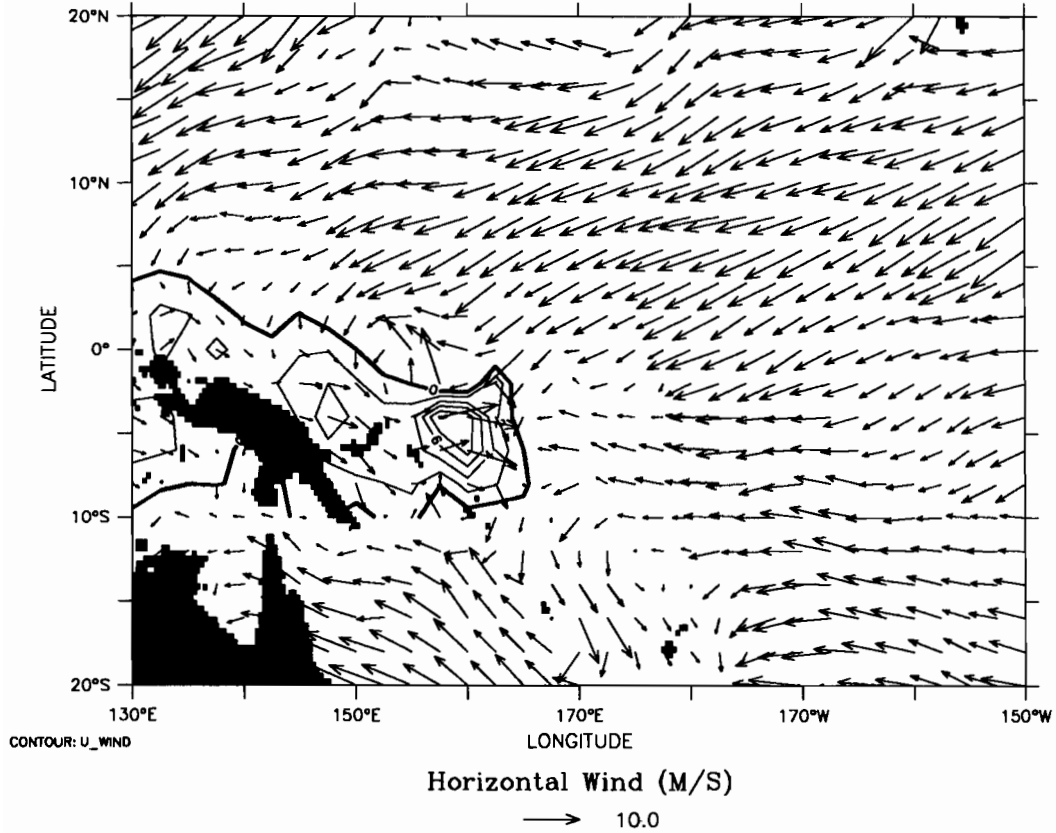
TIME : 03-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



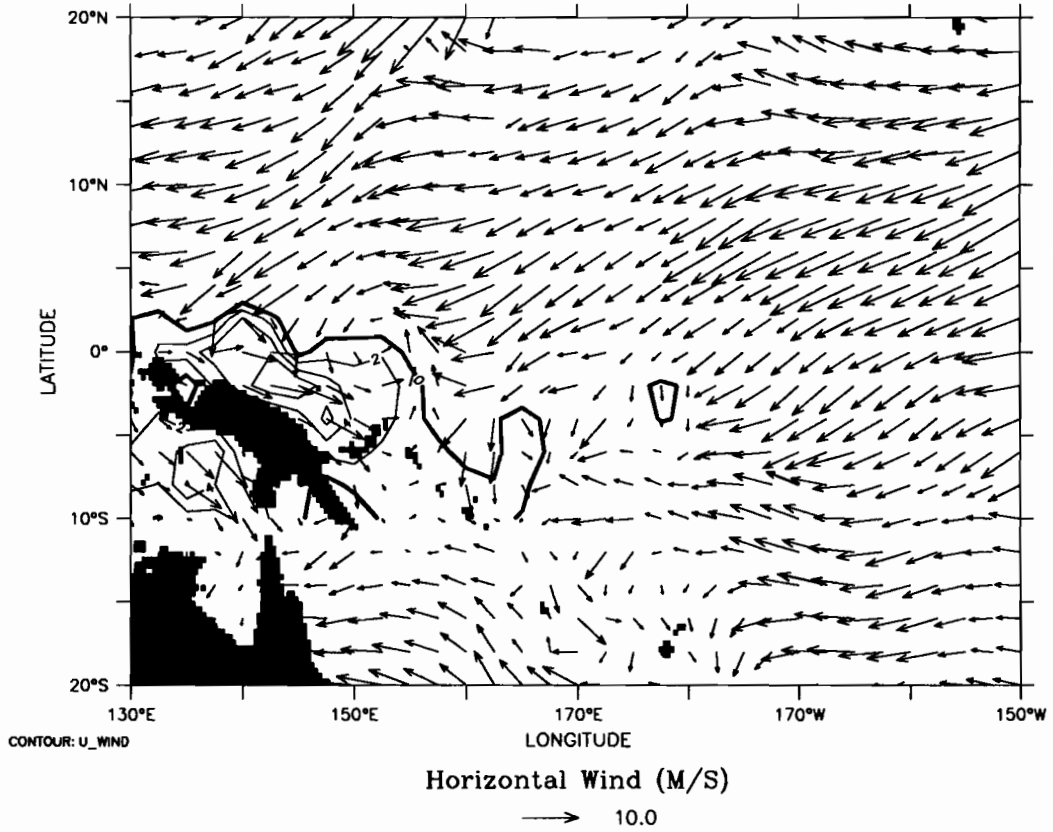
TIME : 04-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



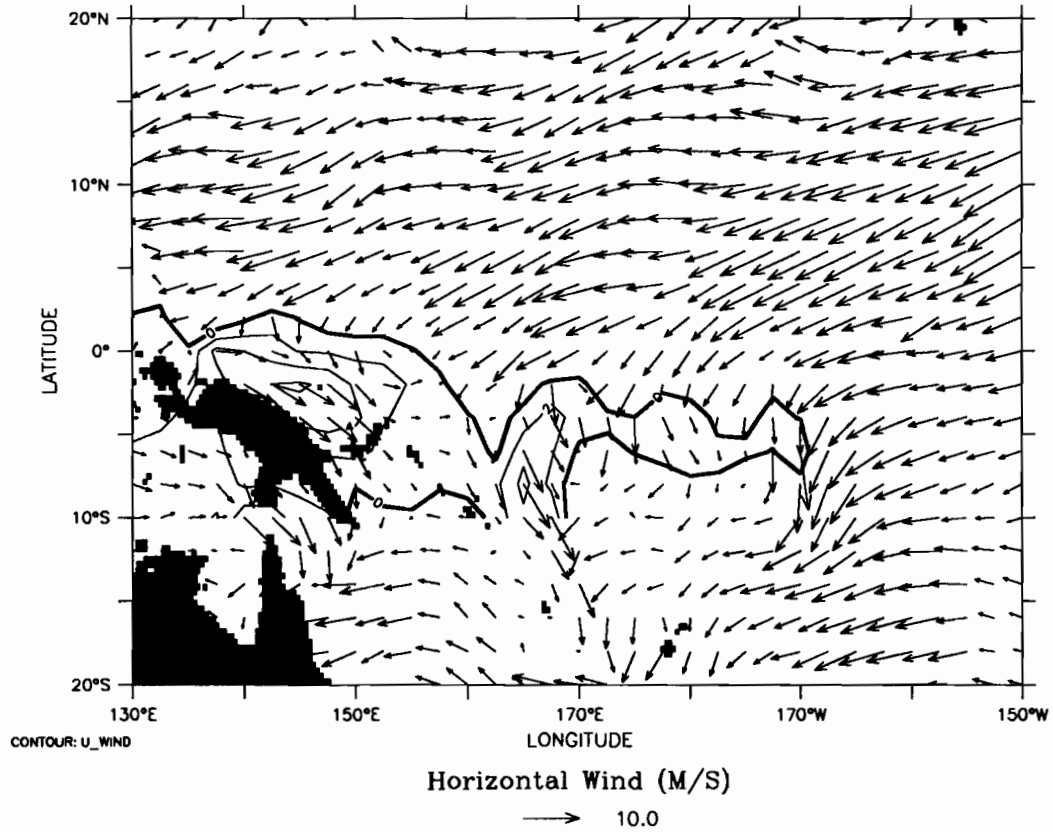
TIME : 05-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



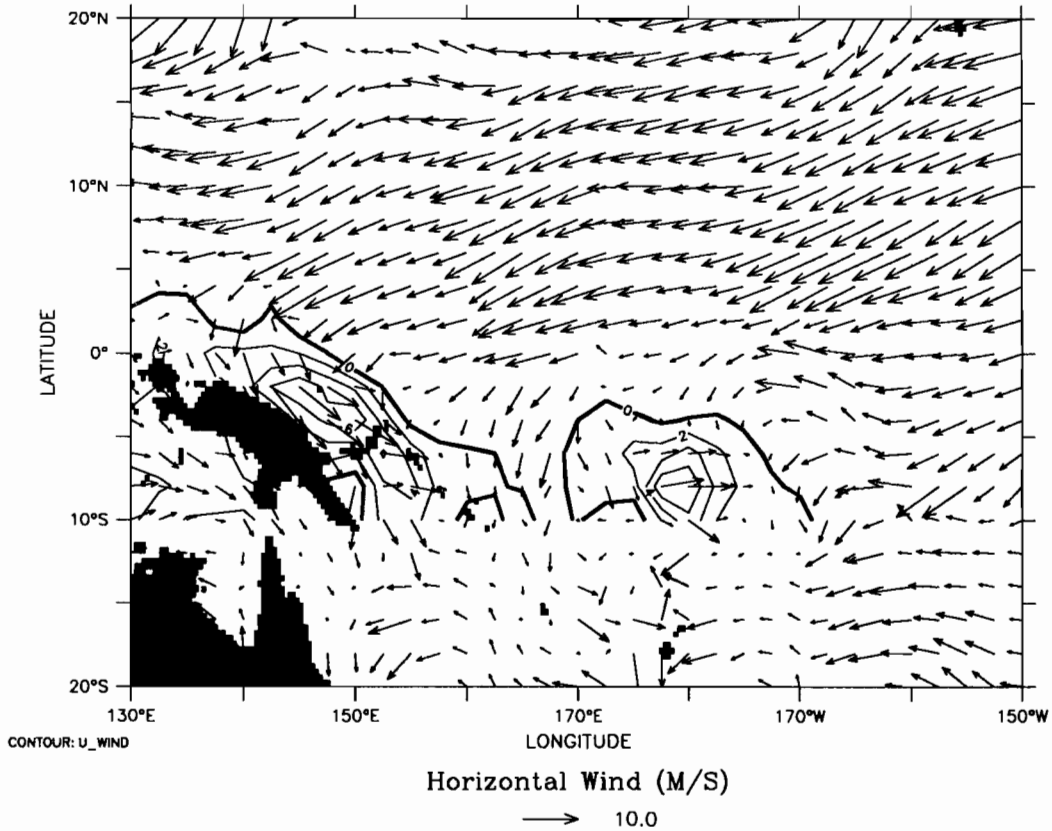
TIME : 06-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



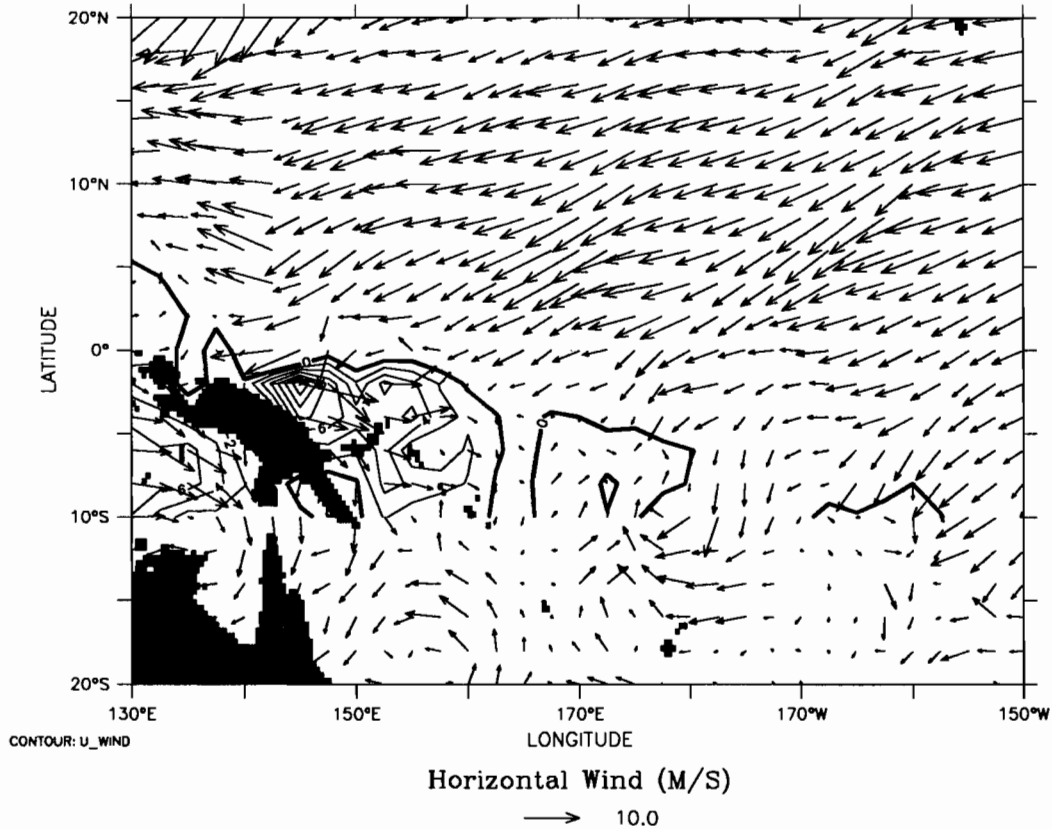
TIME : 07-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



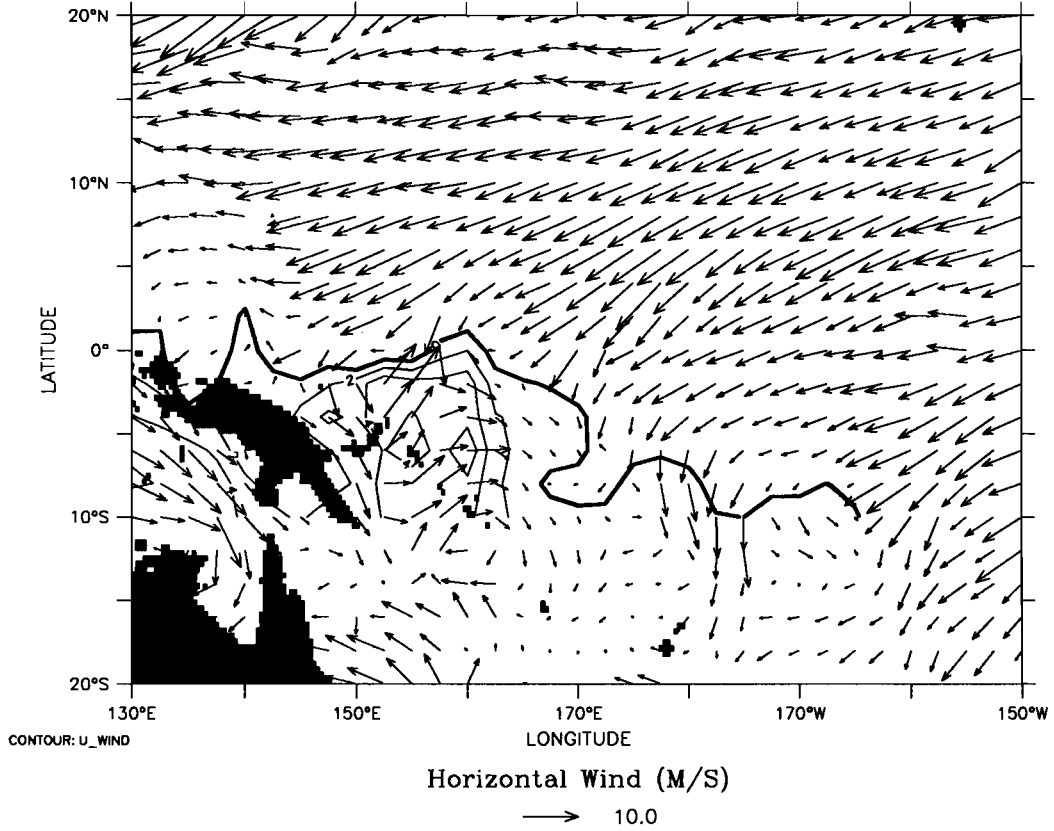
TIME : 08-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



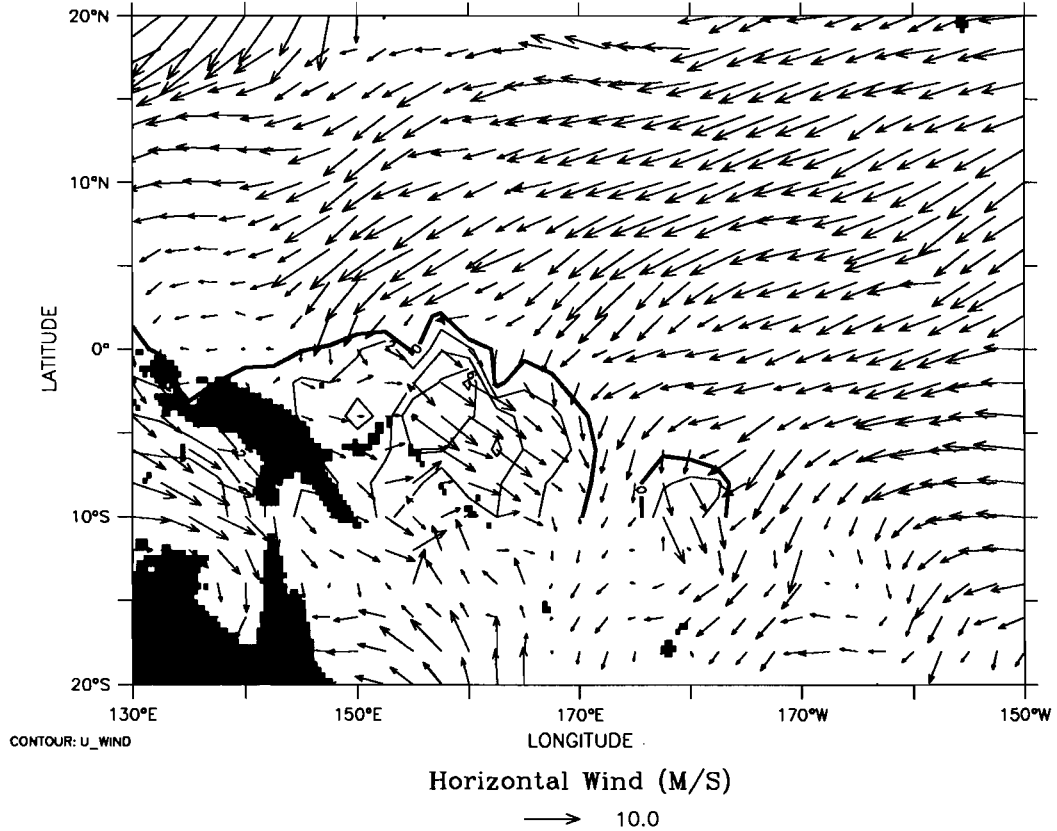
TIME : 09-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



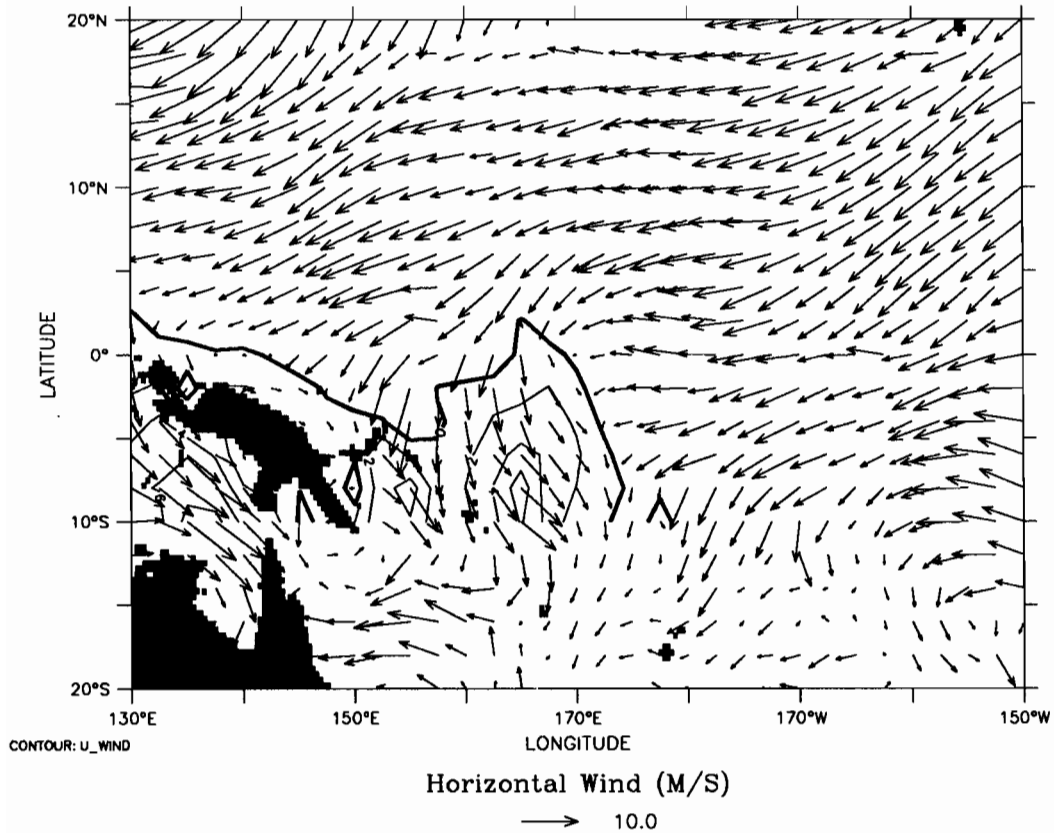
TIME : 10-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



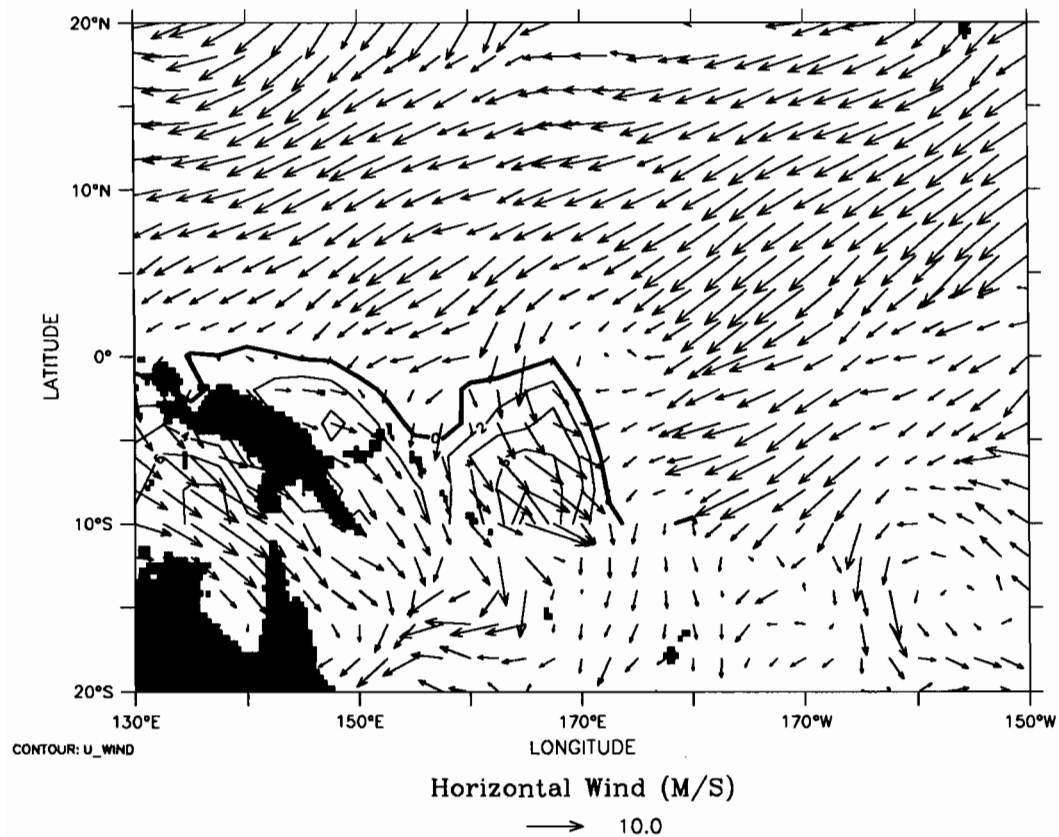
TIME : 11-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



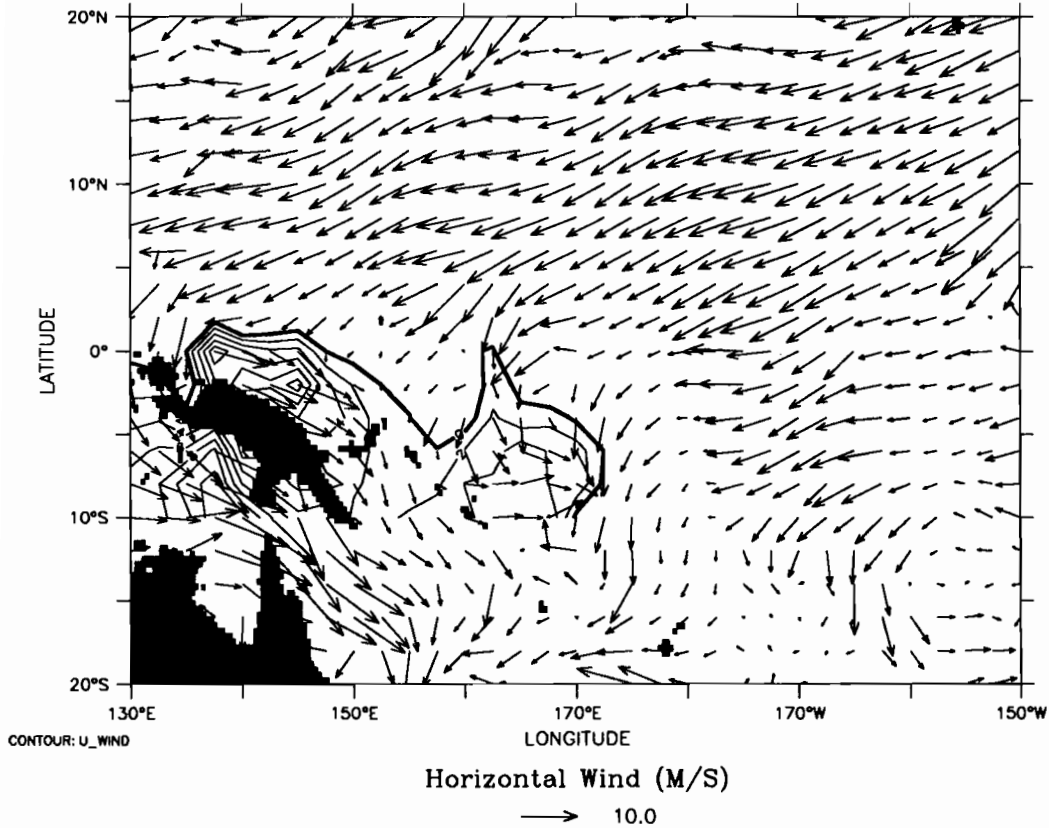
TIME : 12-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



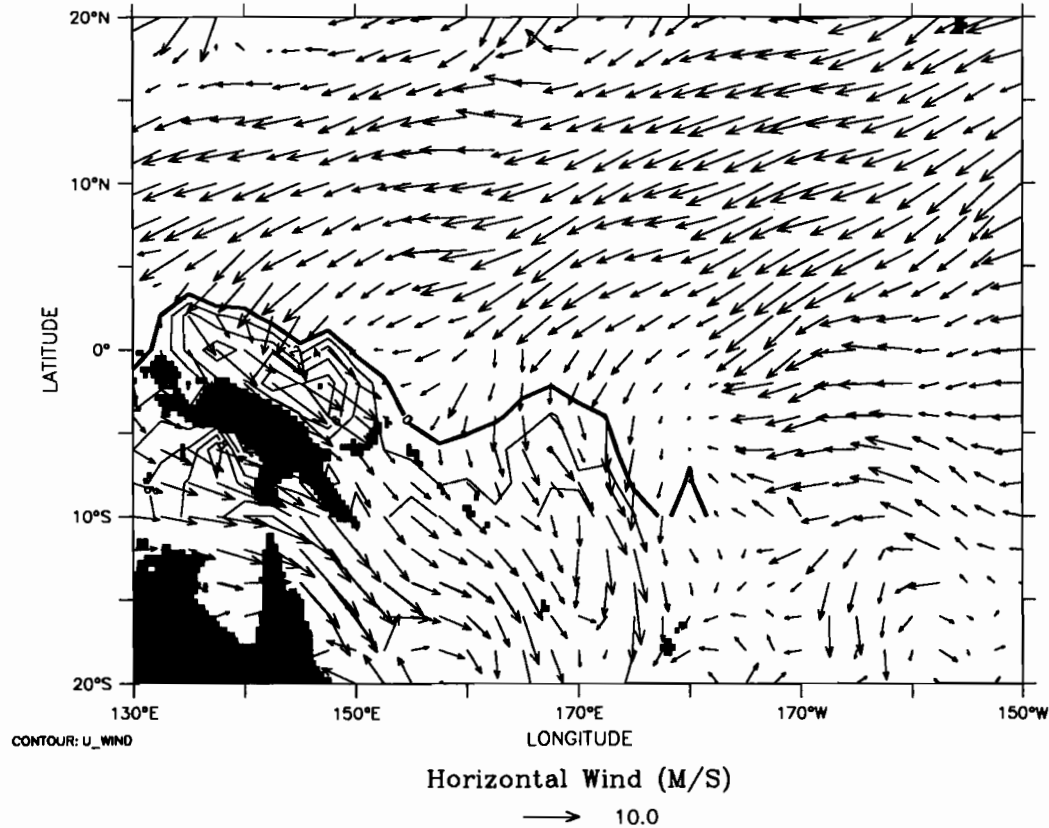
TIME : 13-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



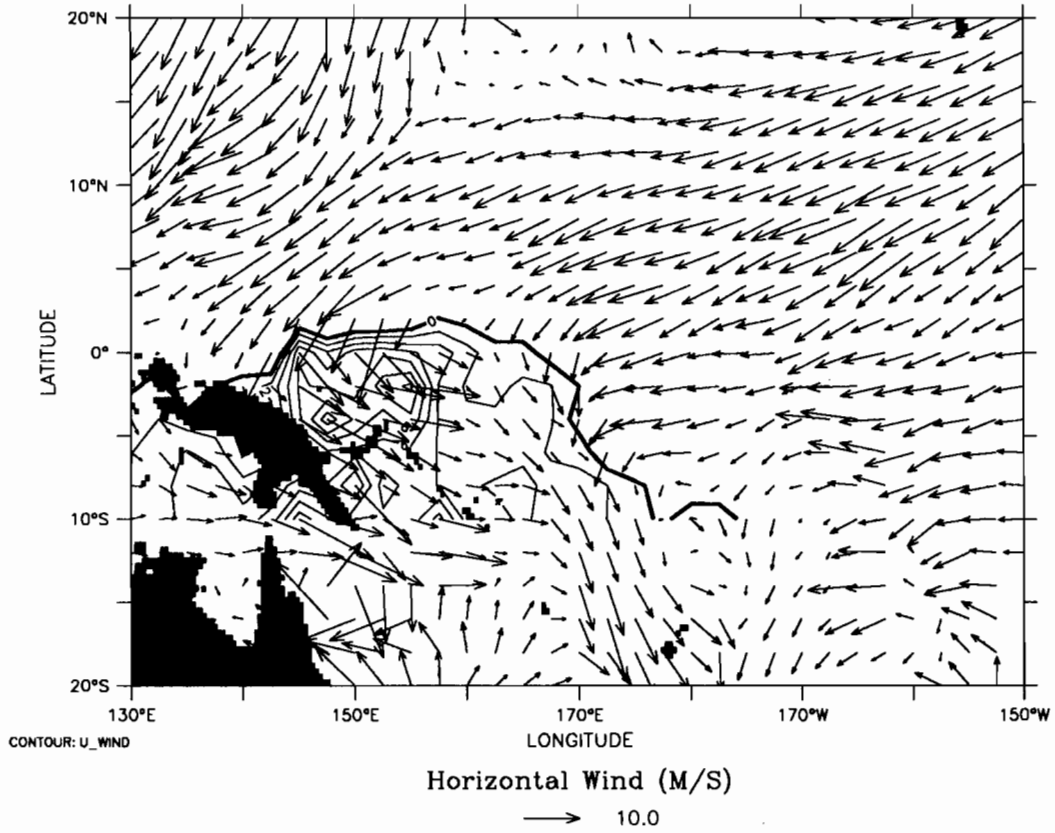
TIME : 14-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



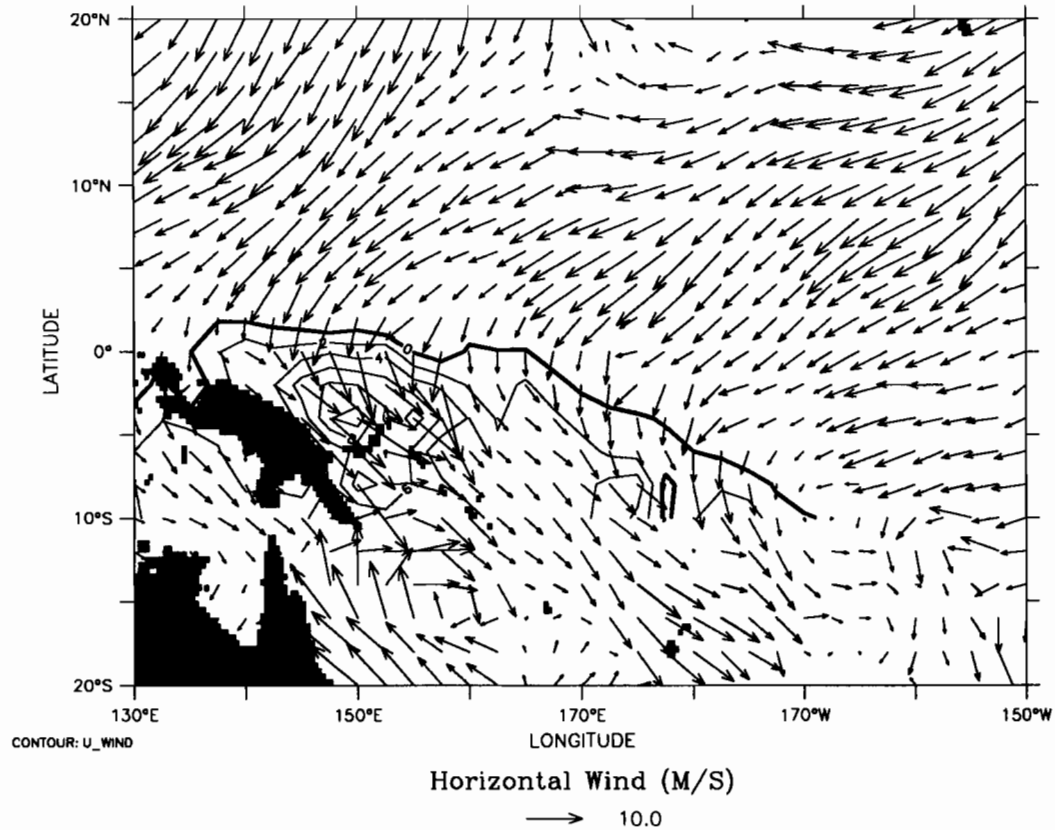
TIME : 16-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 17-FEB-1988 18:00

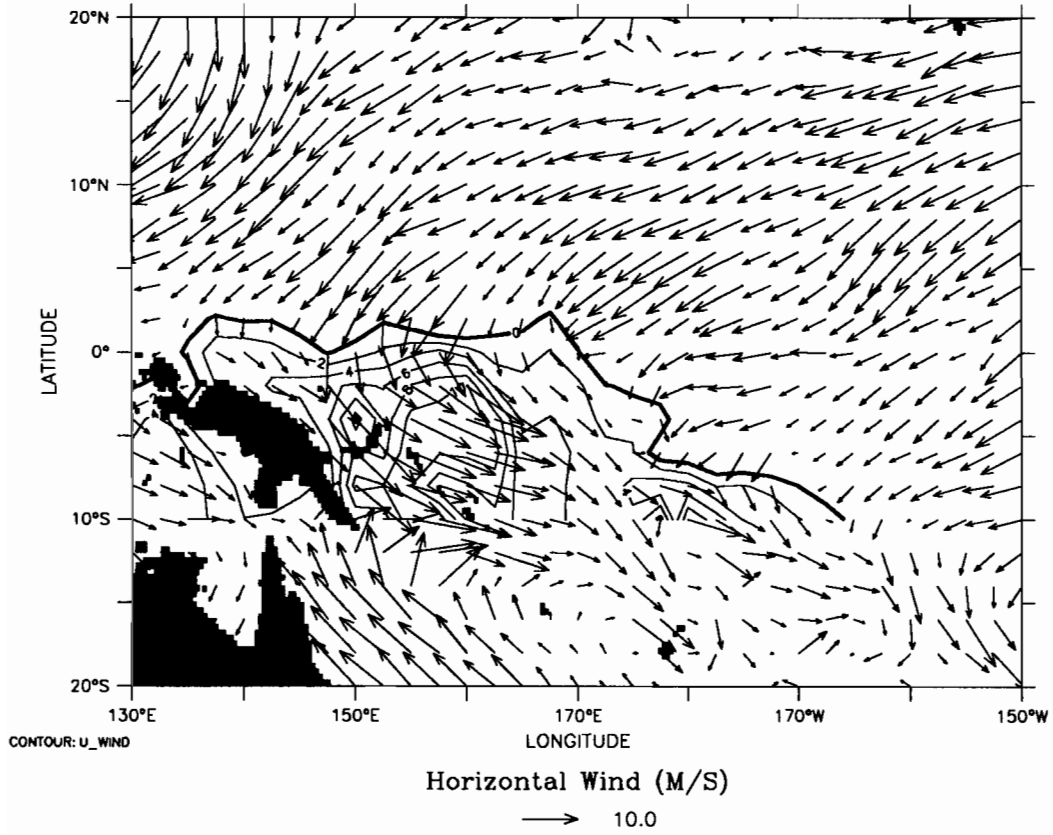
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





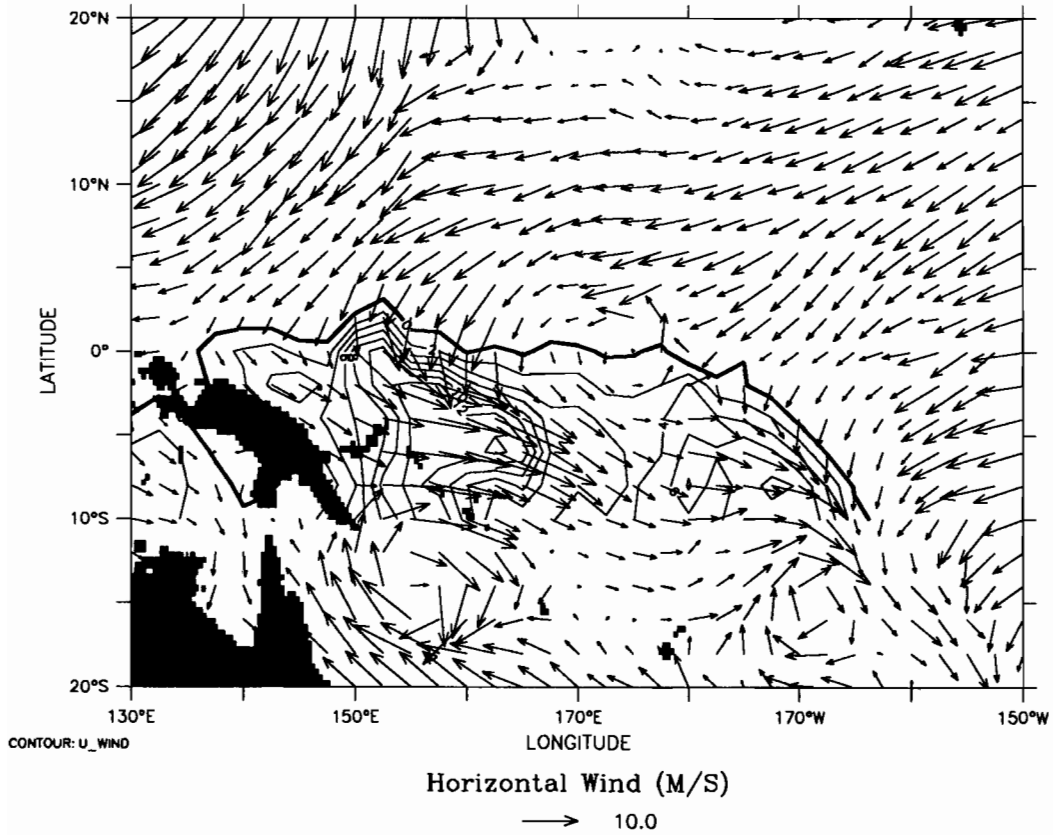
TIME : 18-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



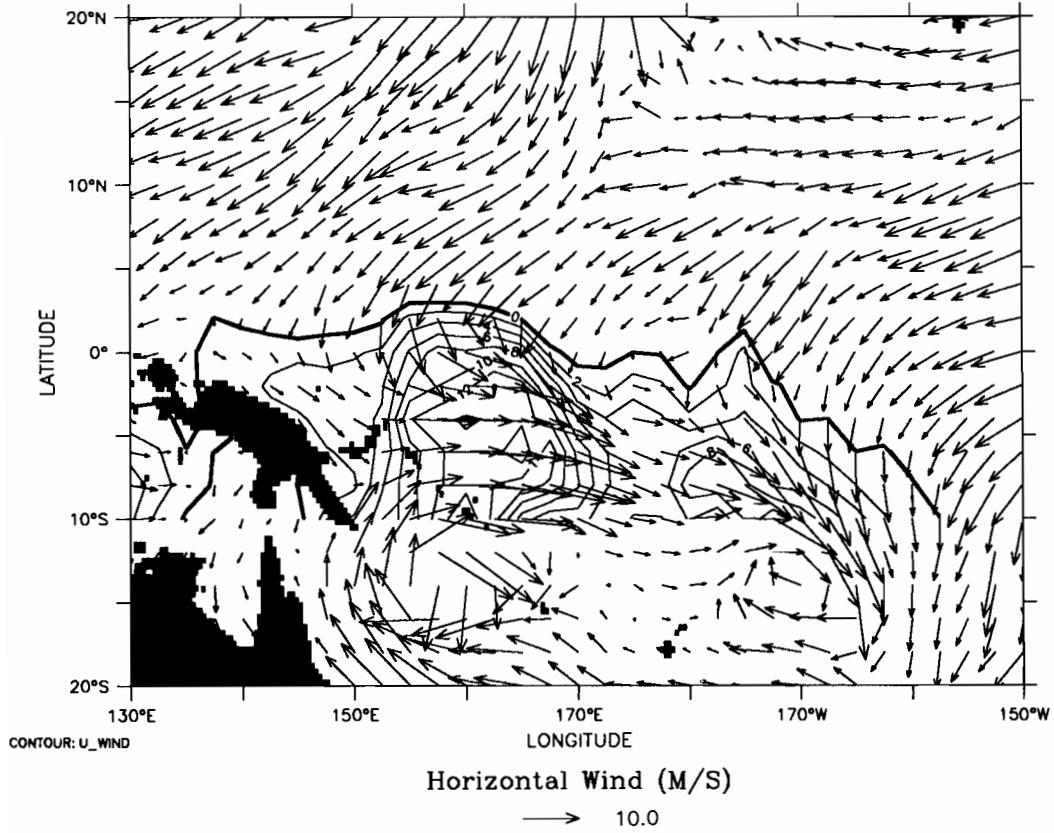
TIME : 19-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



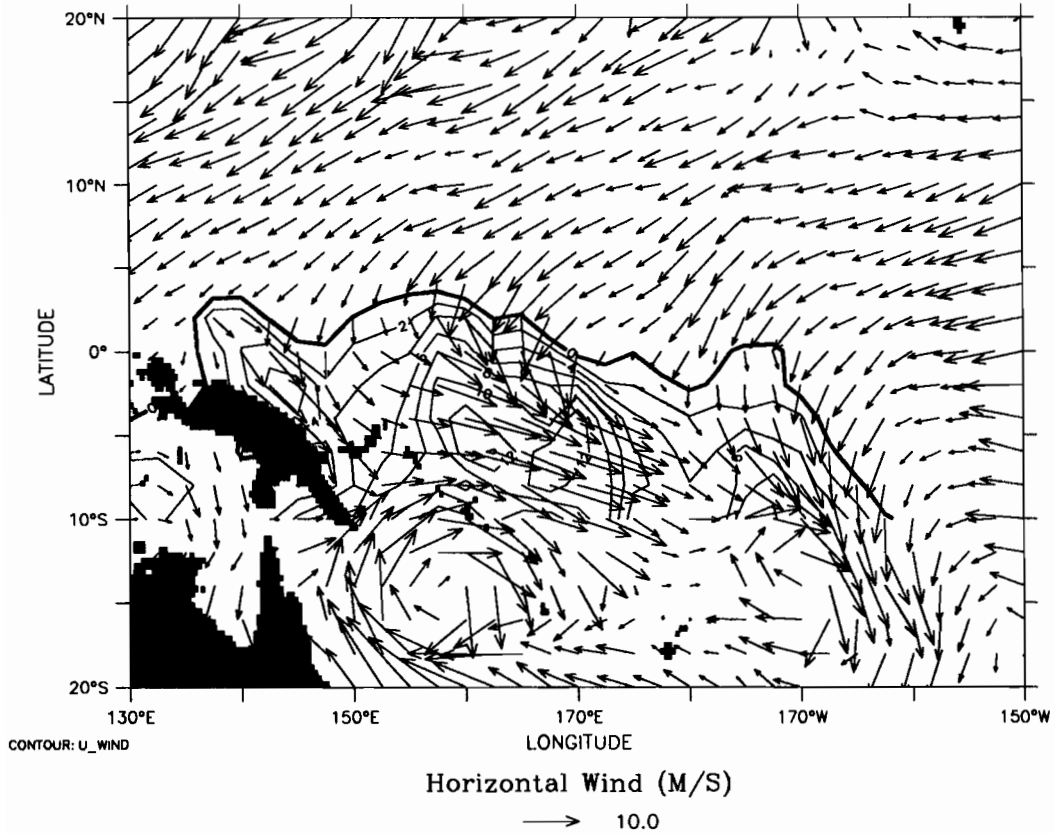
TIME : 20-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



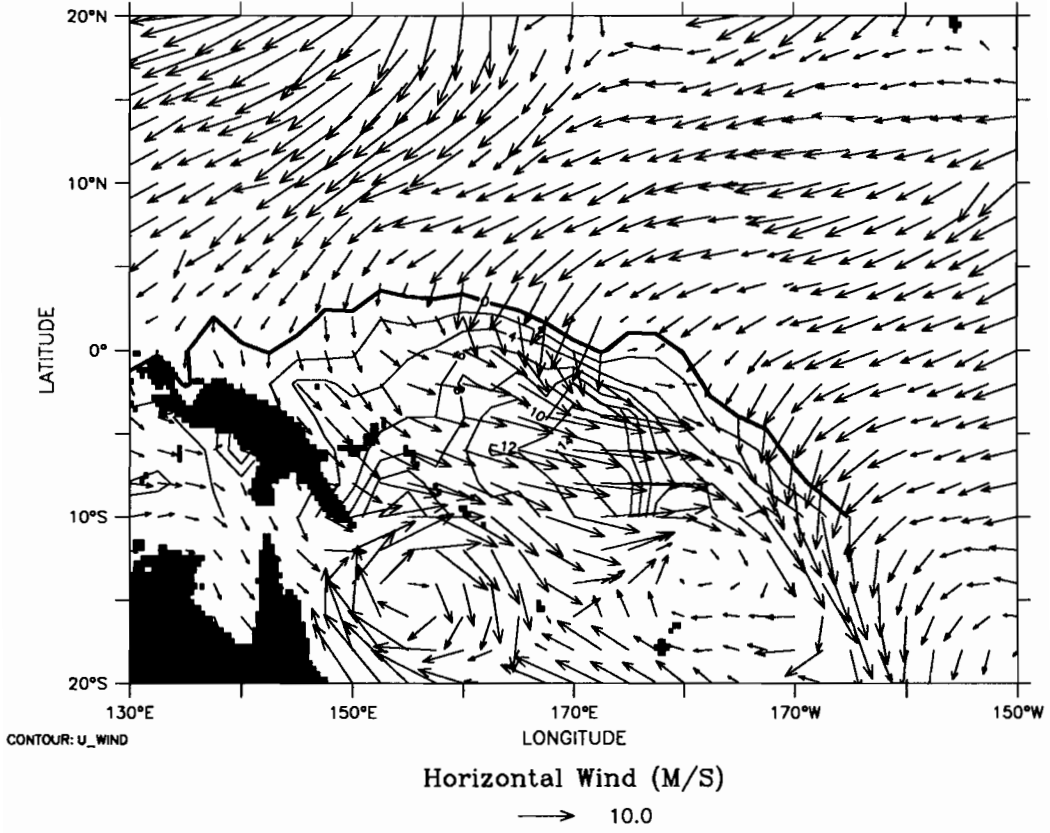
TIME : 21-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



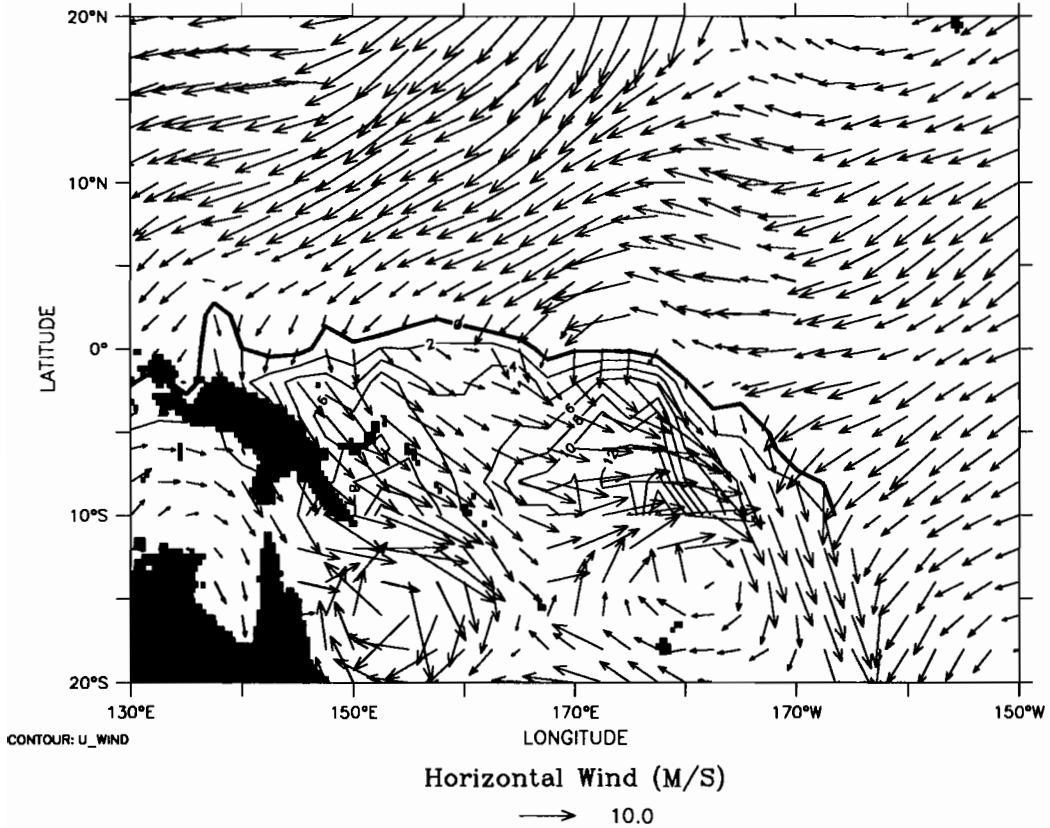
TIME : 22-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



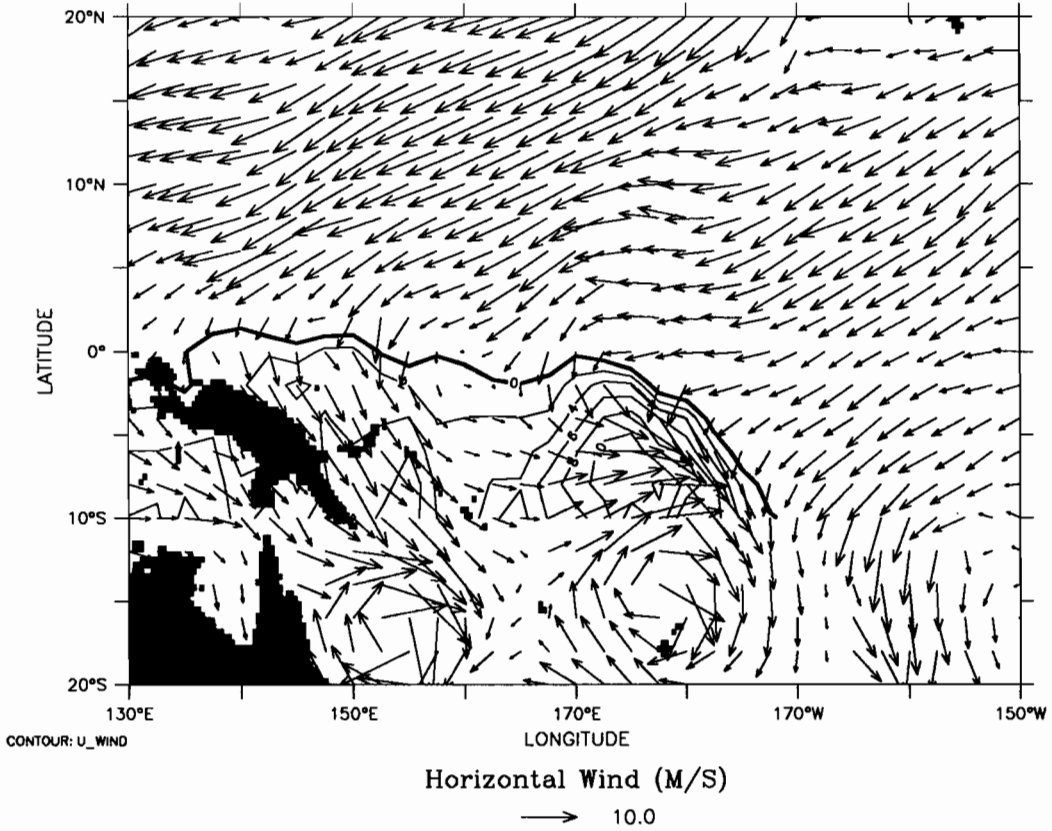
TIME : 23-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



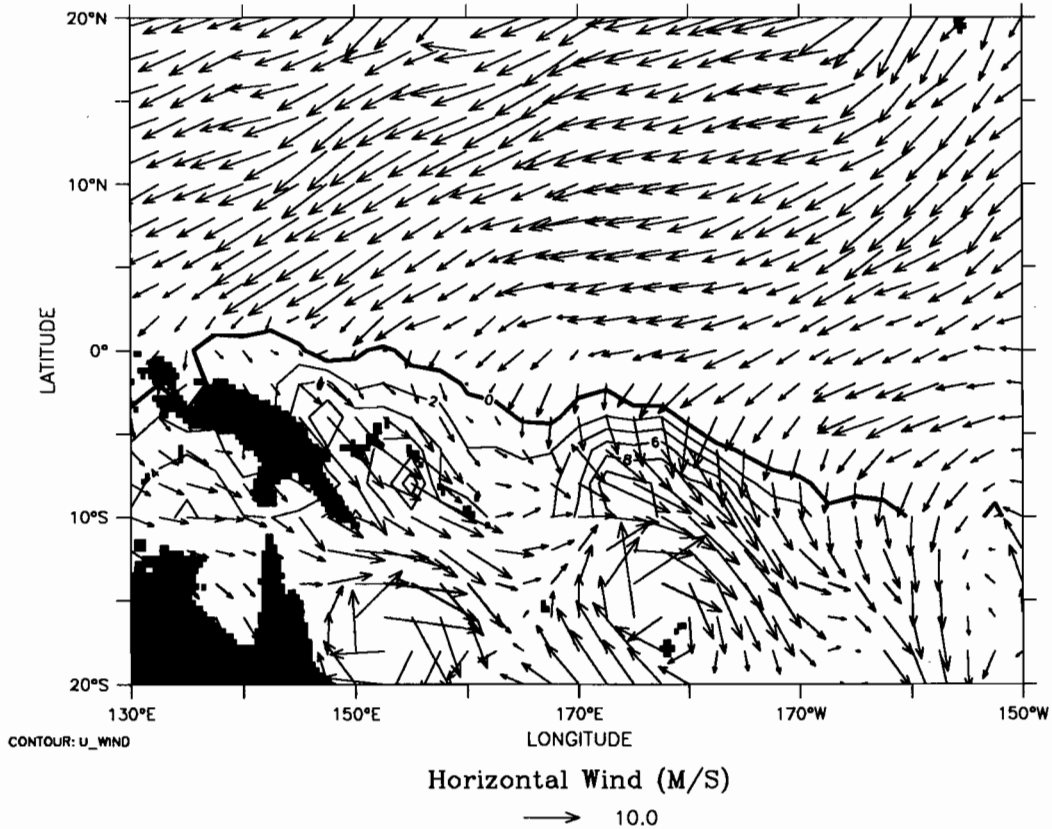
TIME : 24-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



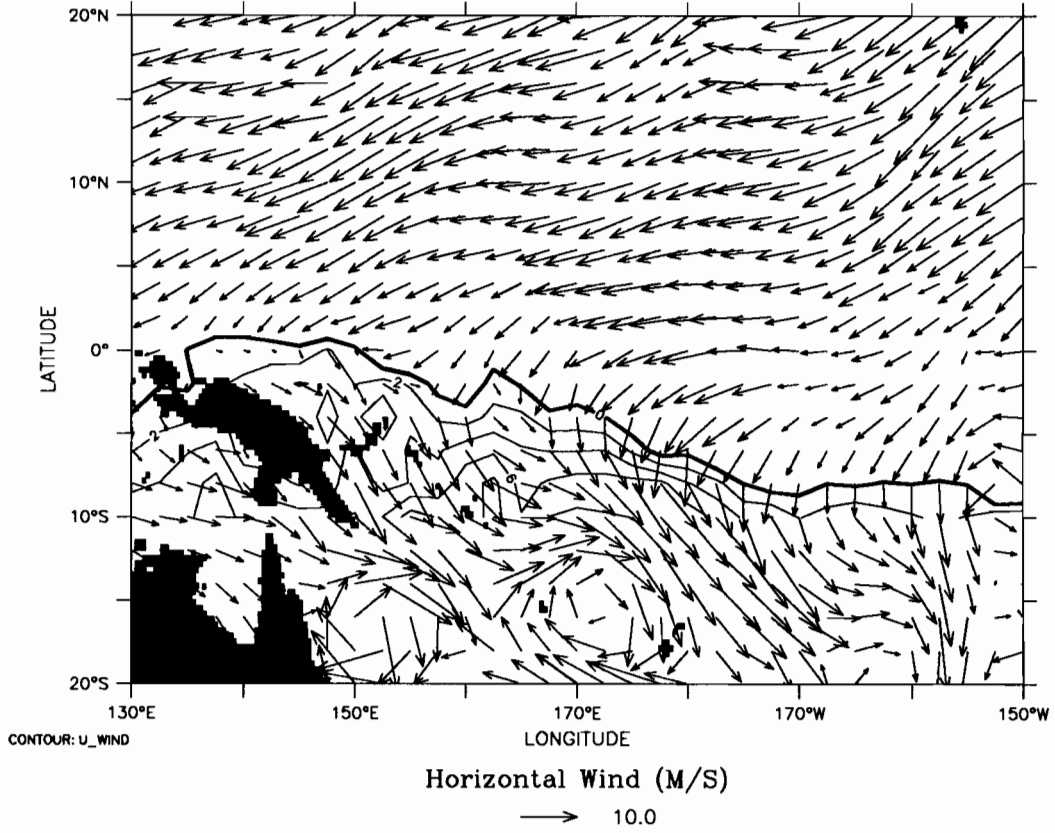
TIME : 25-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



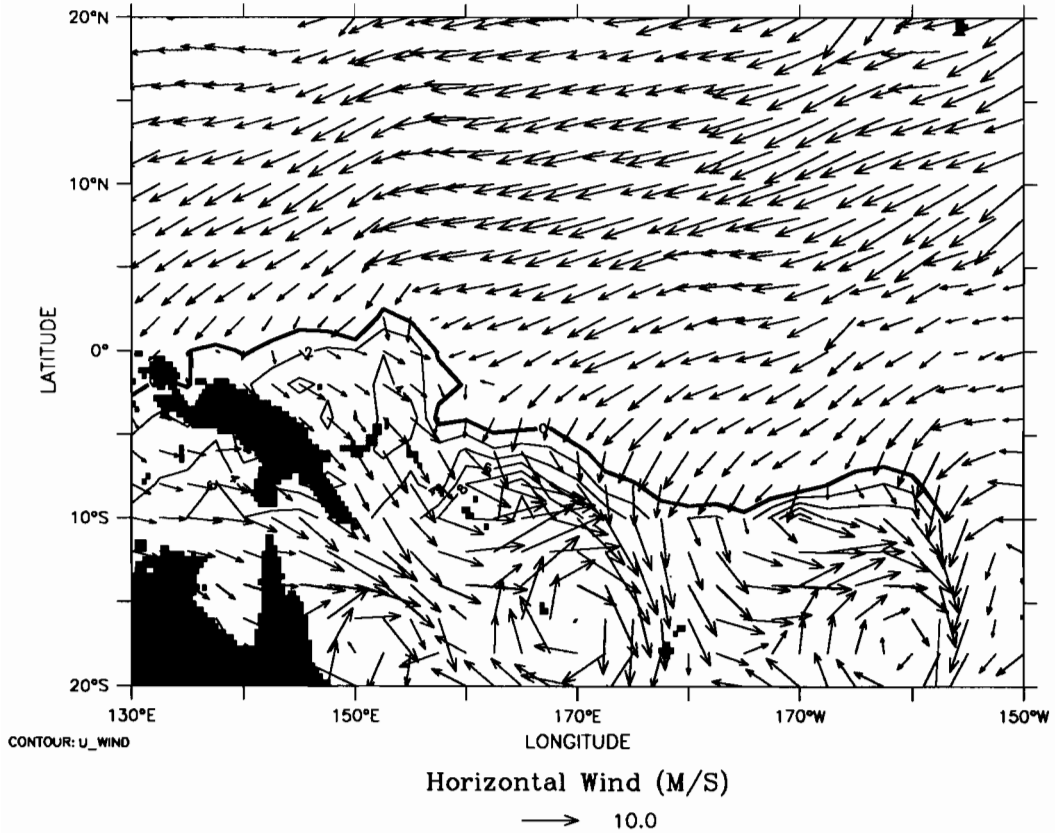
TIME : 26-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



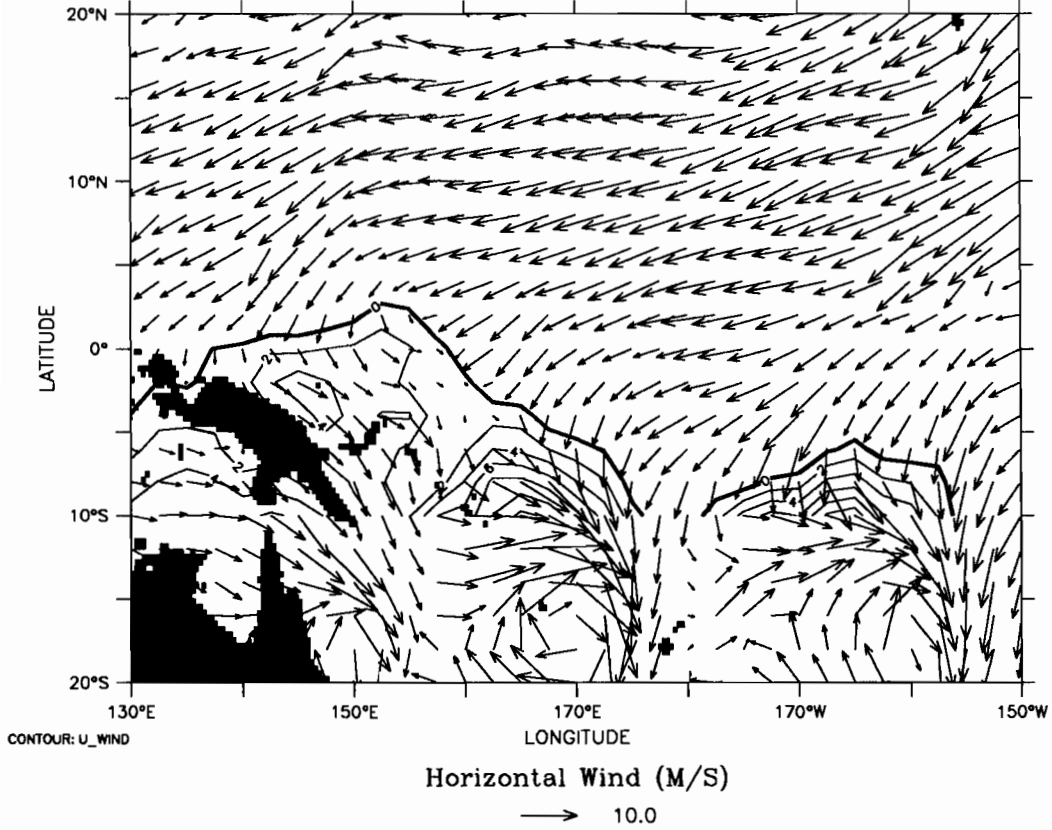
TIME : 27-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



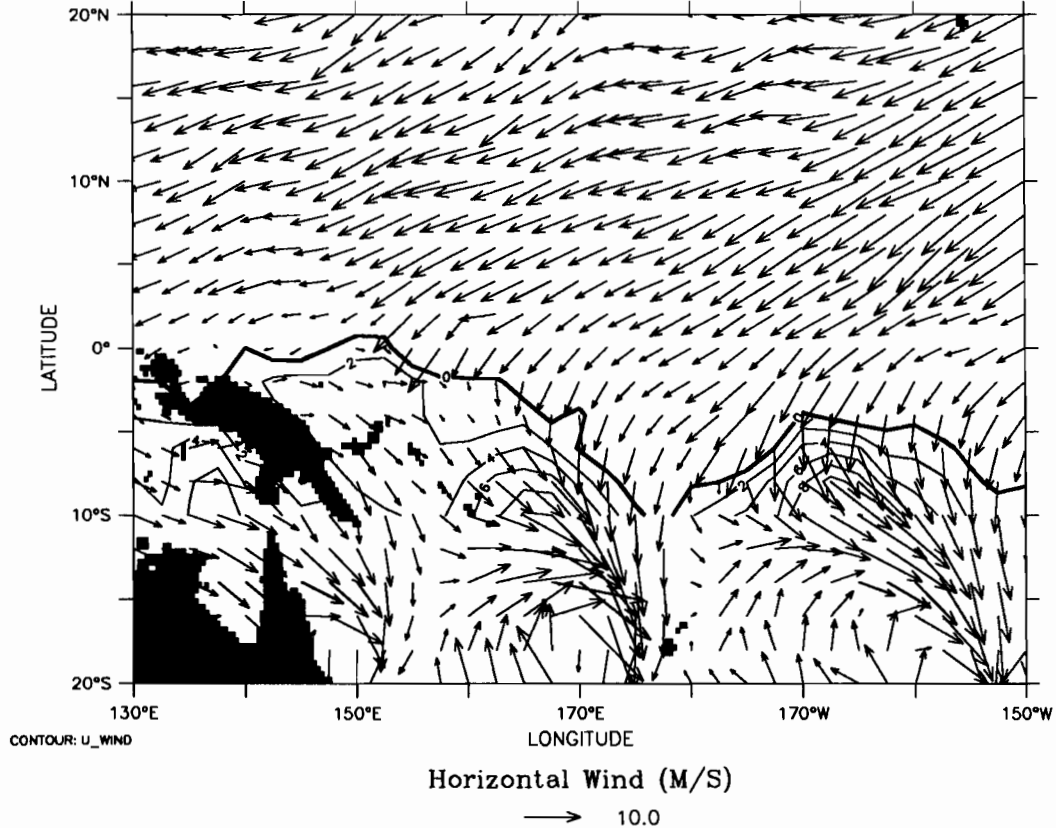
TIME : 28-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



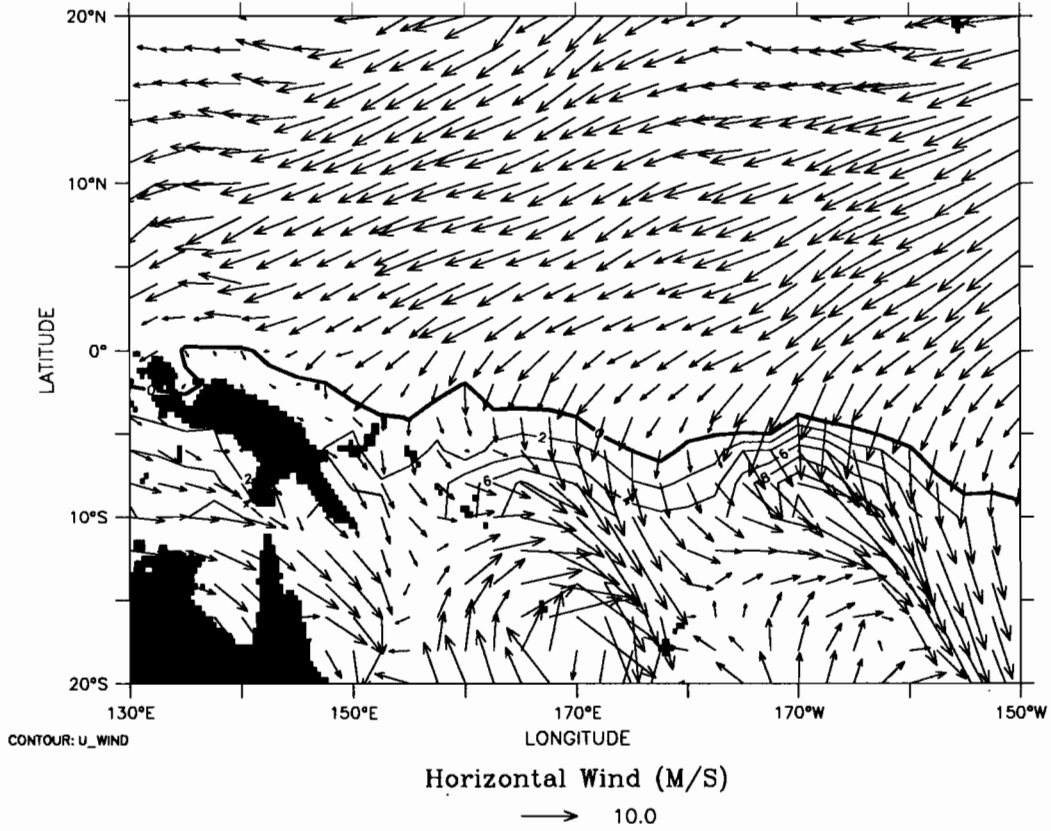
TIME : 29-FEB-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



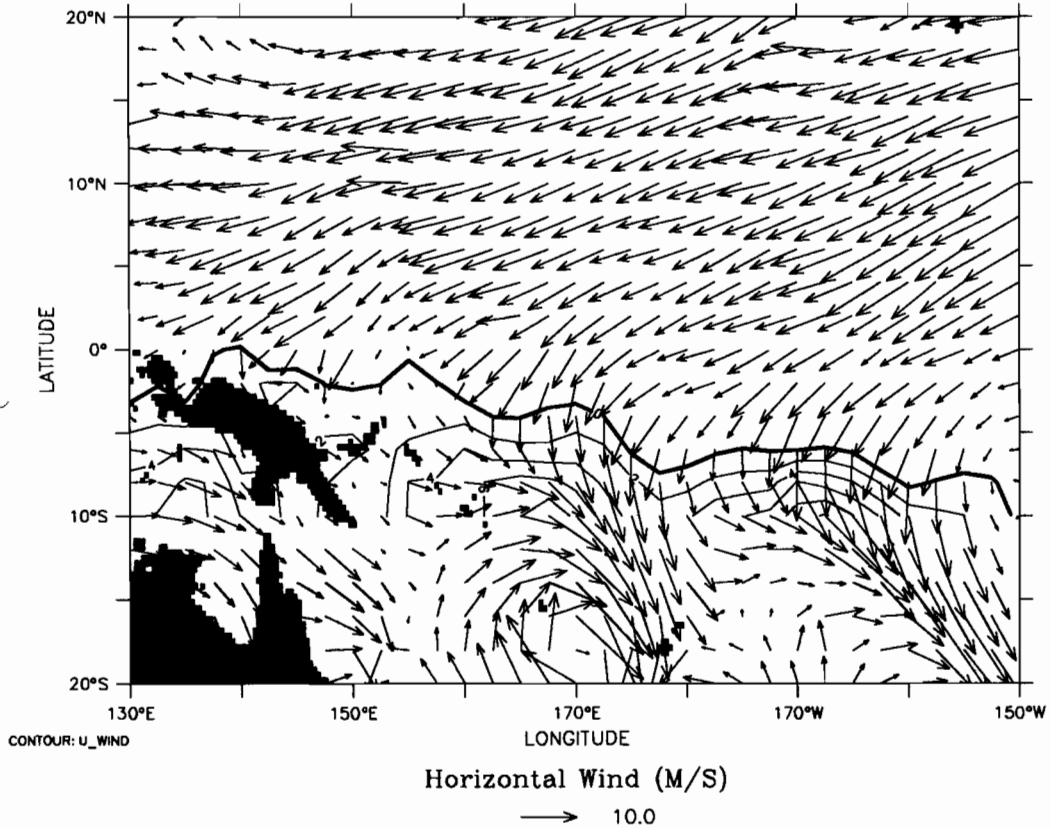
TIME : 01-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



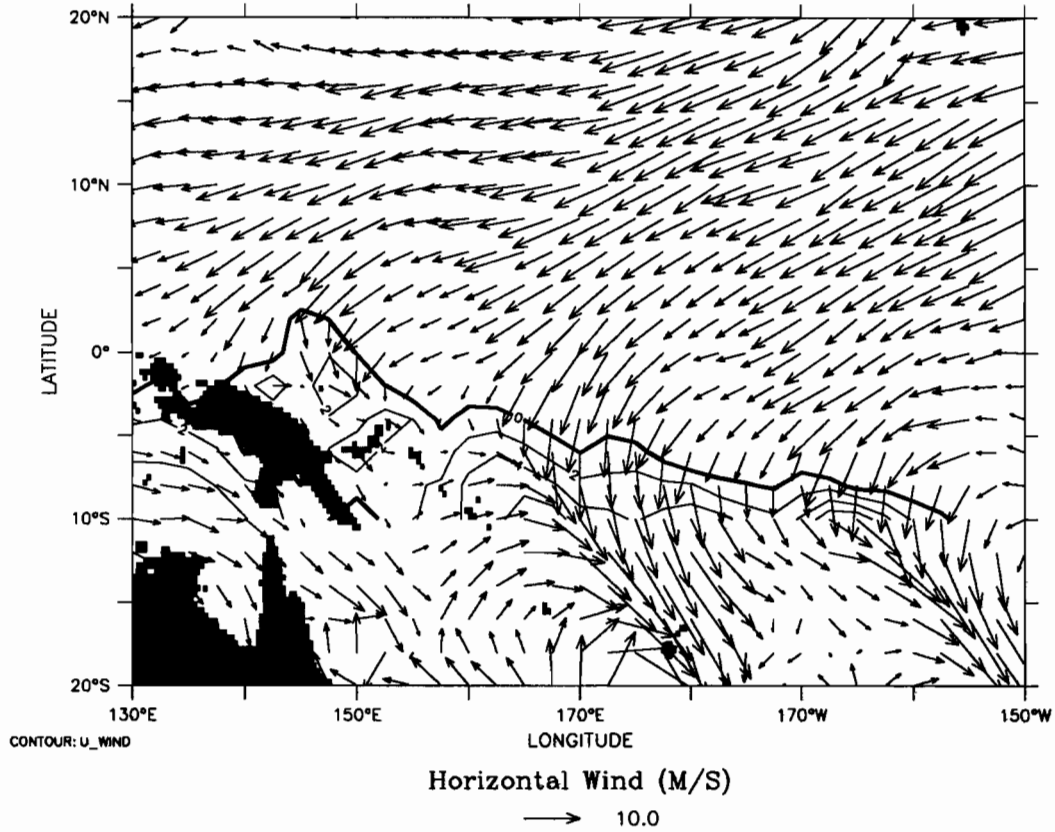
TIME : 02-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



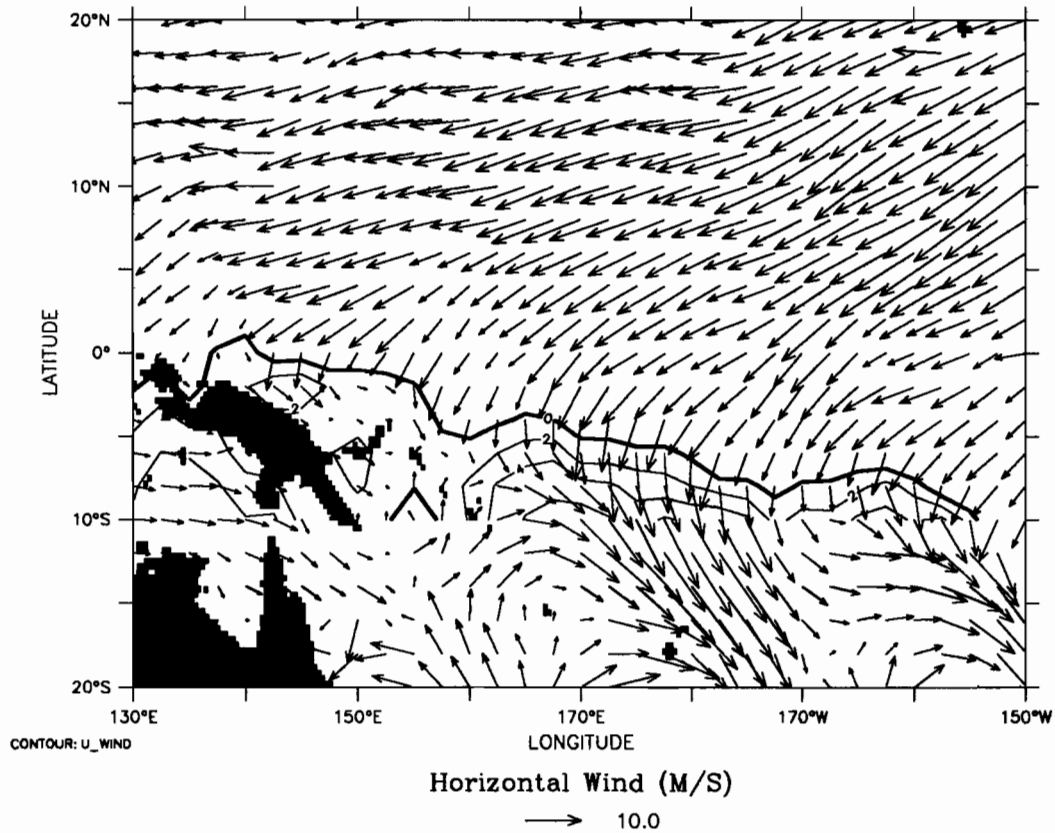
TIME : 03-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 04-MAR-1988 18:00

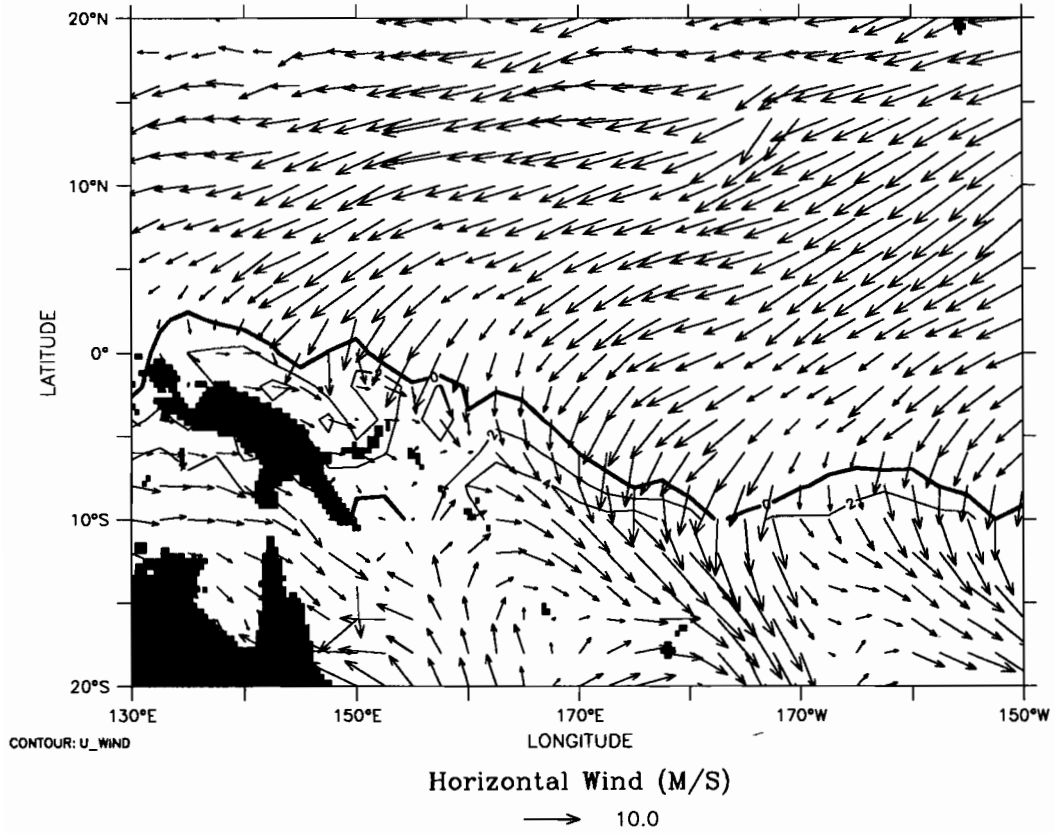
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





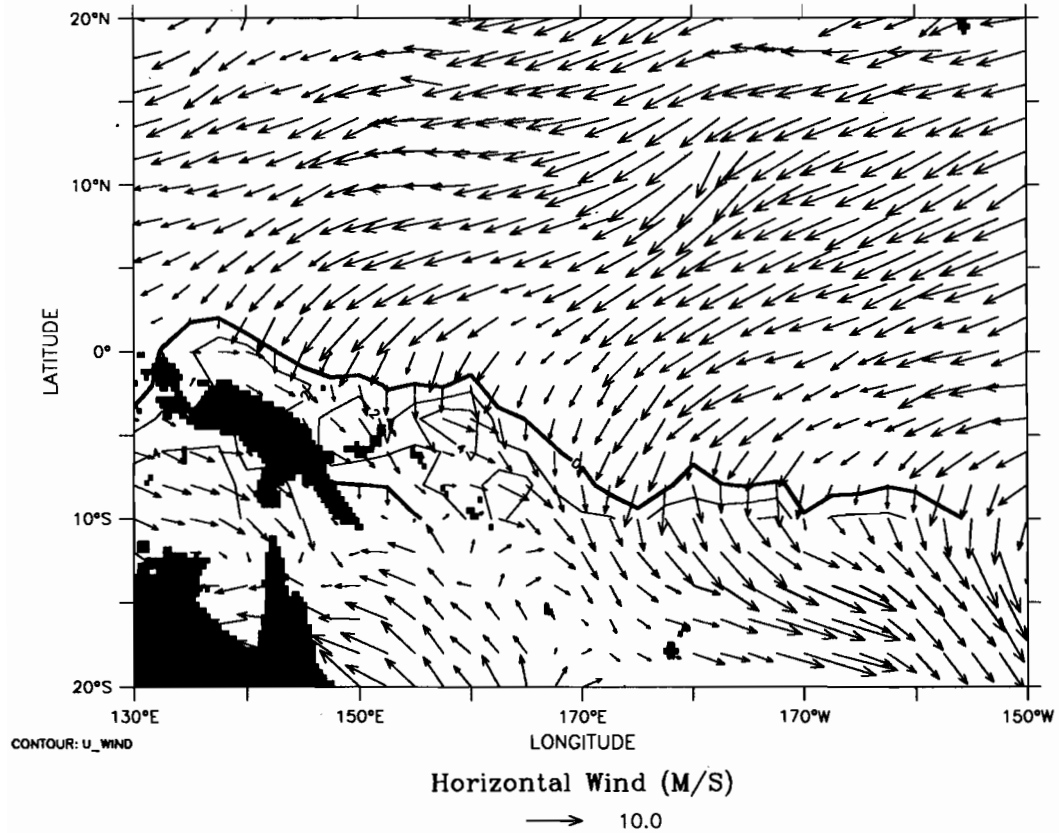
TIME : 05-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



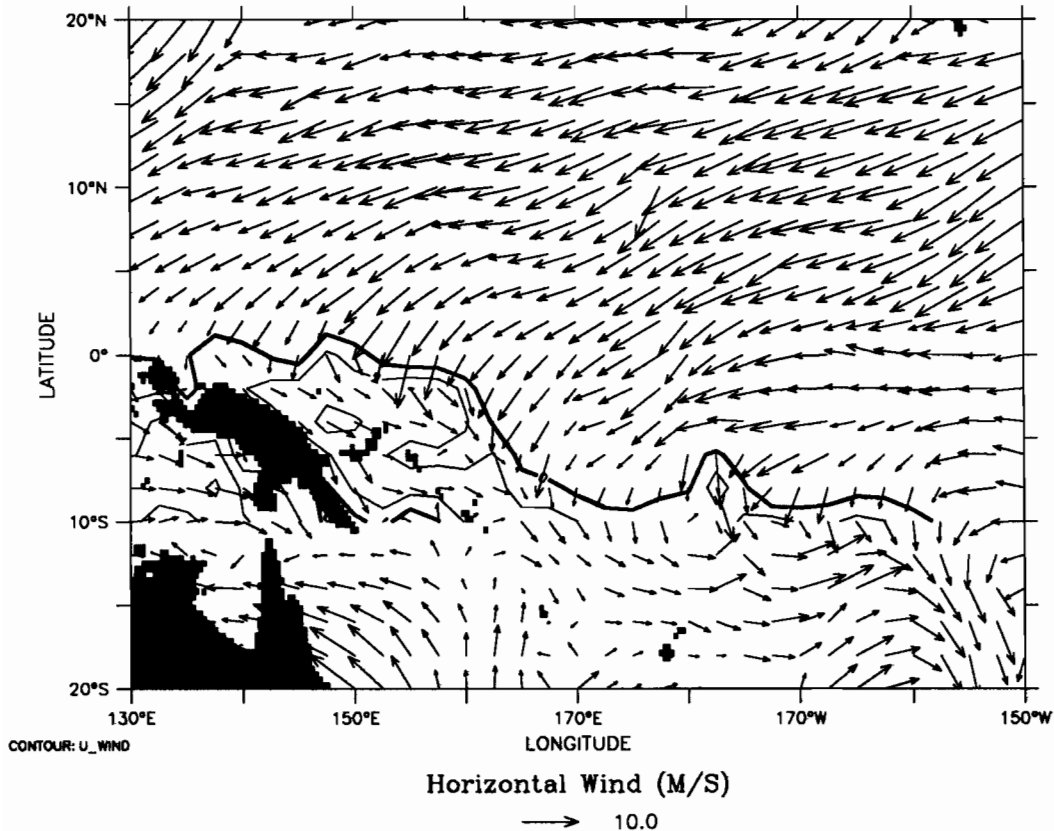
TIME : 06-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



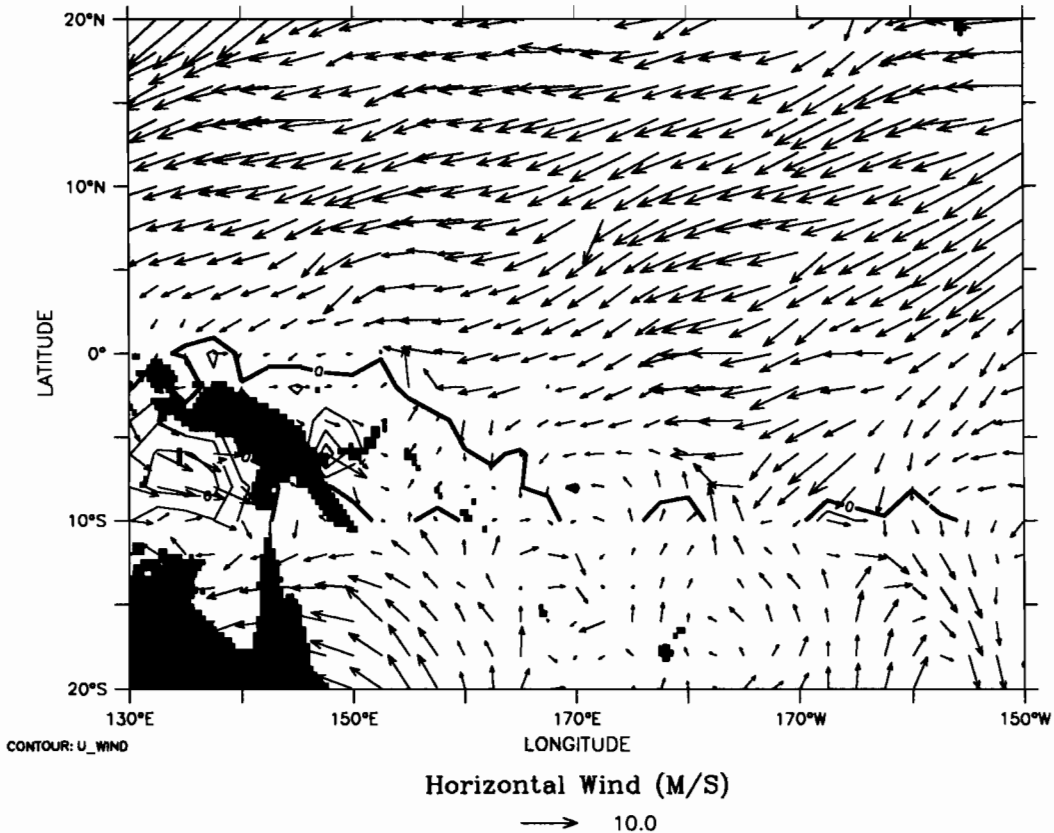
TIME : 07-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



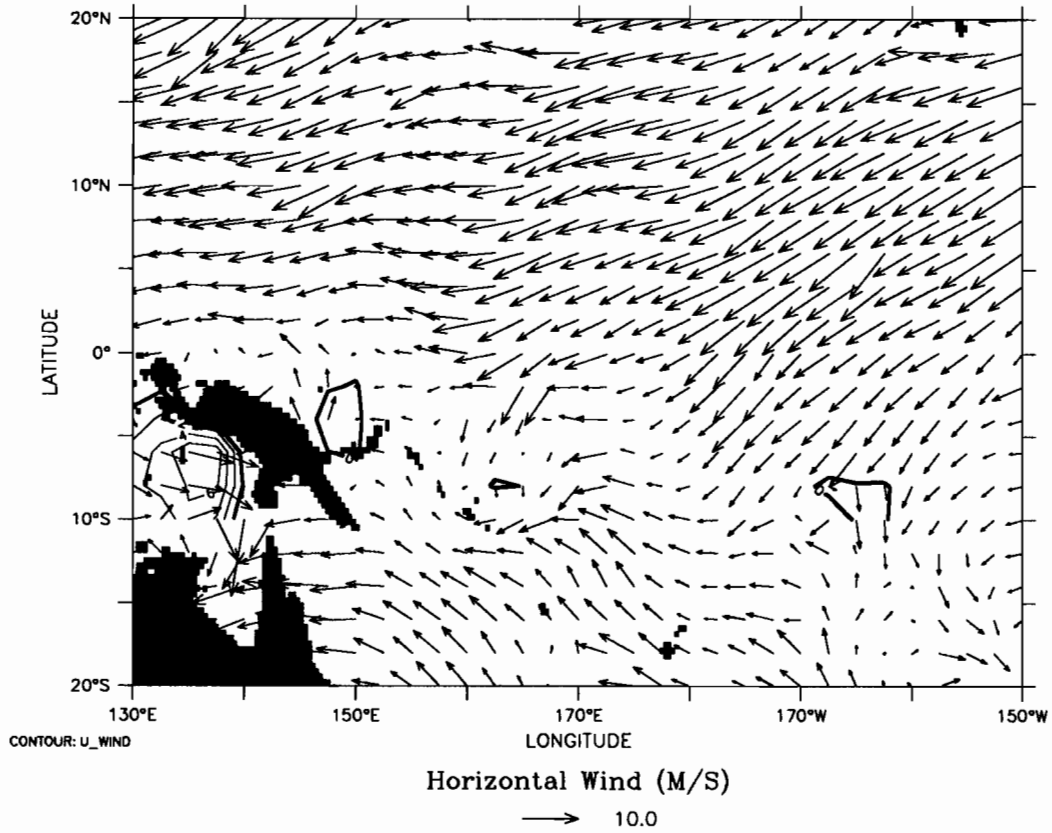
TIME : 08-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



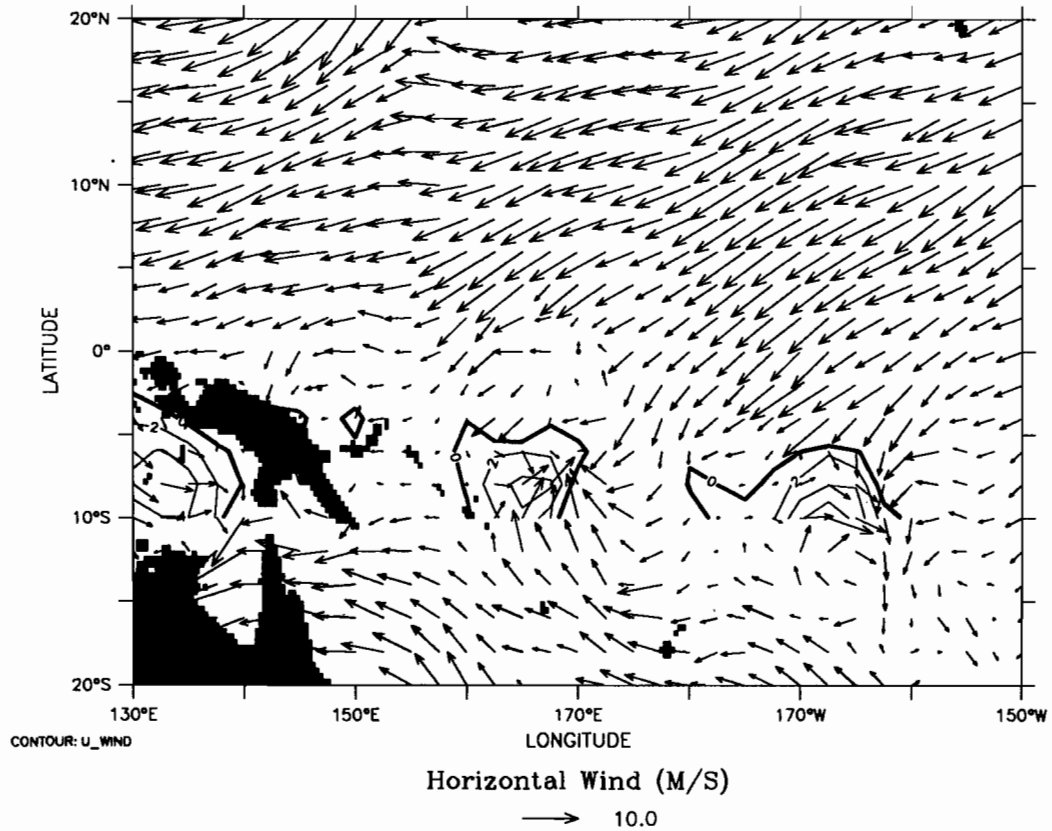
TIME : 09-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



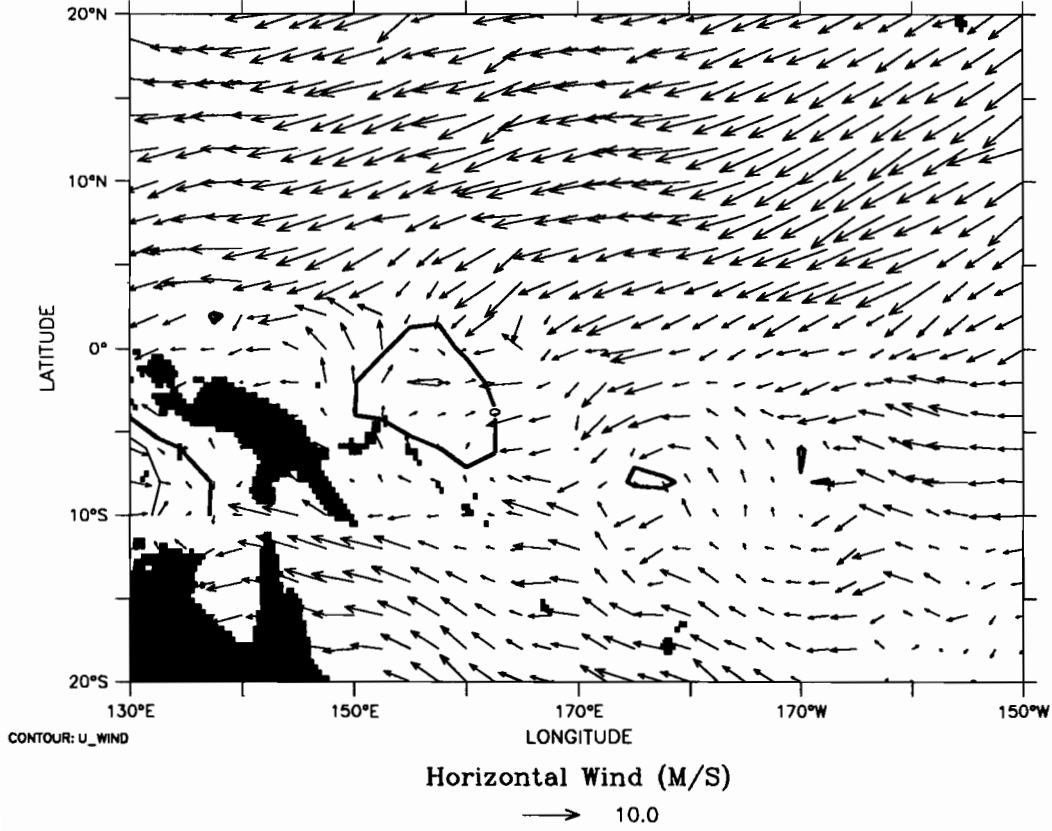
TIME : 10-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



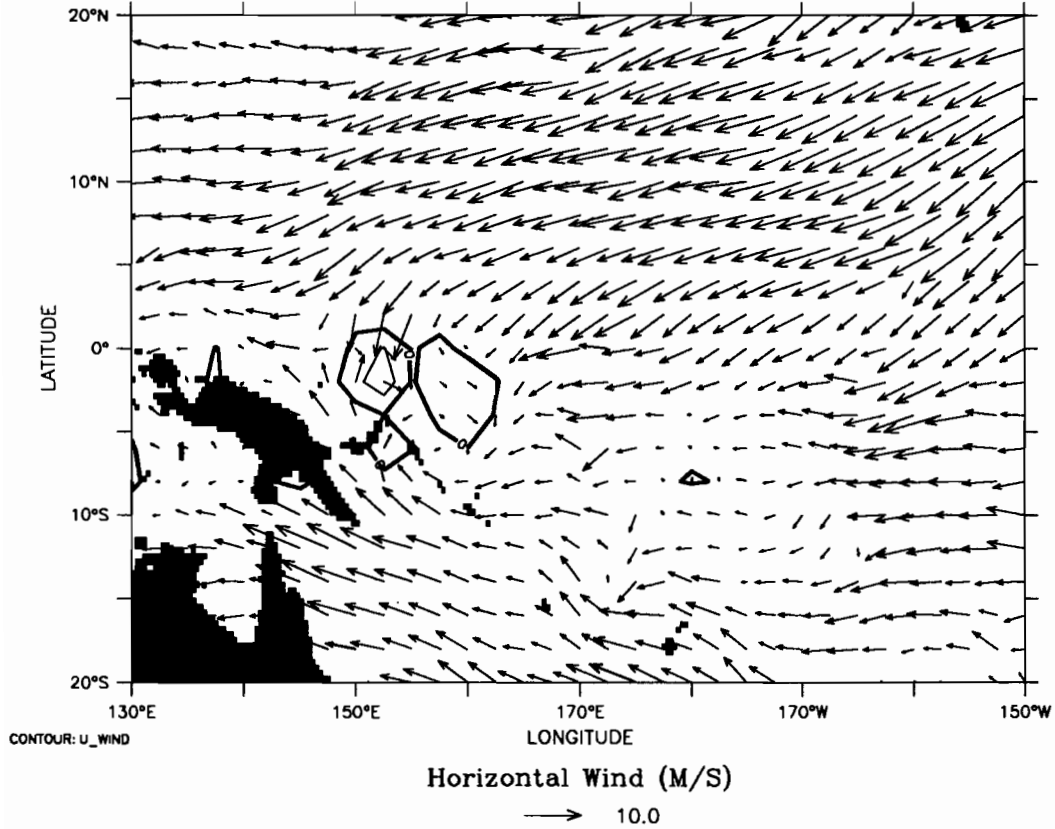
TIME : 11-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



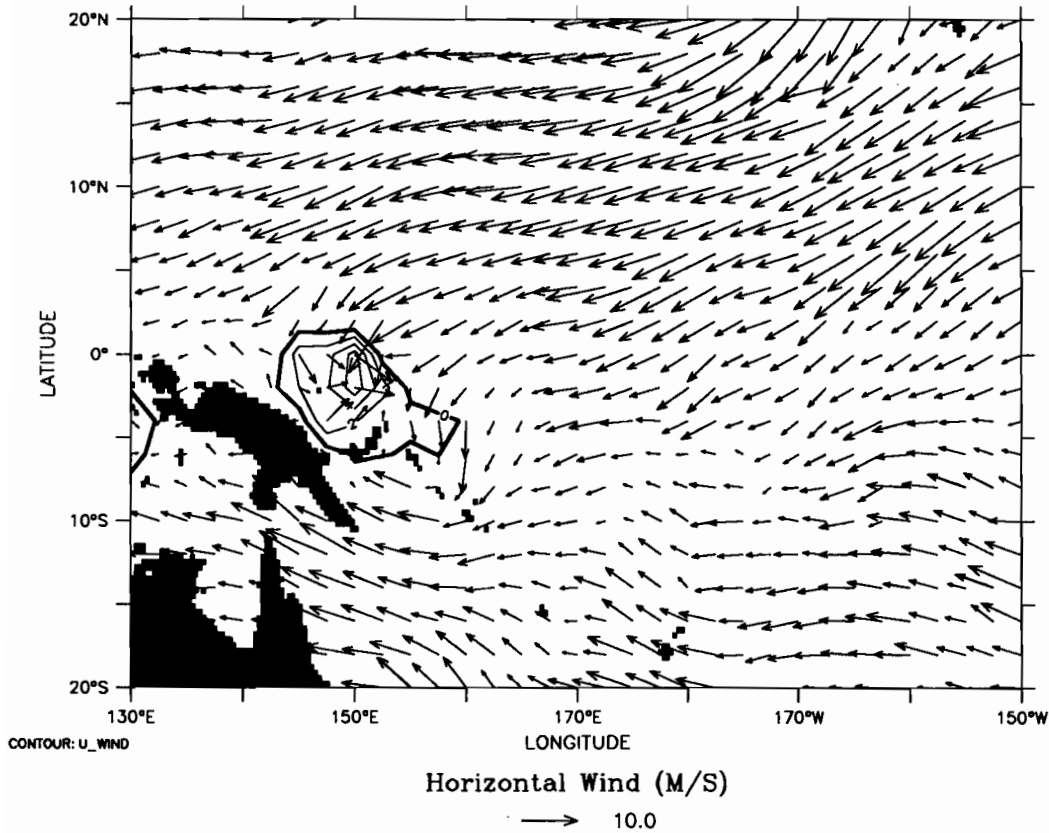
TIME : 12-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



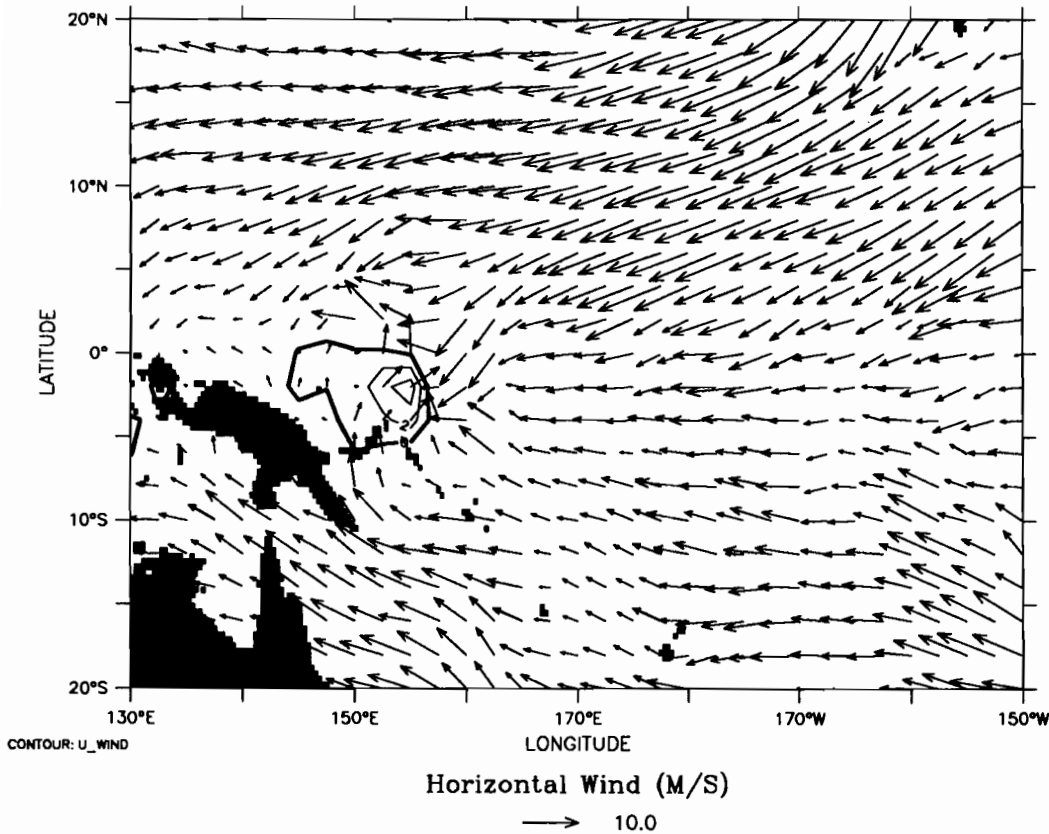
TIME : 13-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



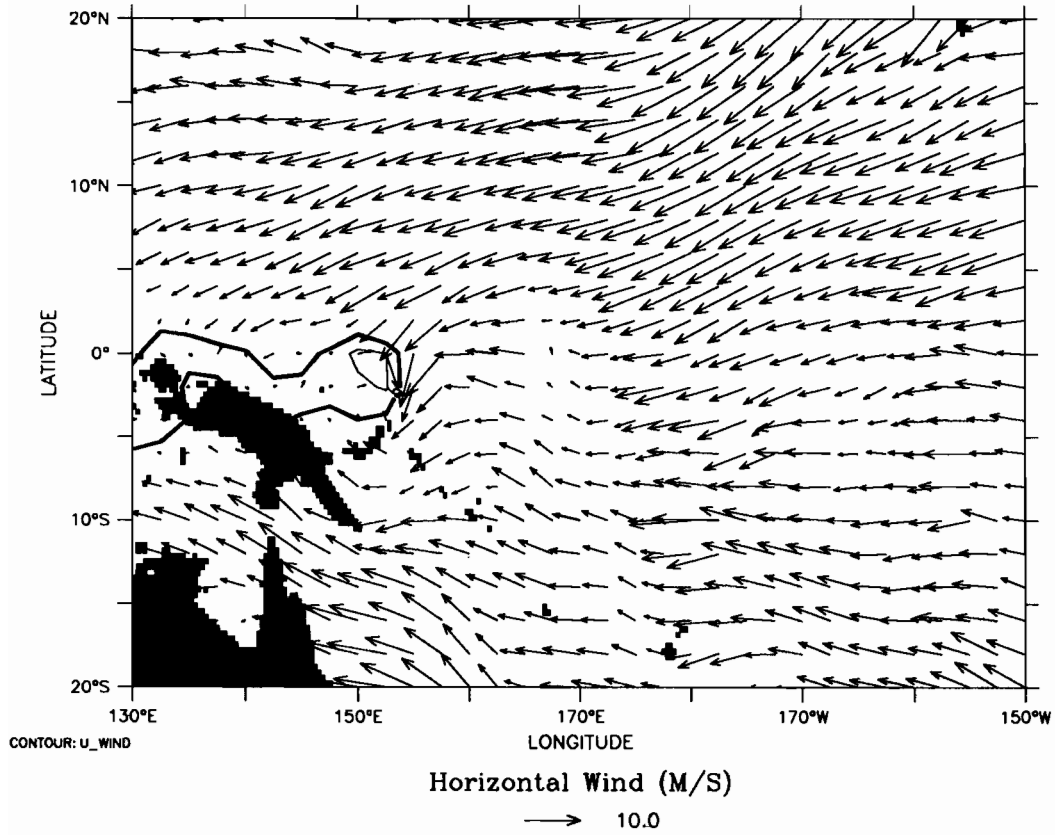
TIME : 14-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



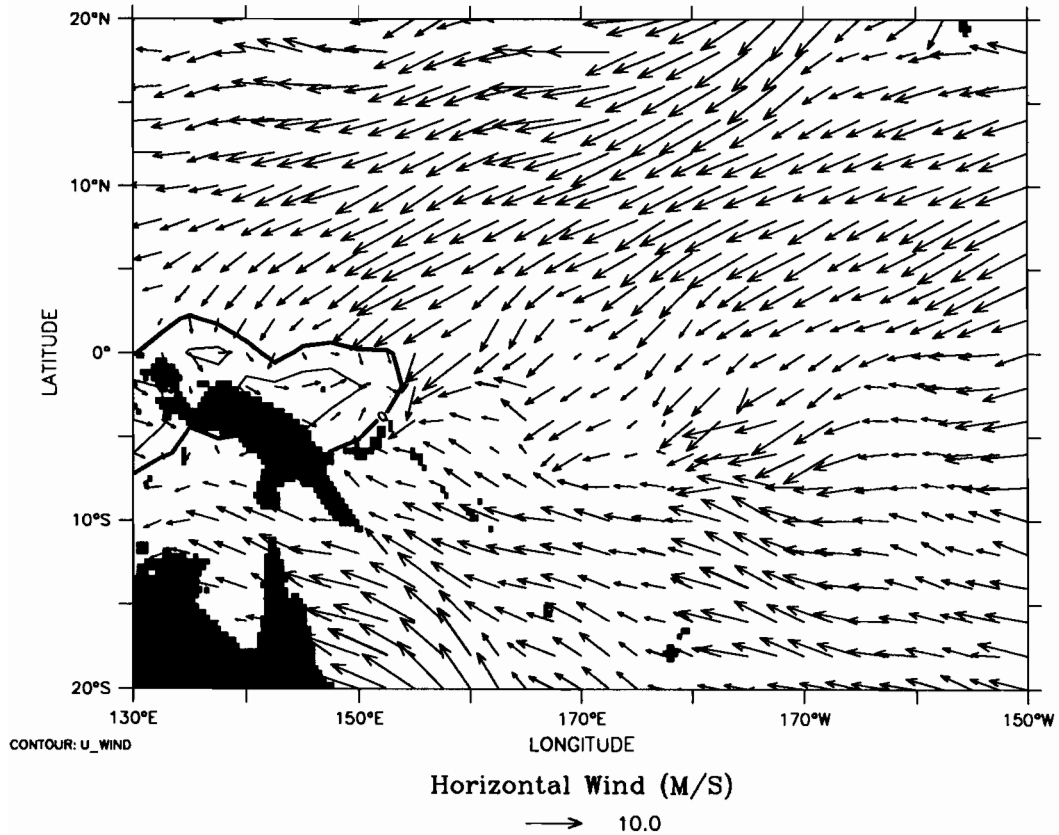
TIME : 15-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



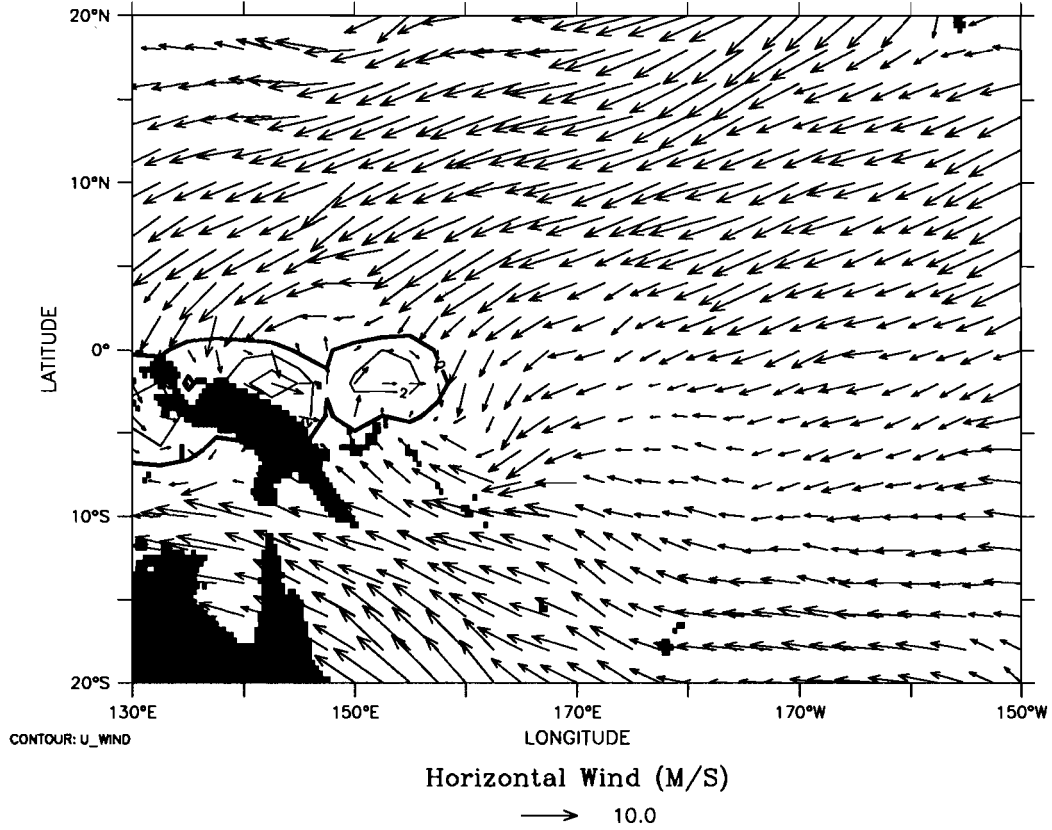
TIME : 16-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



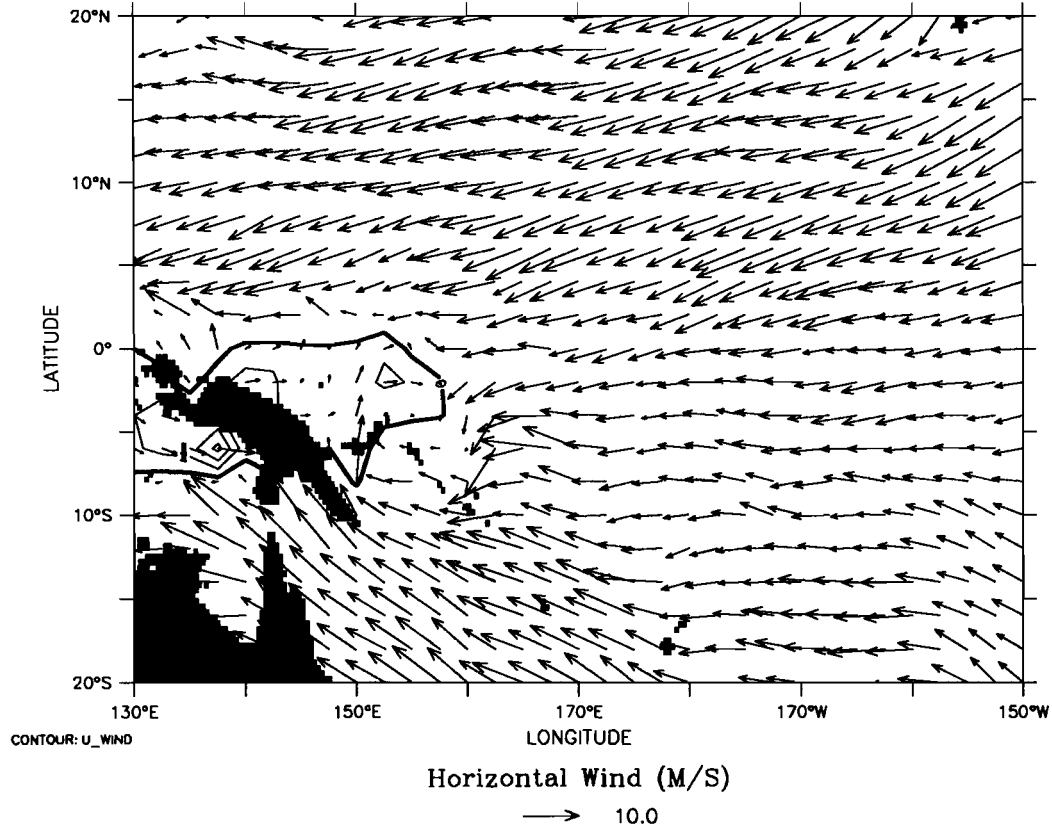
TIME : 17-MAR-1988 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



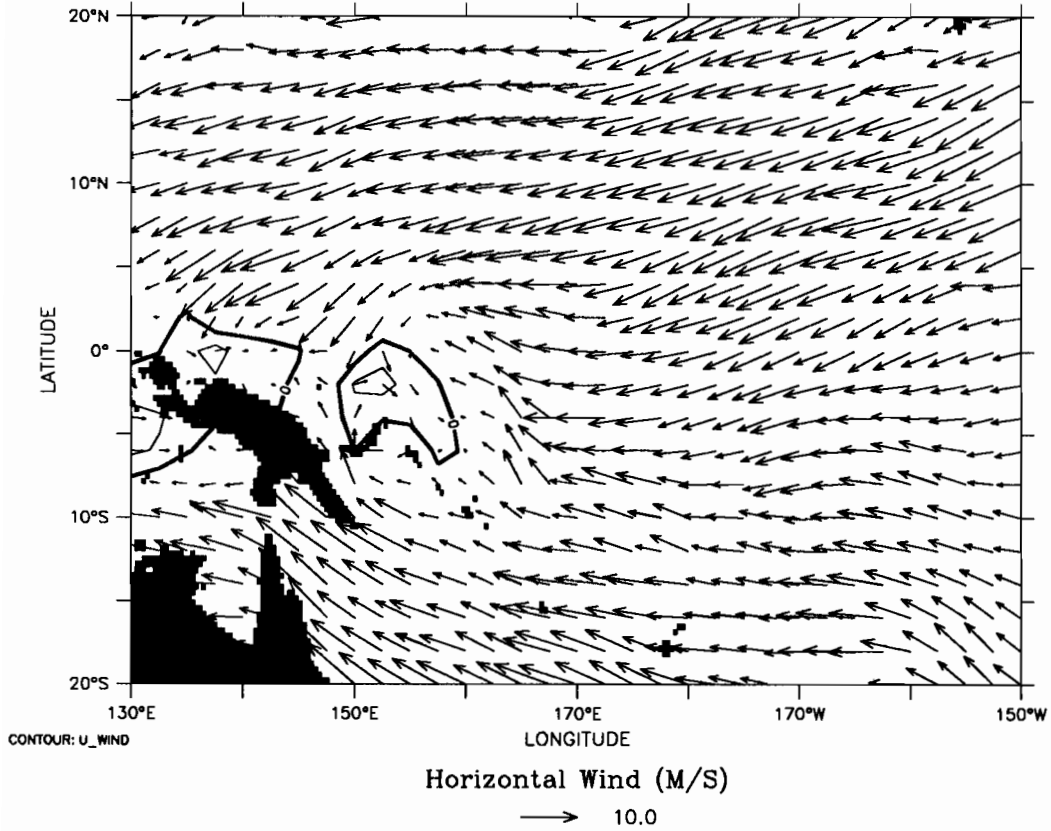
TIME : 18-MAR-1988 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



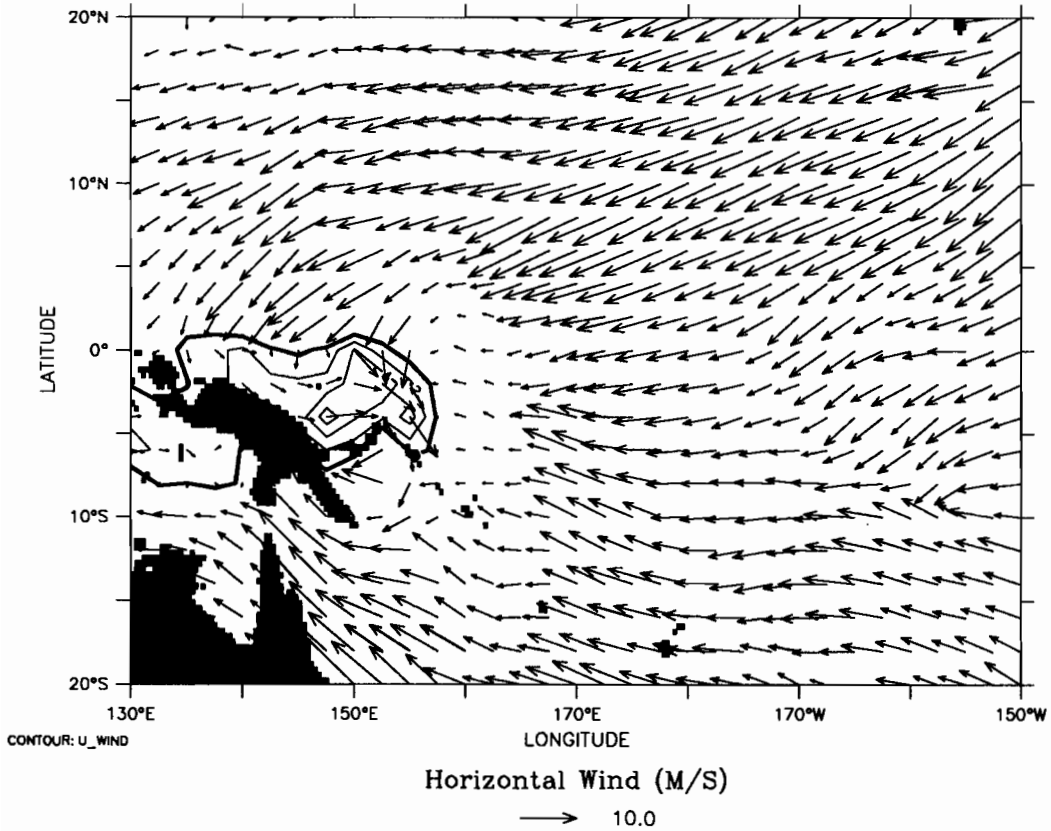
TIME : 19-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 20-MAR-1988 18:00

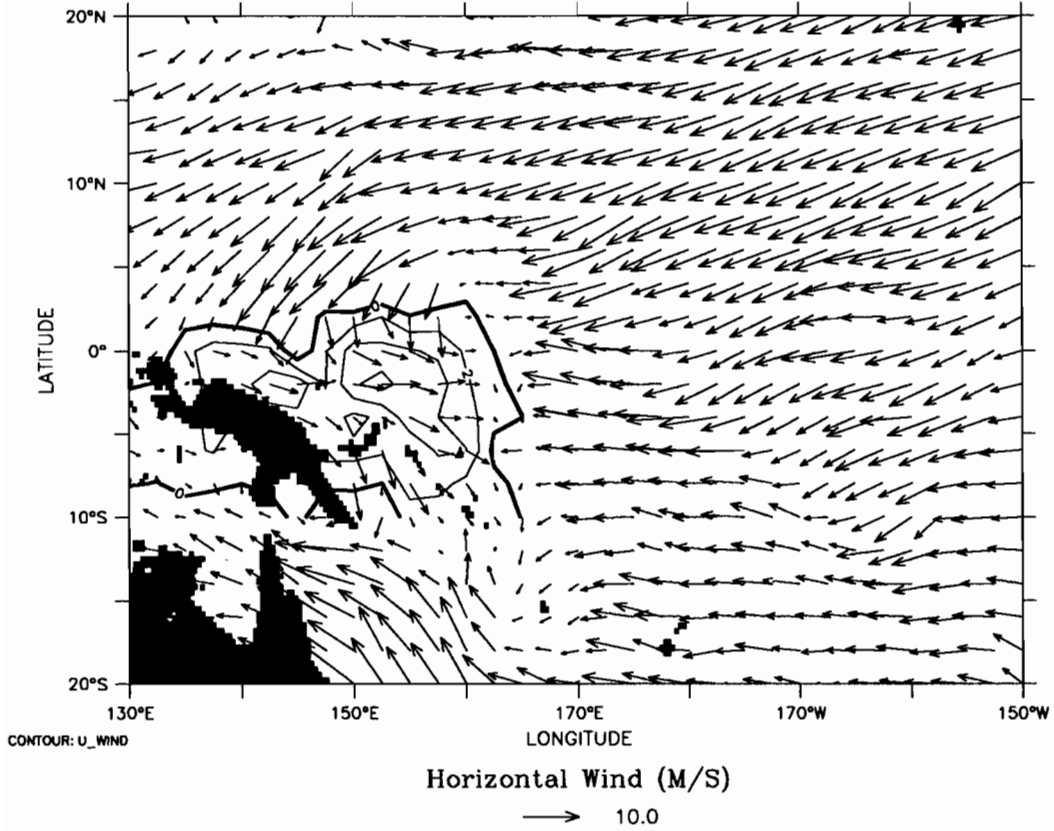
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





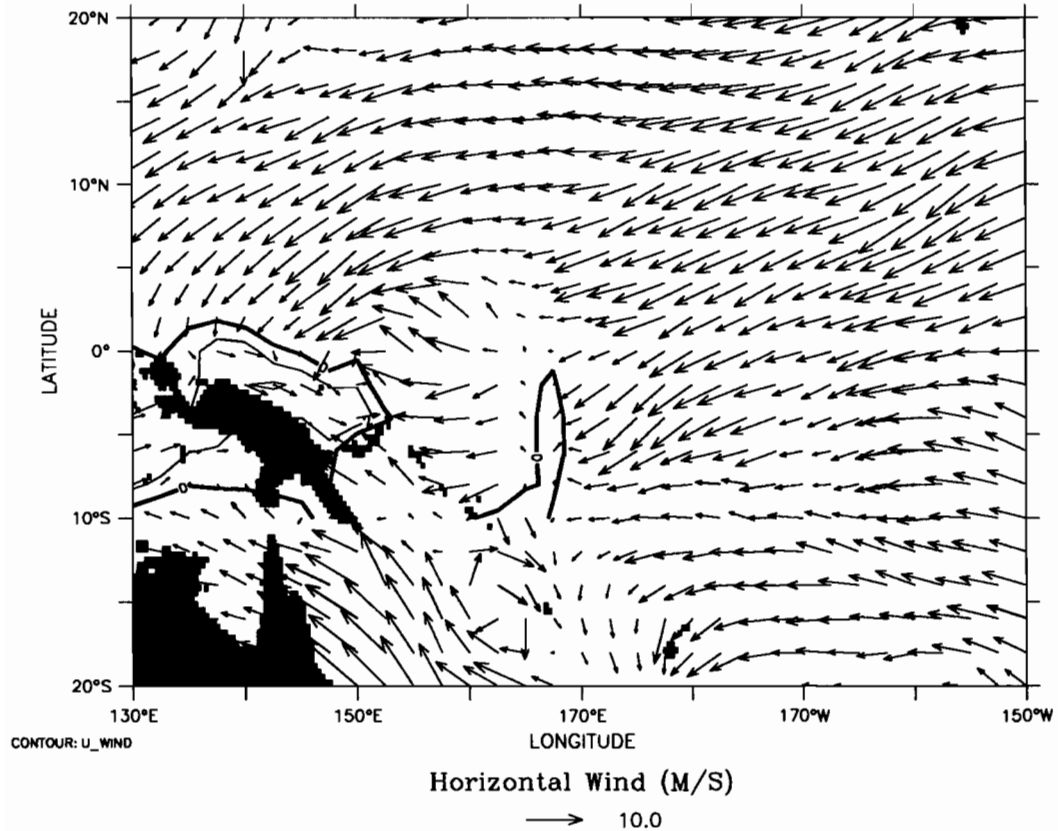
TIME : 21-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



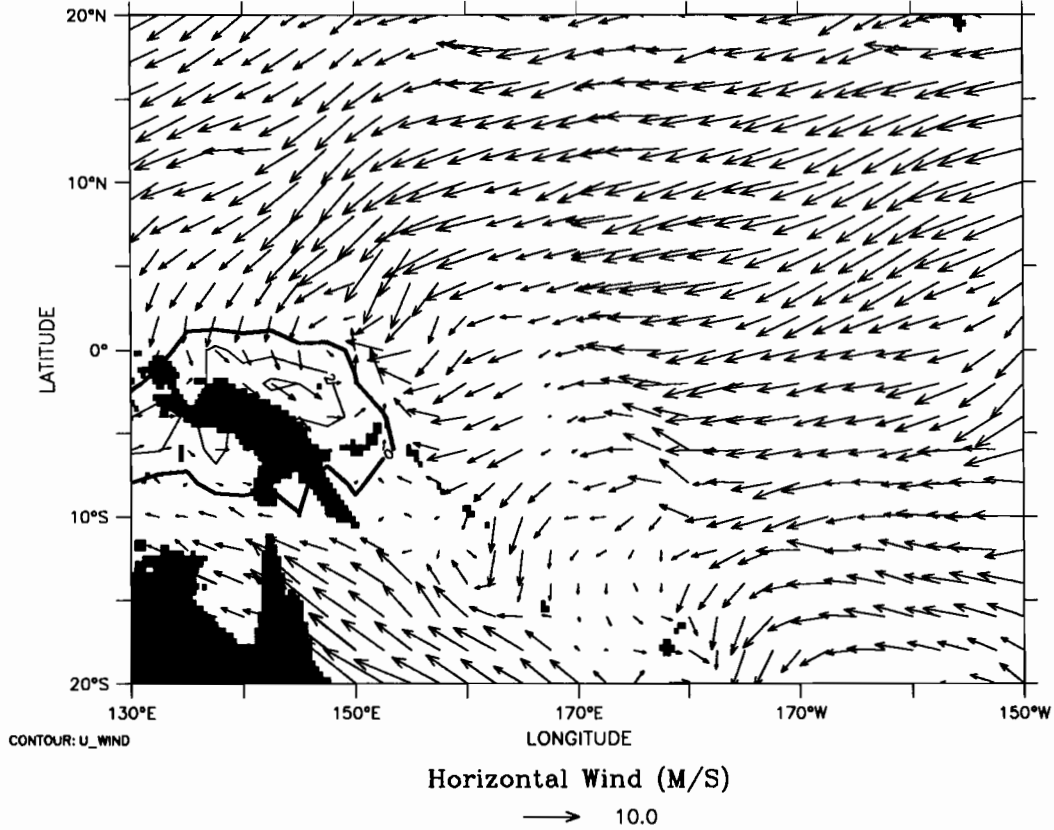
TIME : 22-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



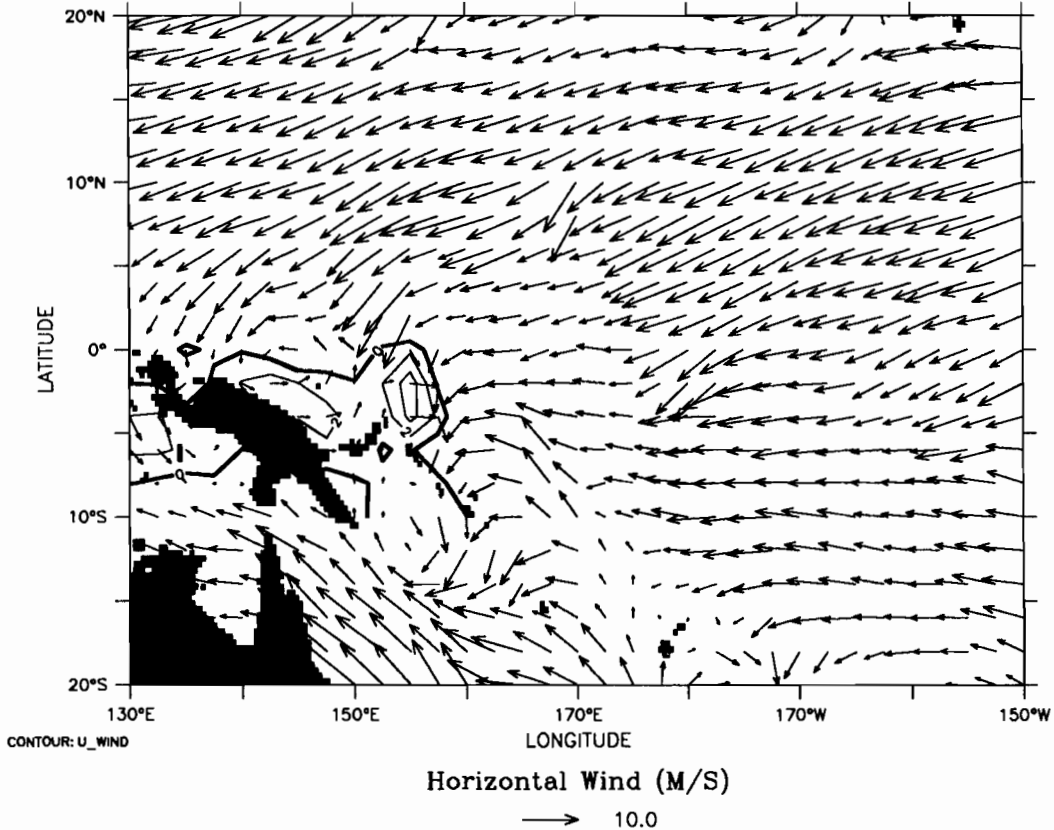
TIME : 23-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



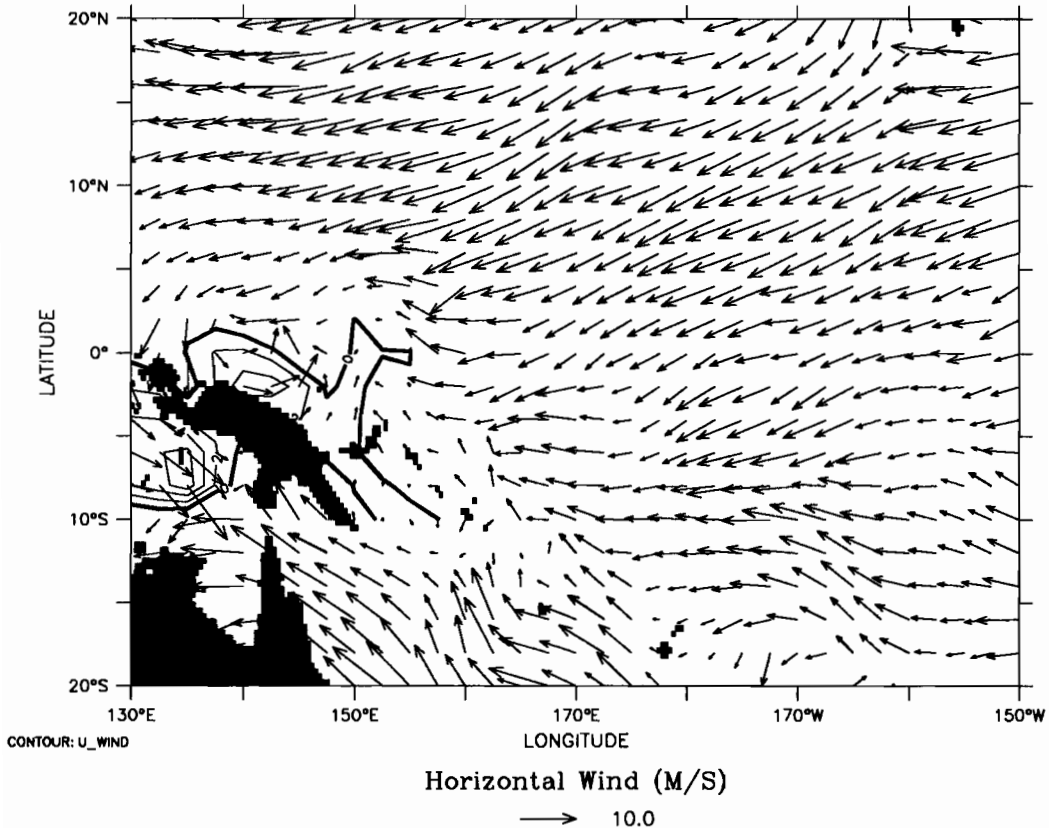
TIME : 24-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



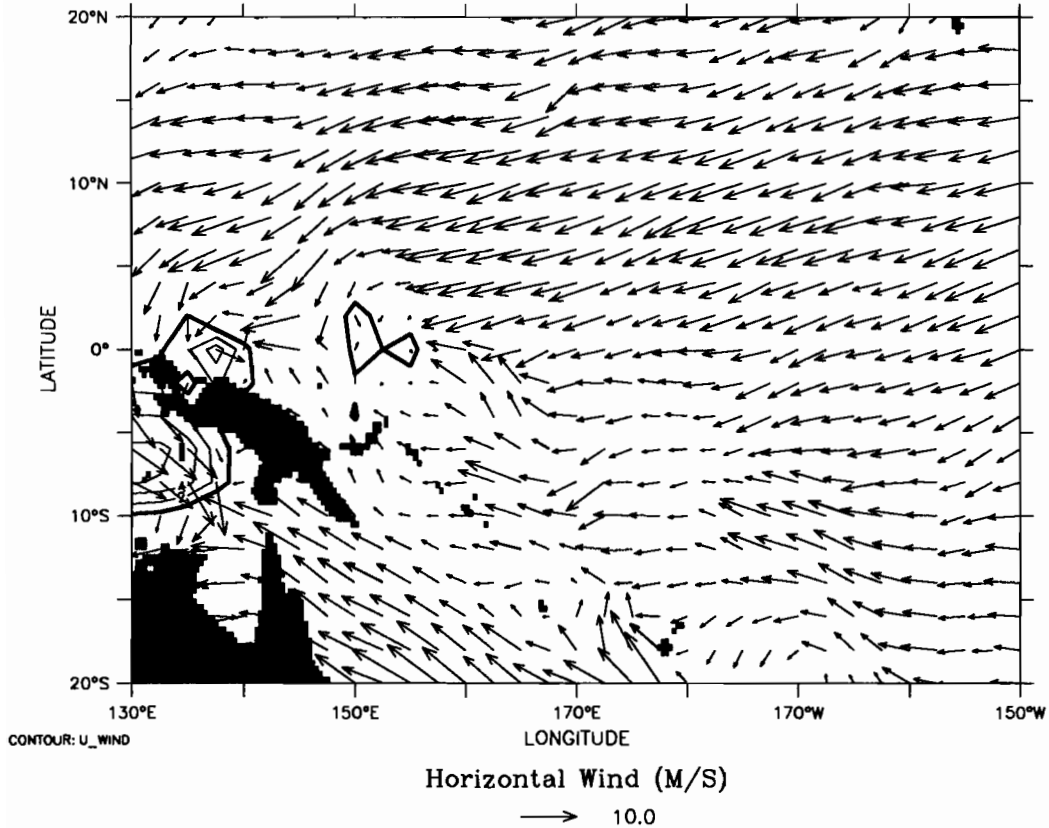
TIME : 25-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



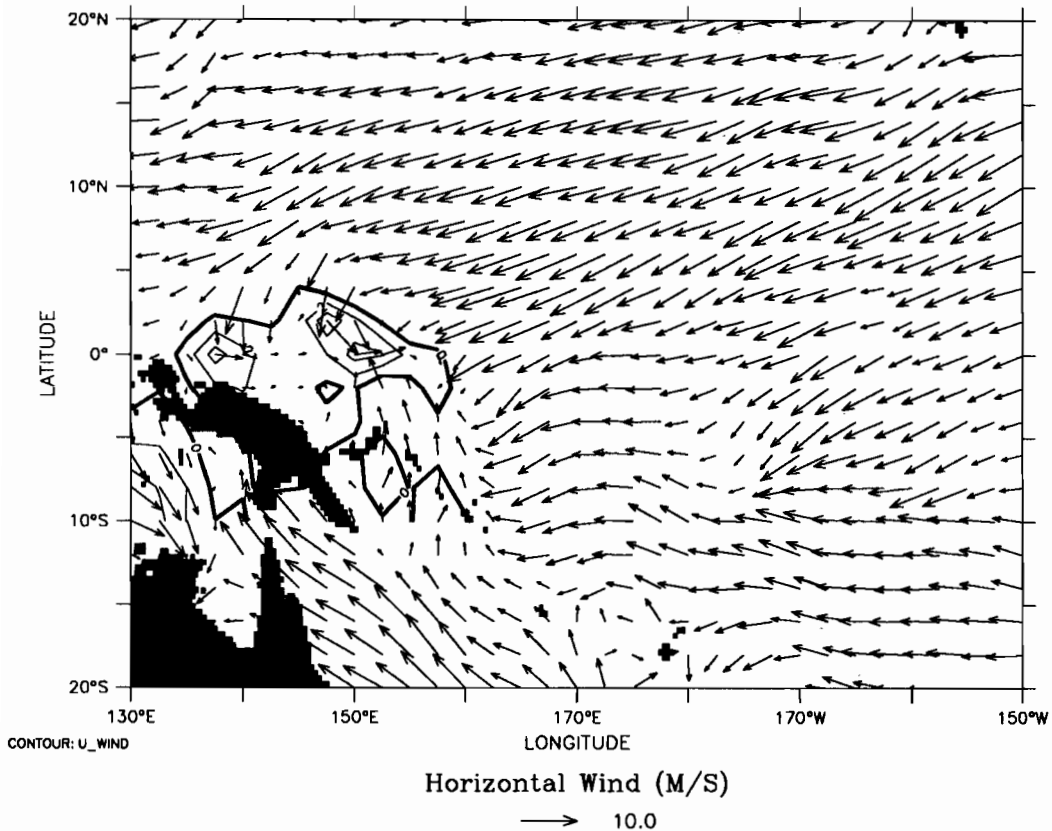
TIME : 26-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



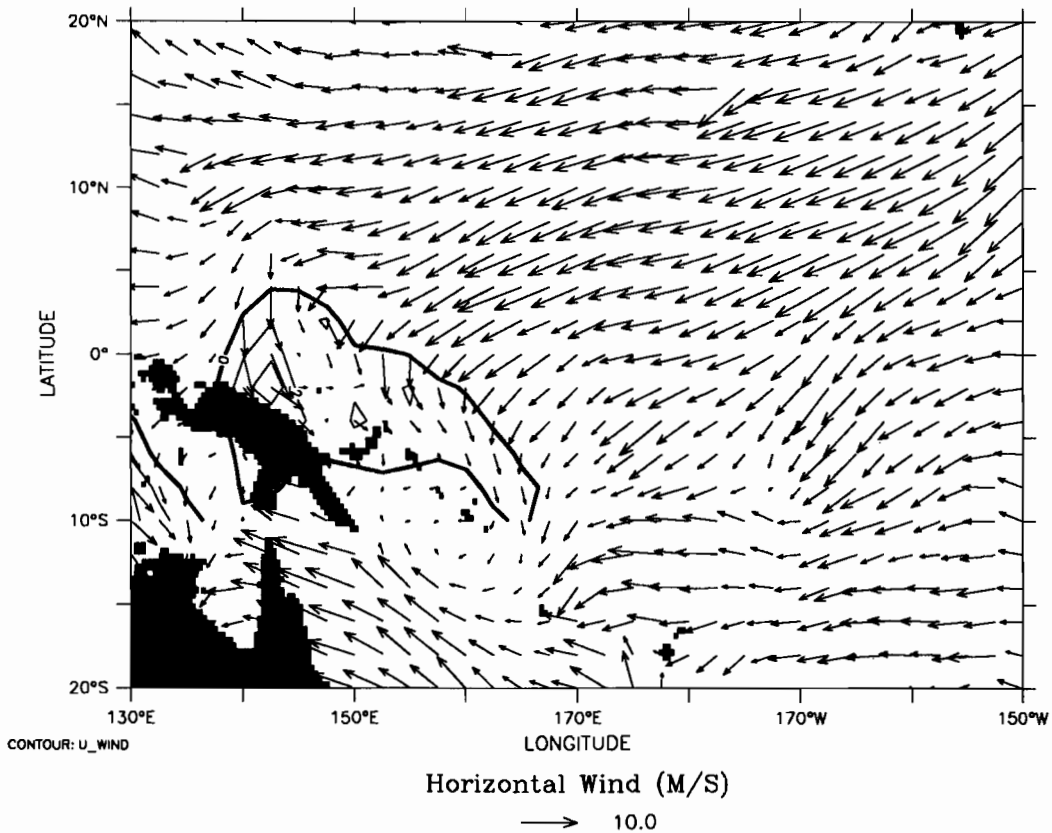
TIME : 27-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



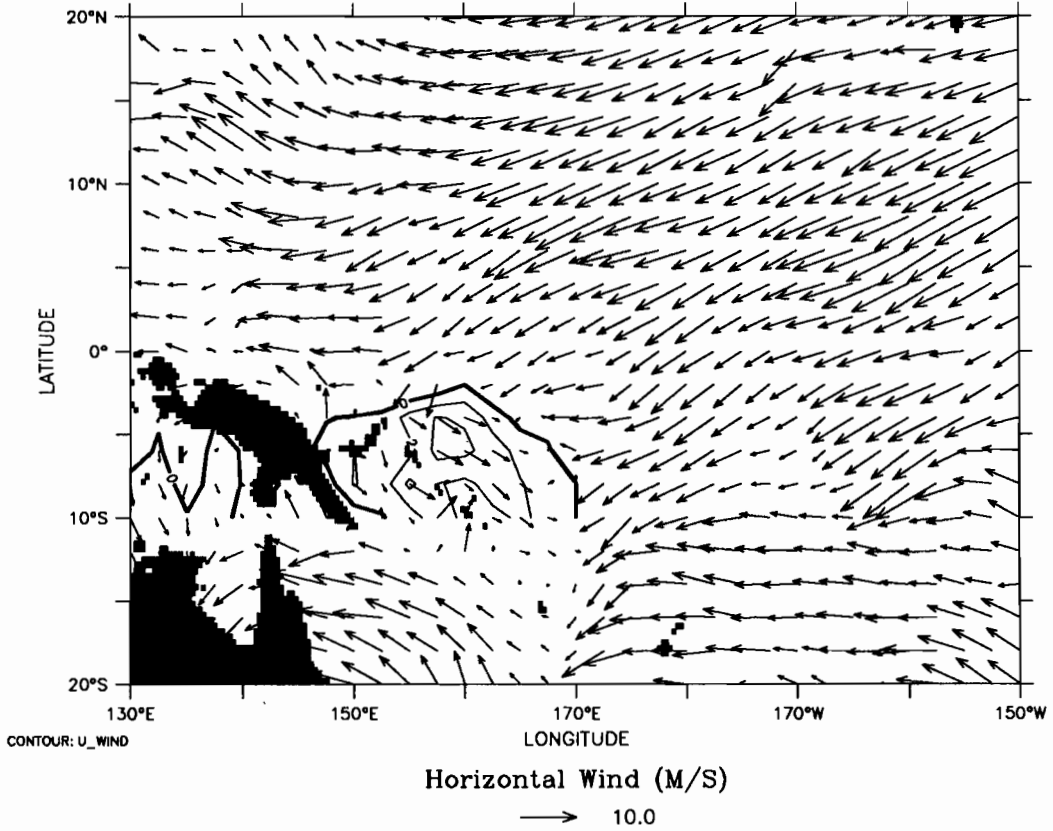
TIME : 28-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



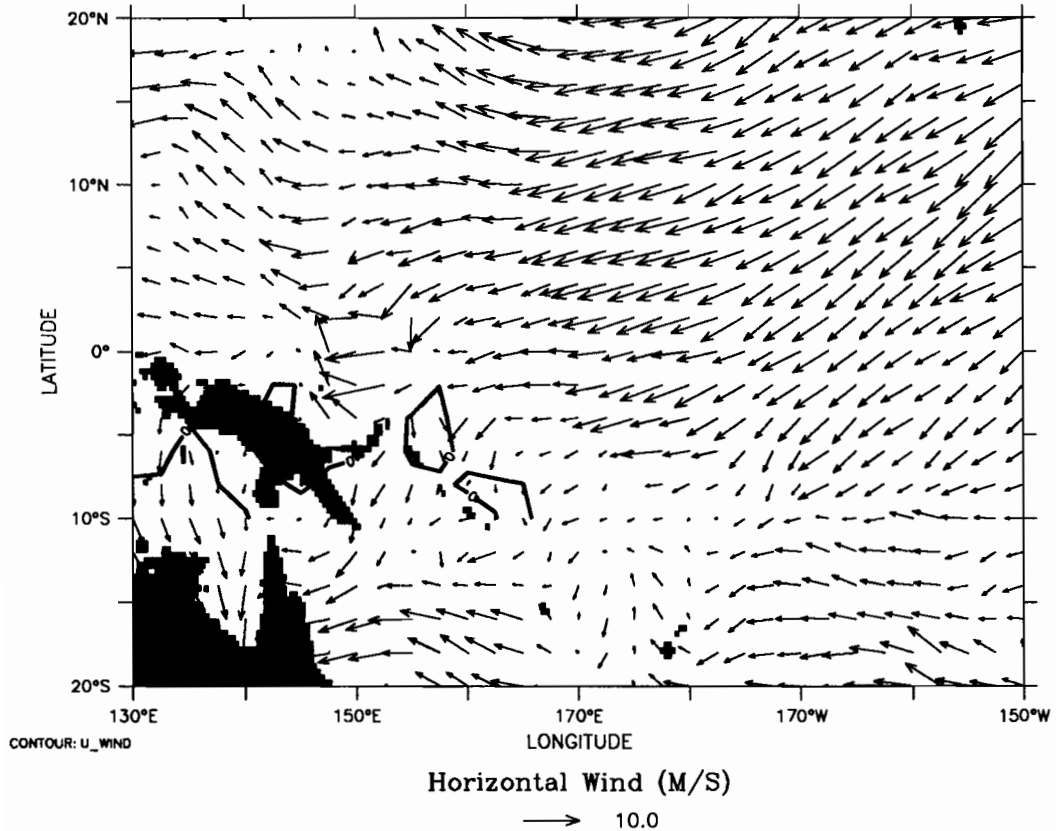
TIME : 29-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



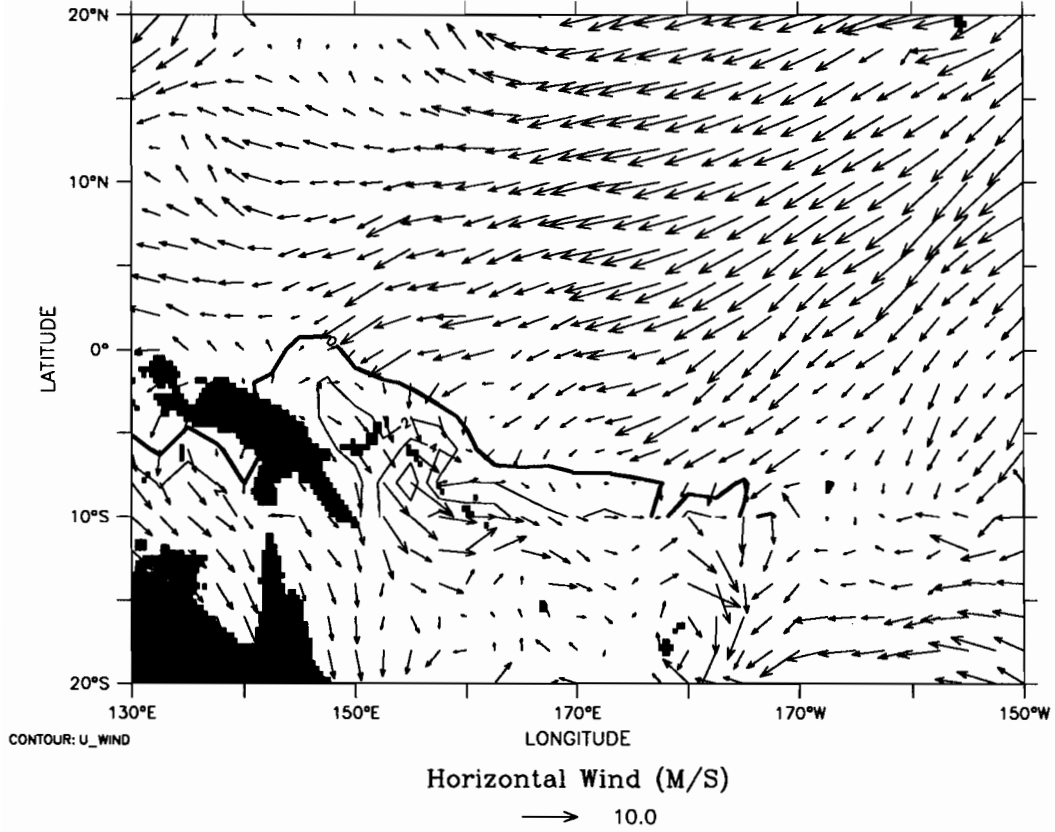
TIME : 30-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



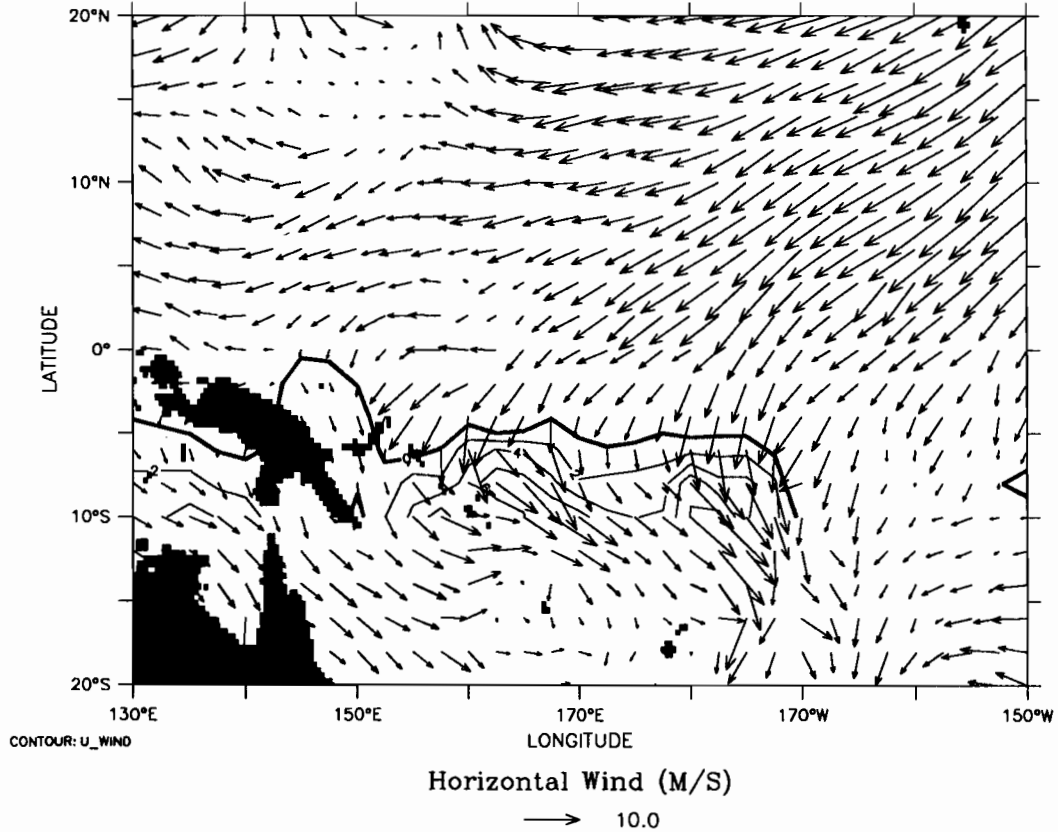
TIME : 31-MAR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



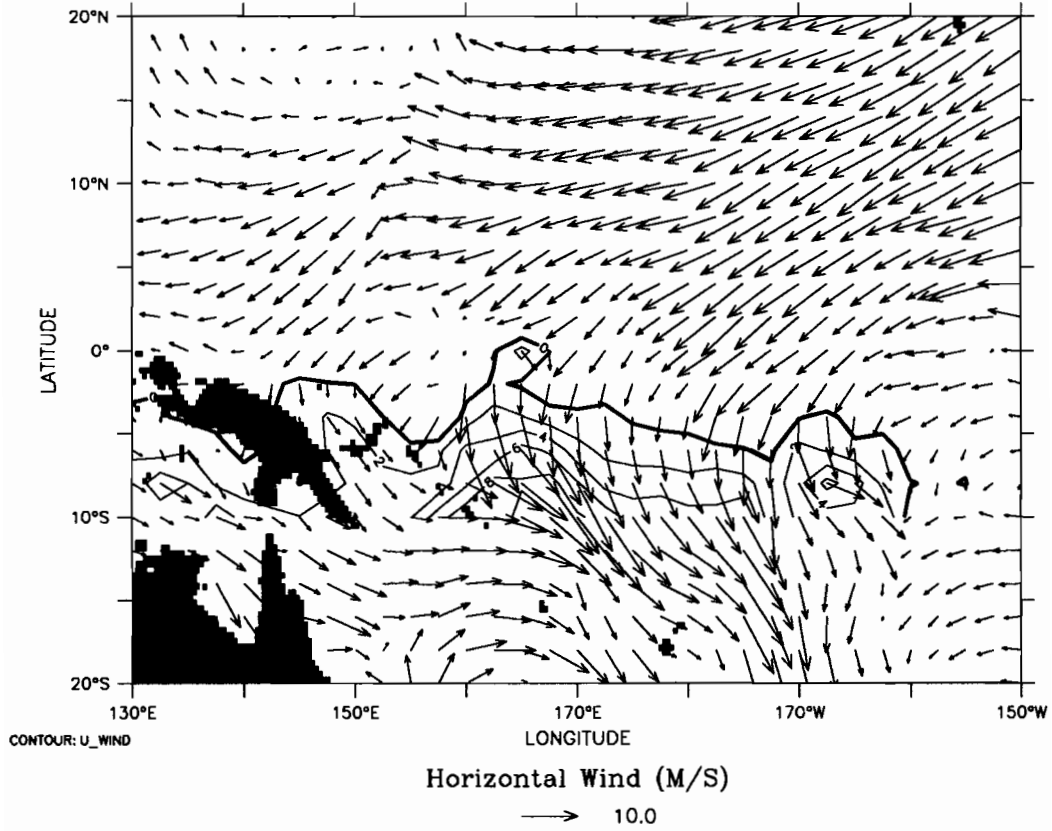
TIME : 01-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



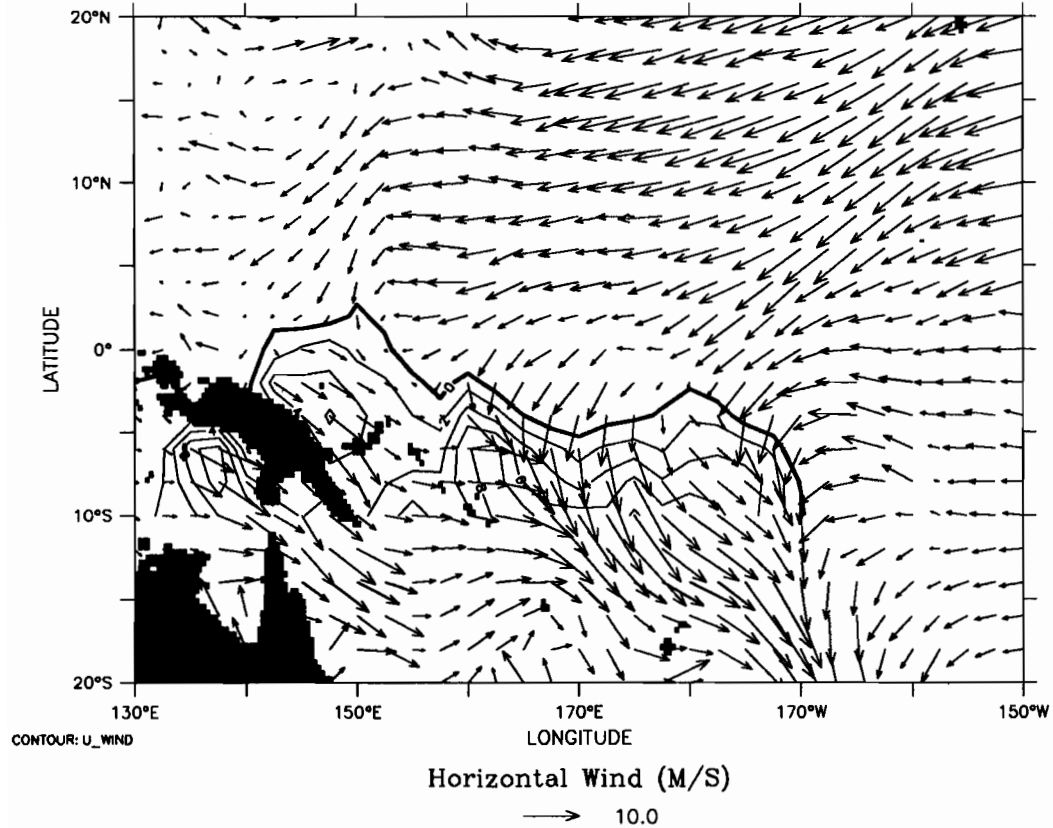
TIME : 02-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



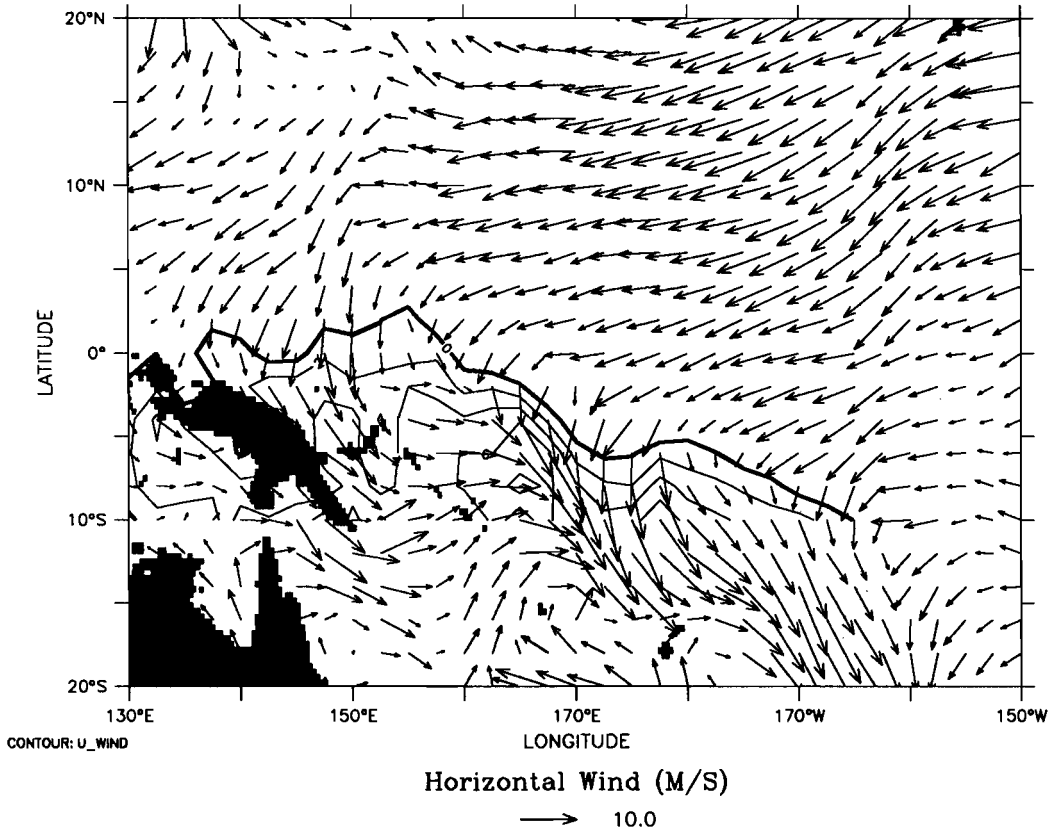
TIME : 03-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



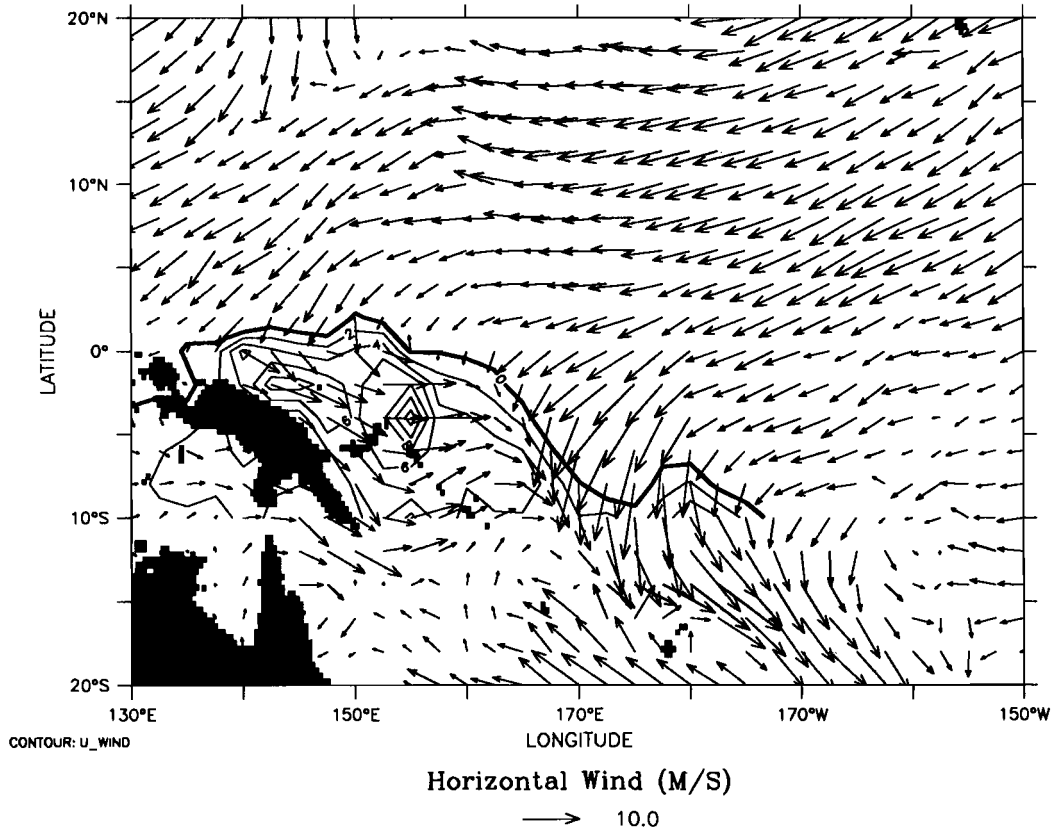
TIME : 04-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 05-APR-1988 18:00

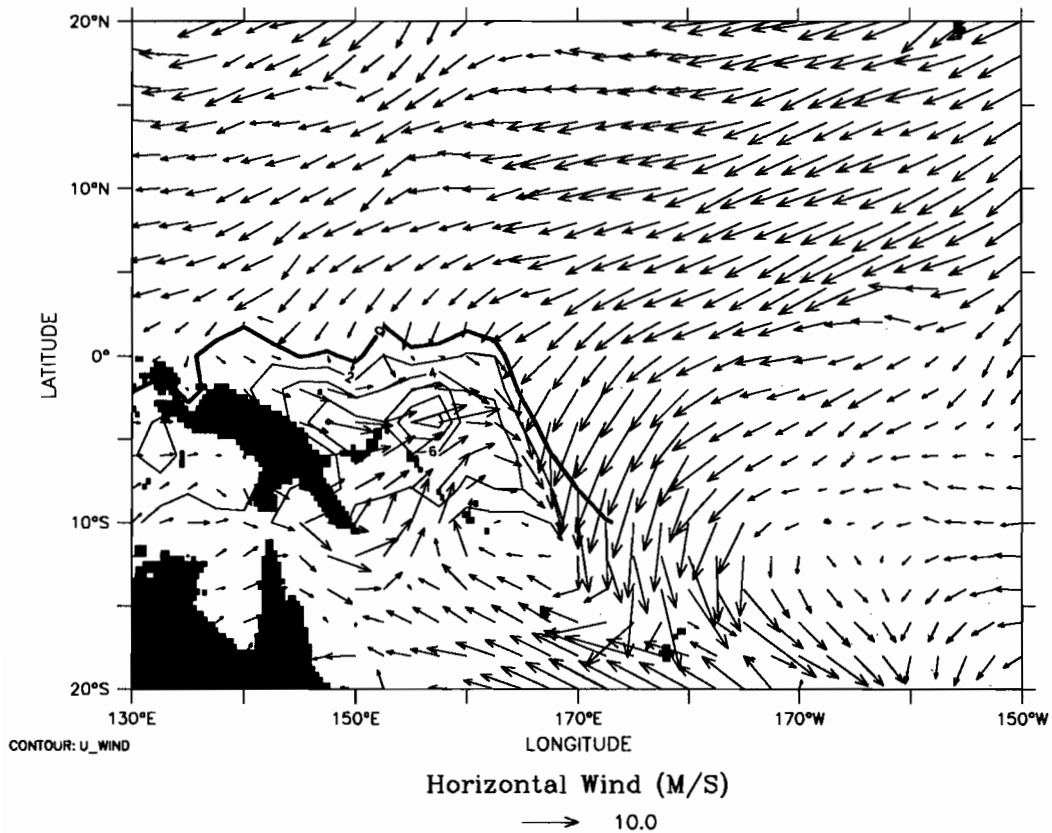
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





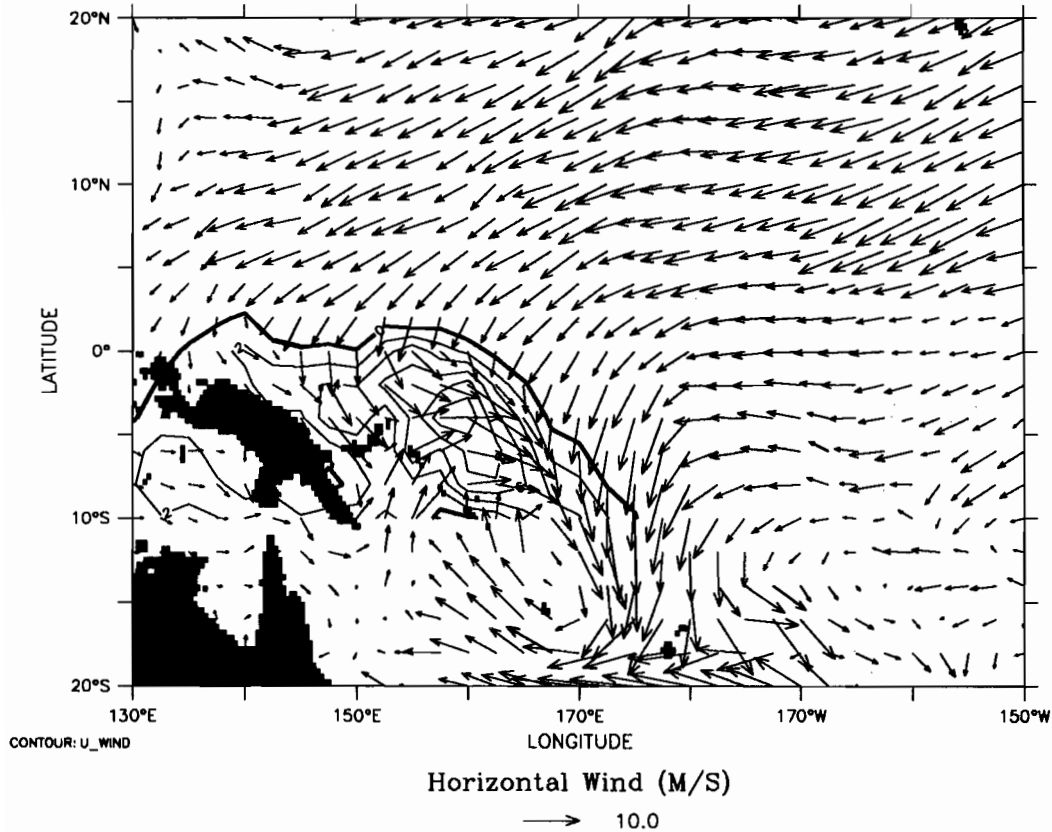
TIME : 06-APR-1988 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



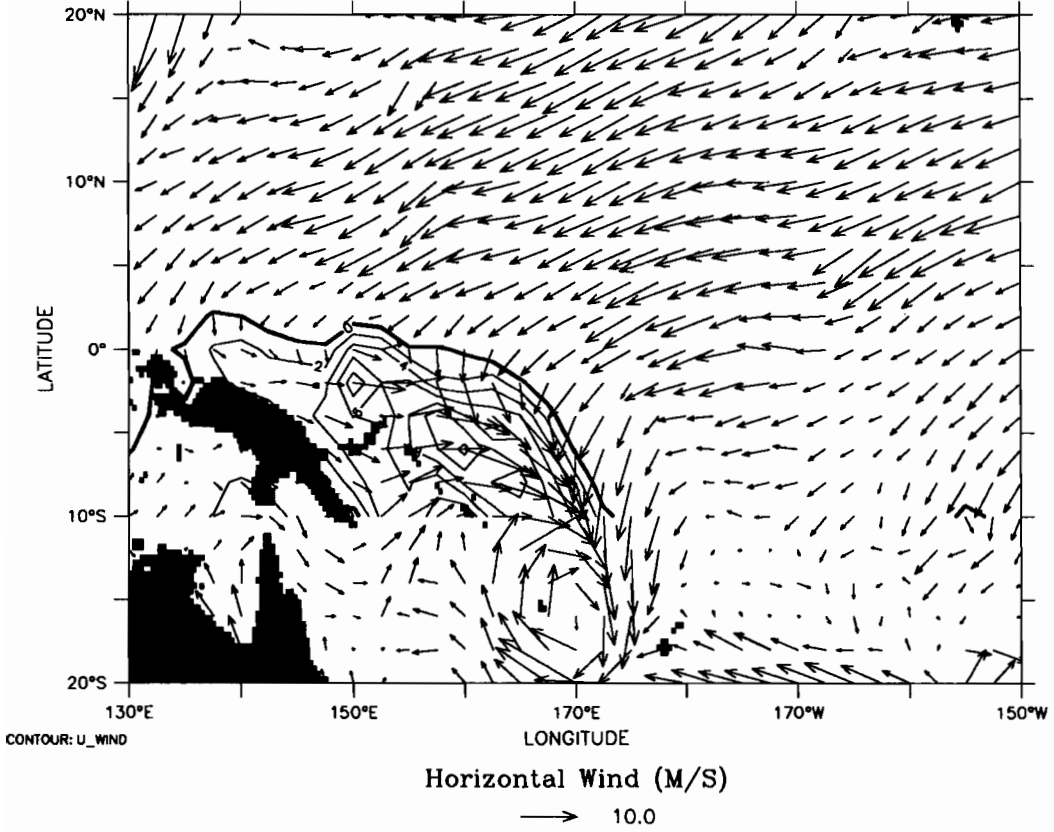
TIME : 07-APR-1988 18:00

6 hrlly 2.5x2.0 degree SSMI/Atlas gridded winds



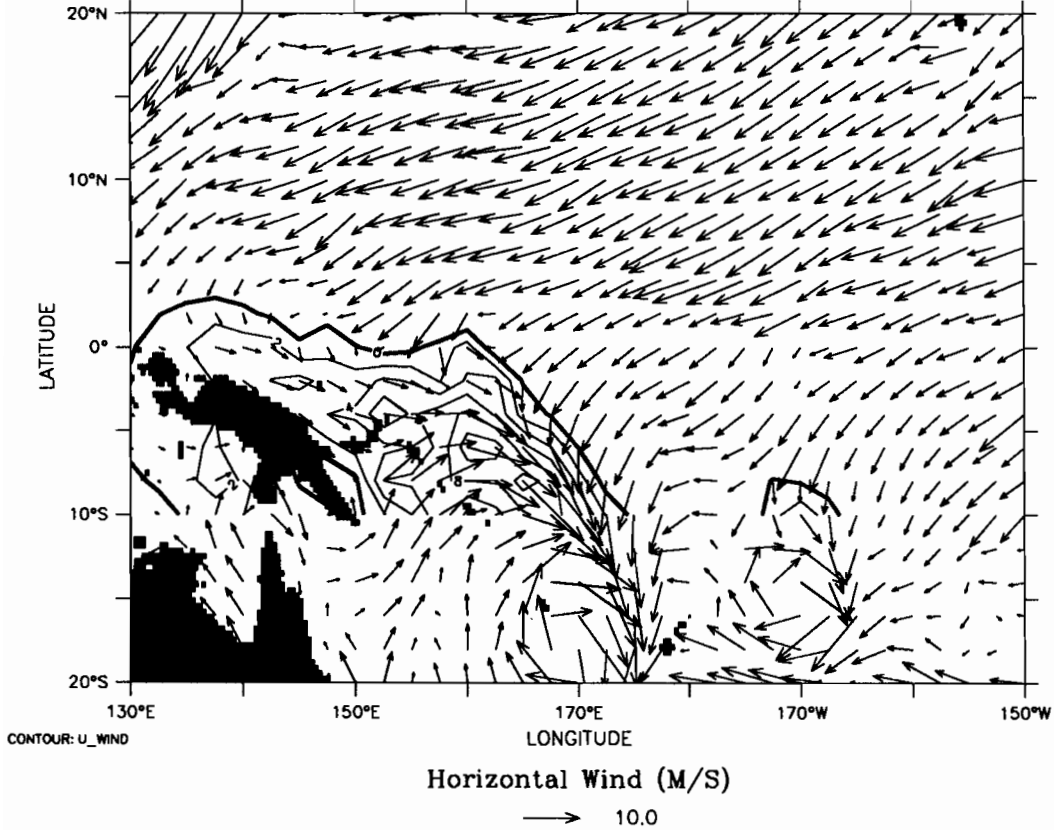
TIME : 08-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



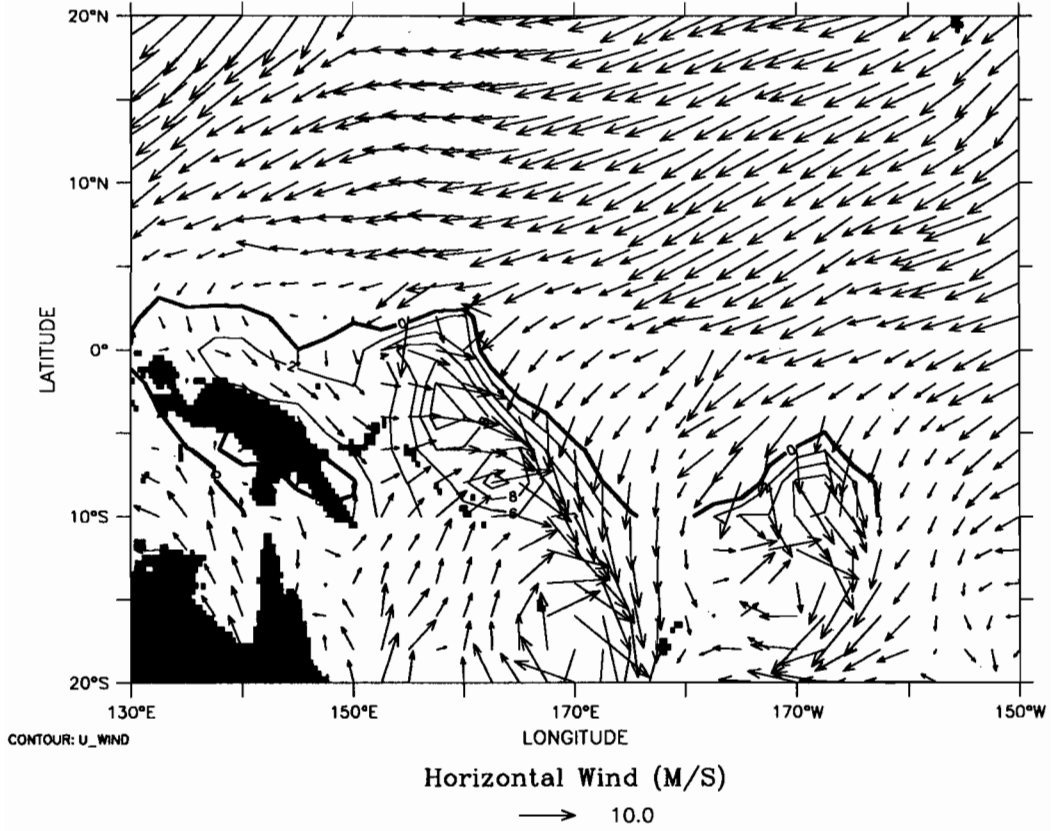
TIME : 09-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



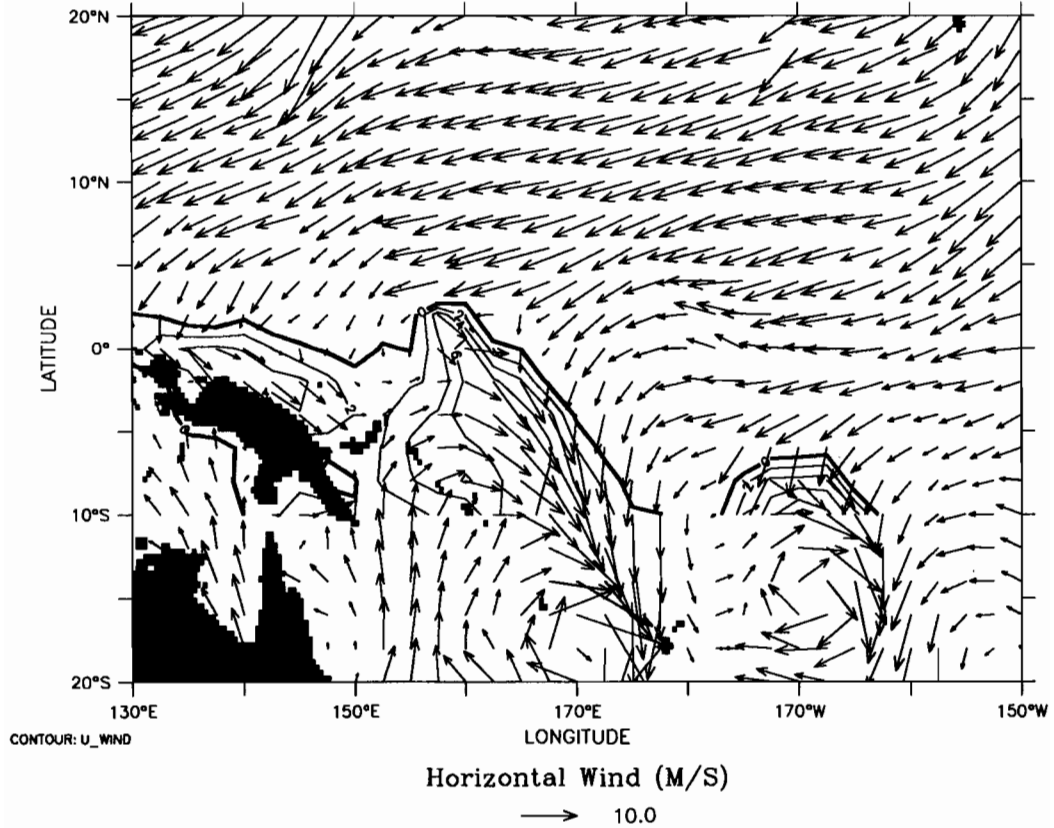
TIME : 10-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



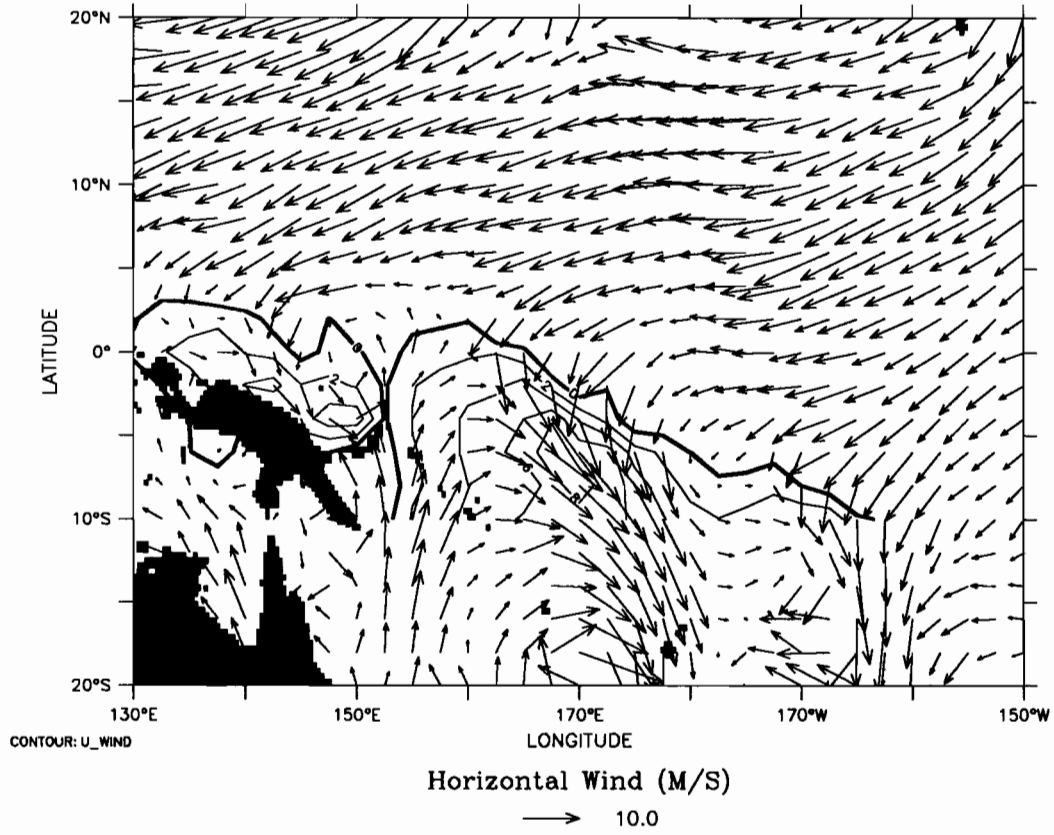
TIME : 11-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



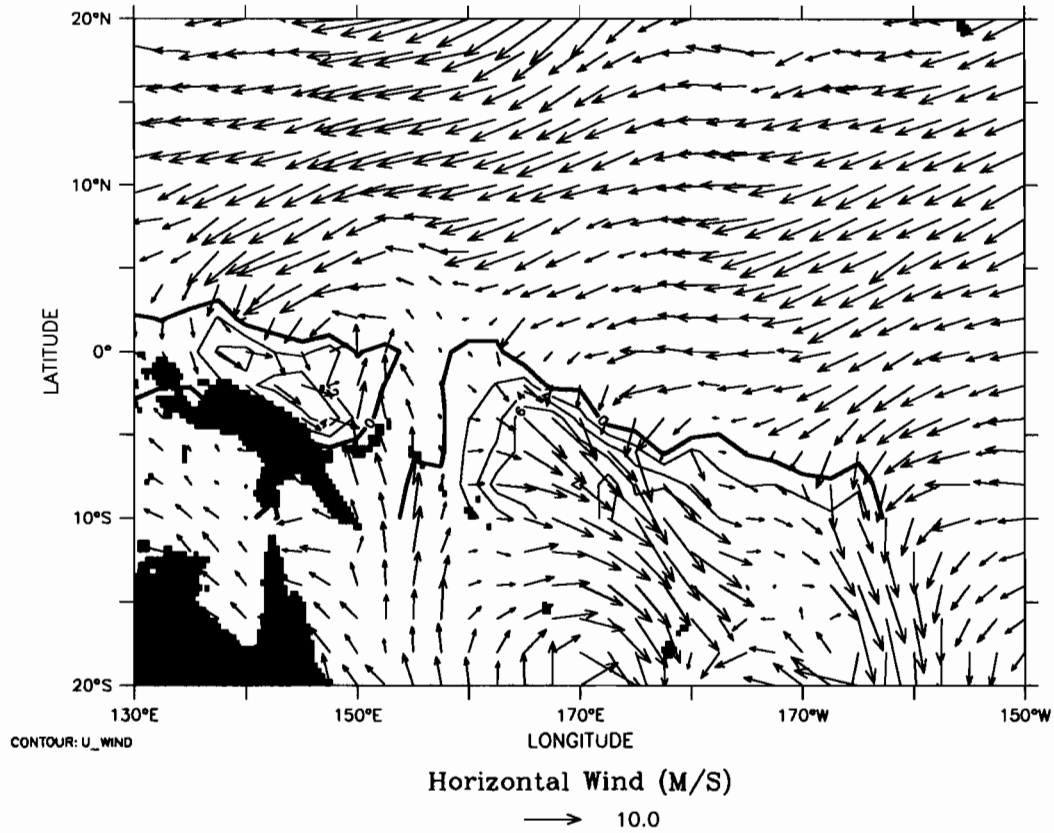
TIME : 12-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



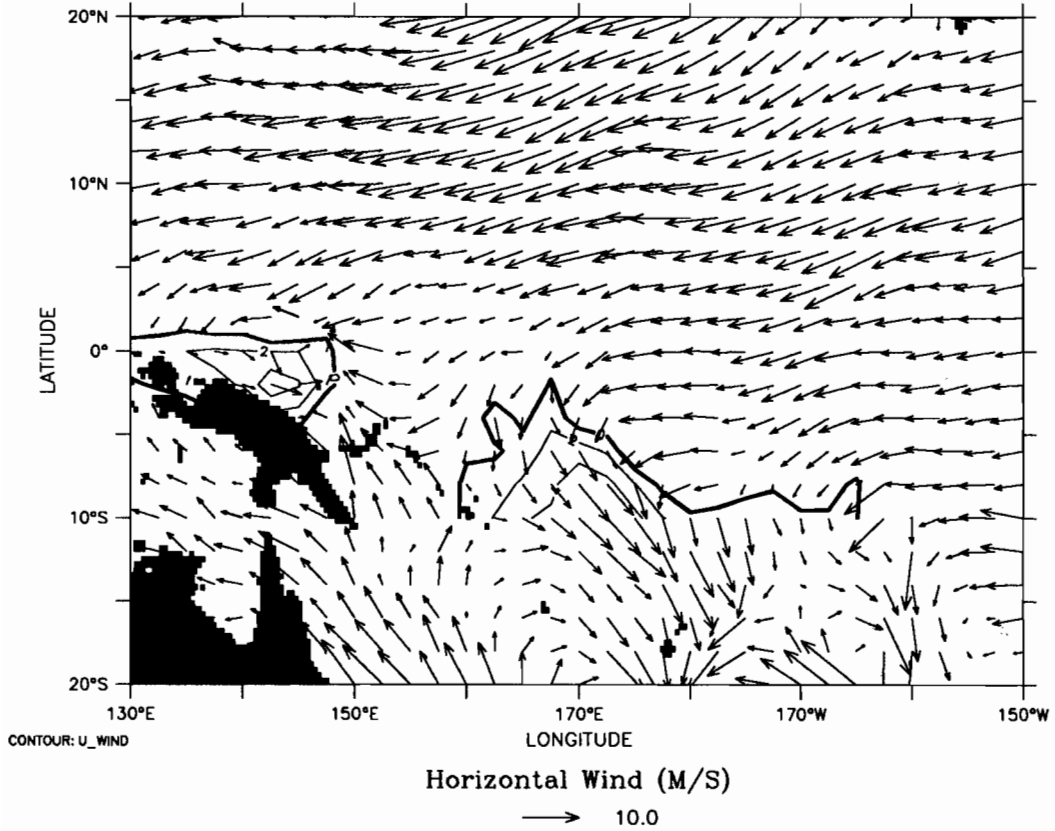
TIME : 13-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



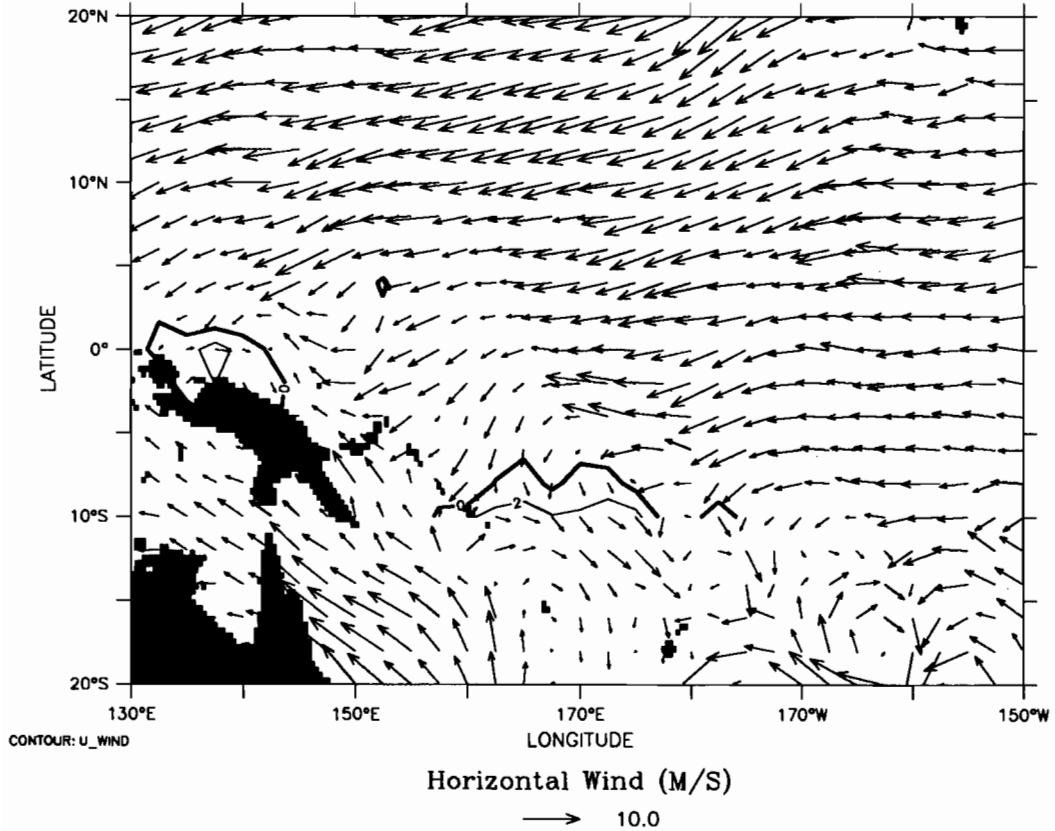
TIME : 14-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



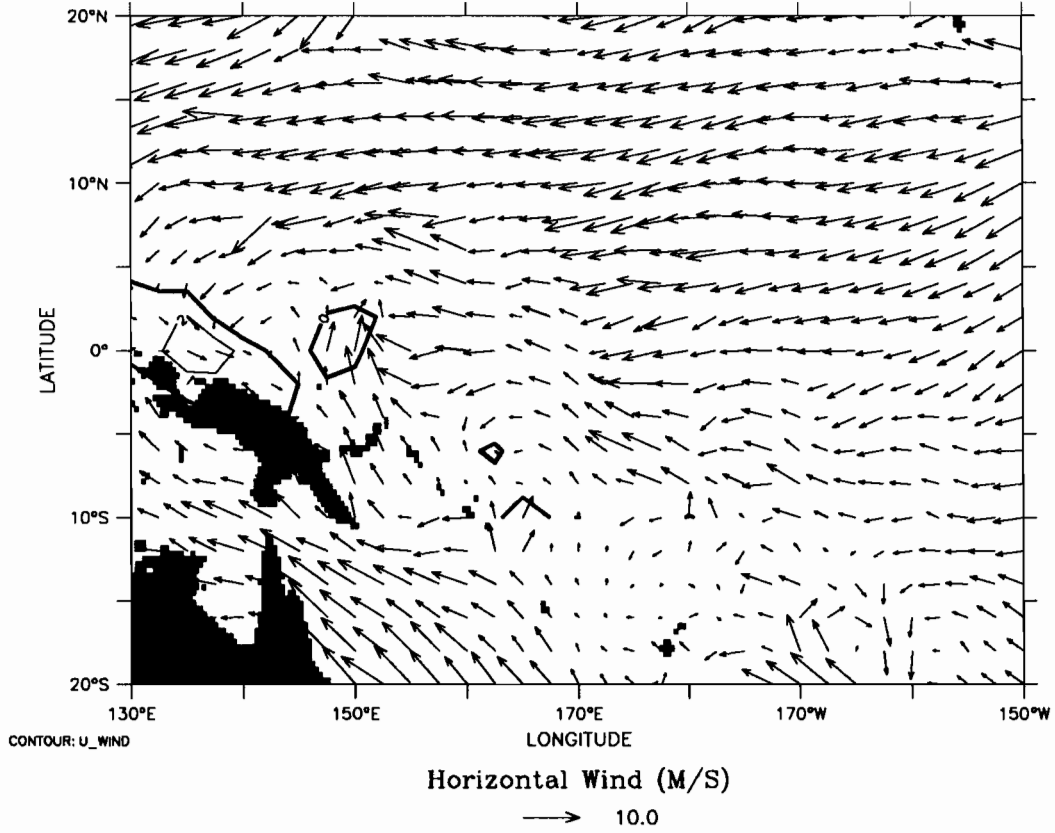
TIME : 15-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



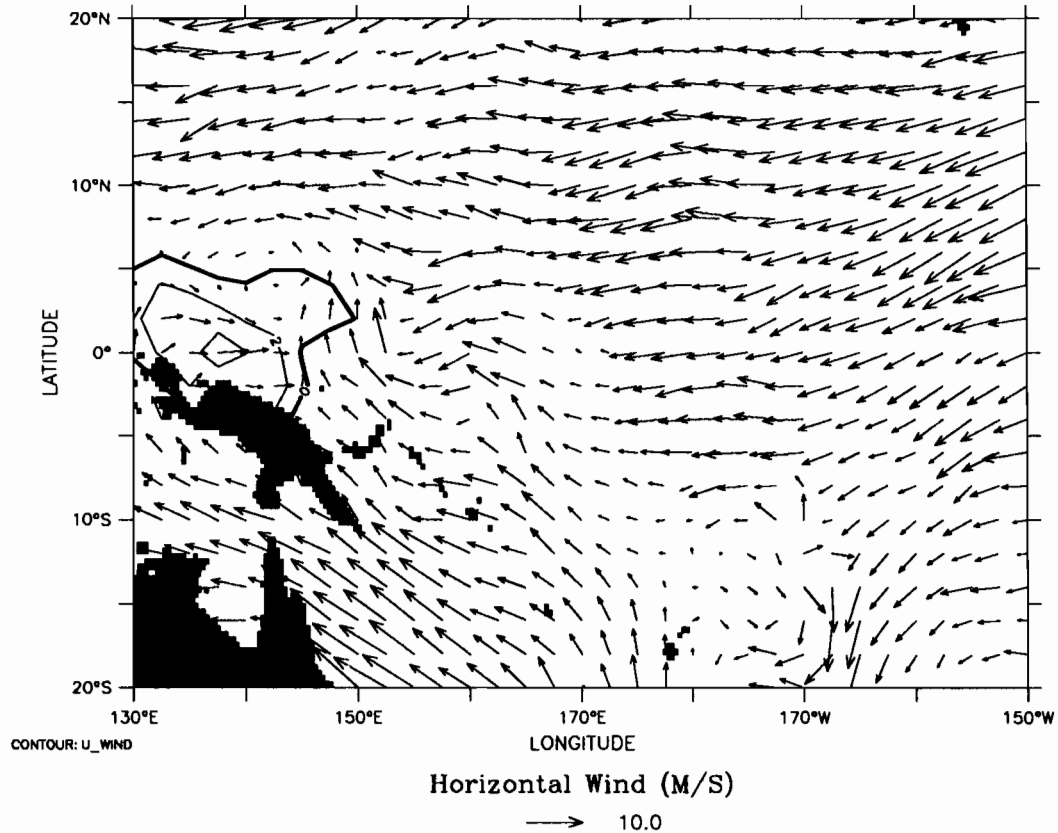
TIME : 16-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



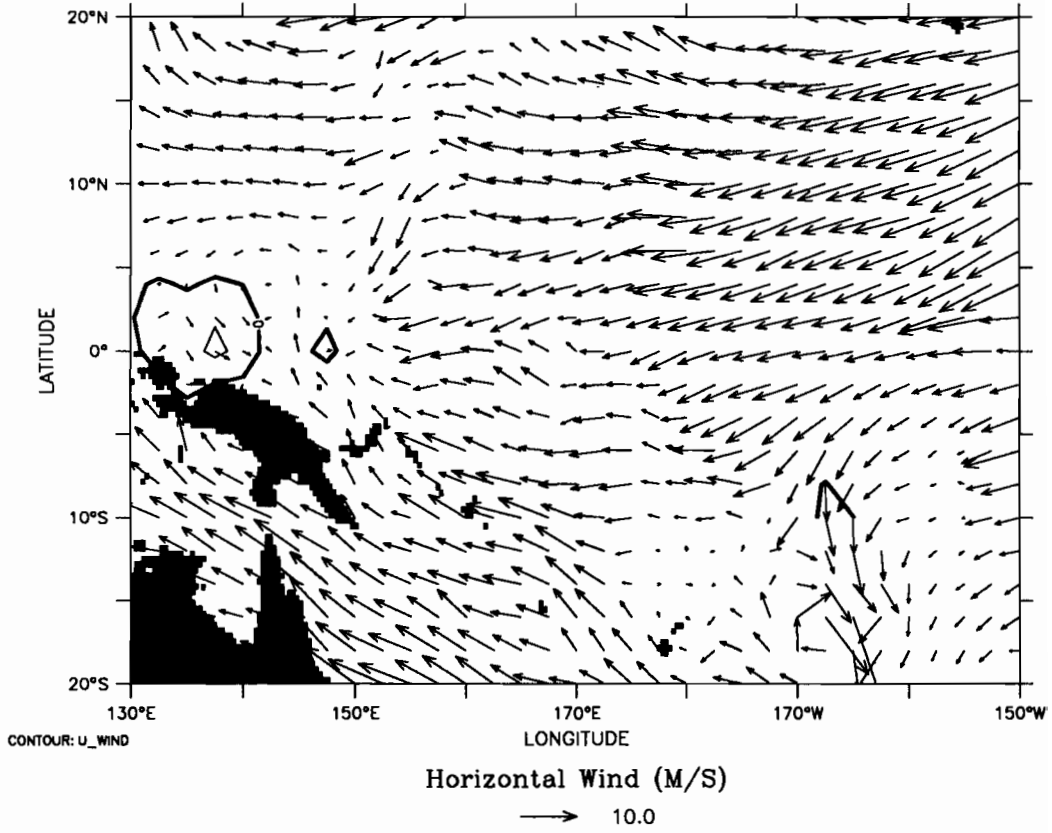
TIME : 17-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



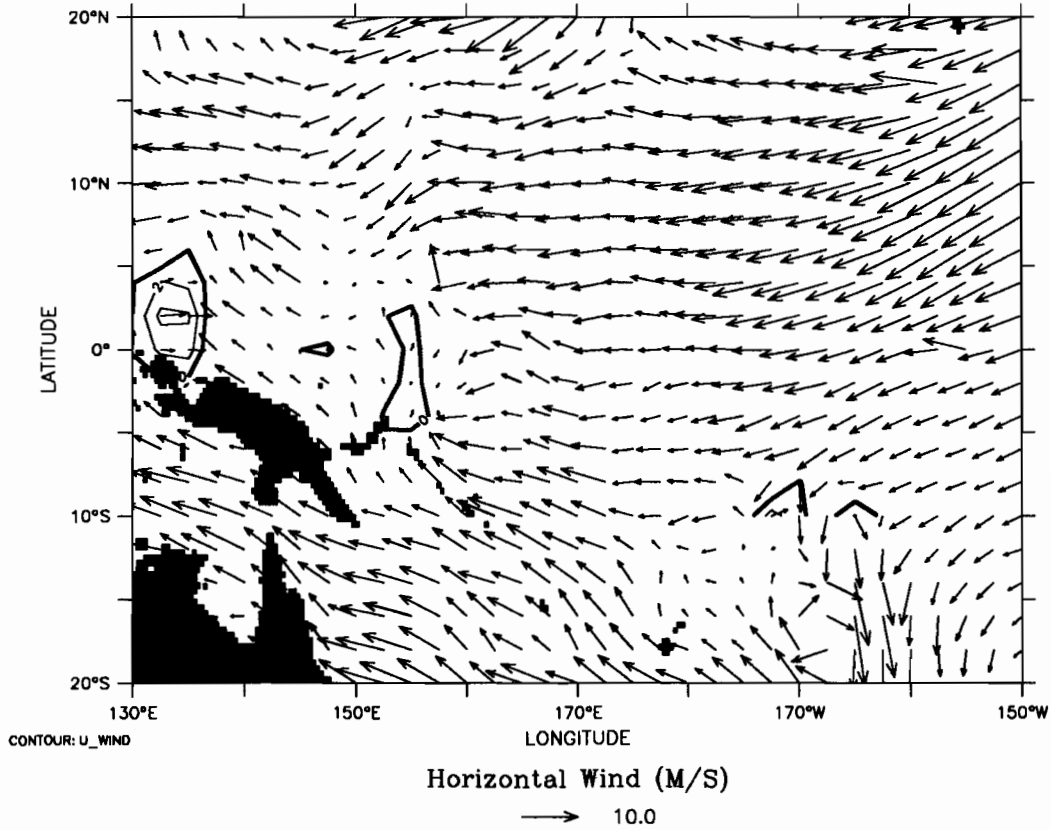
TIME : 18-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



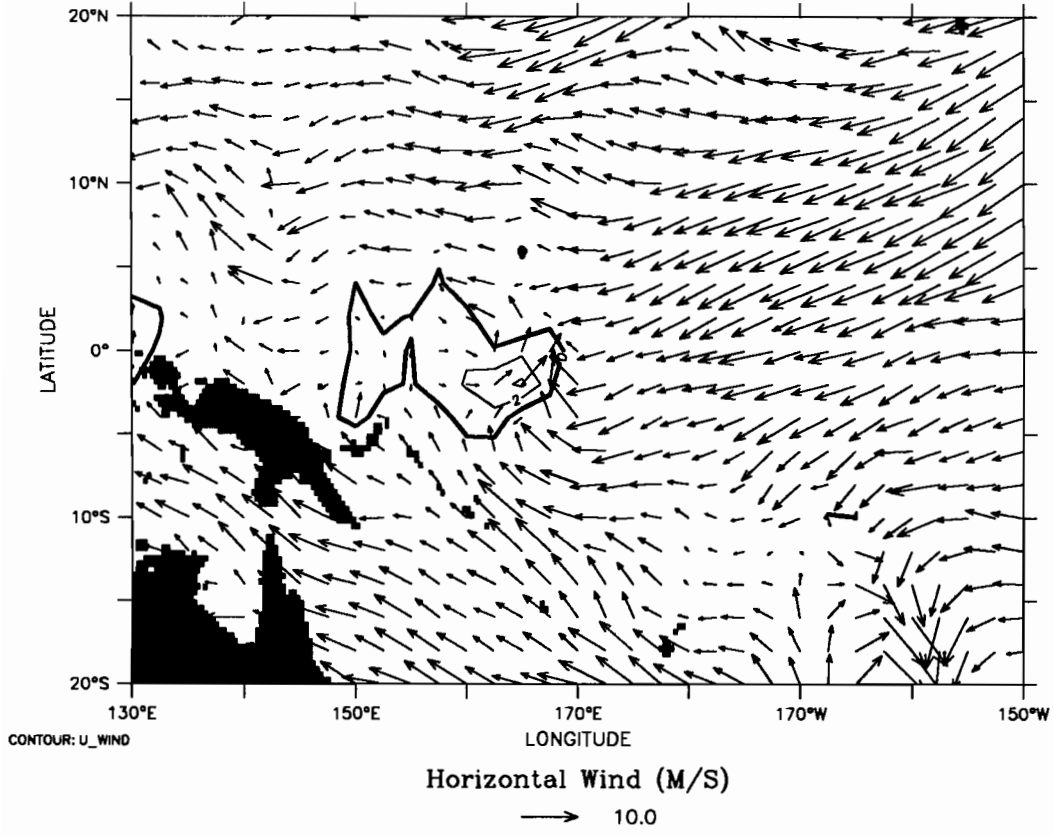
TIME : 19-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



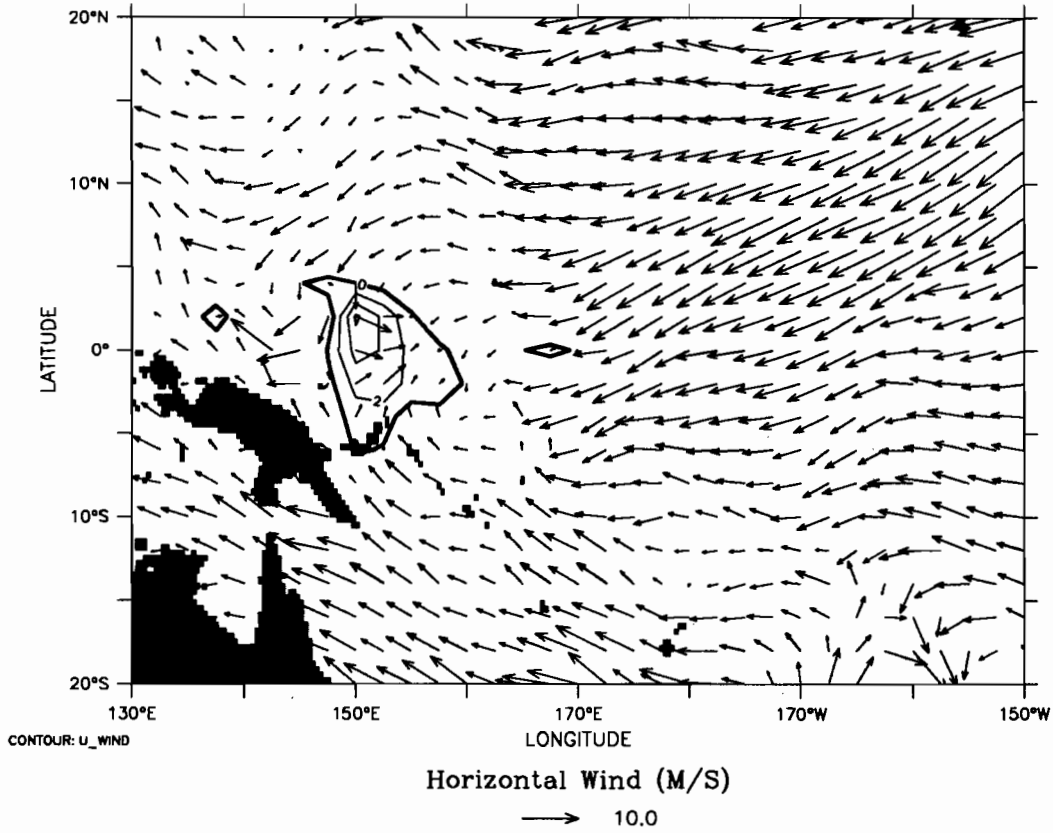
TIME : 20-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 21-APR-1988 18:00

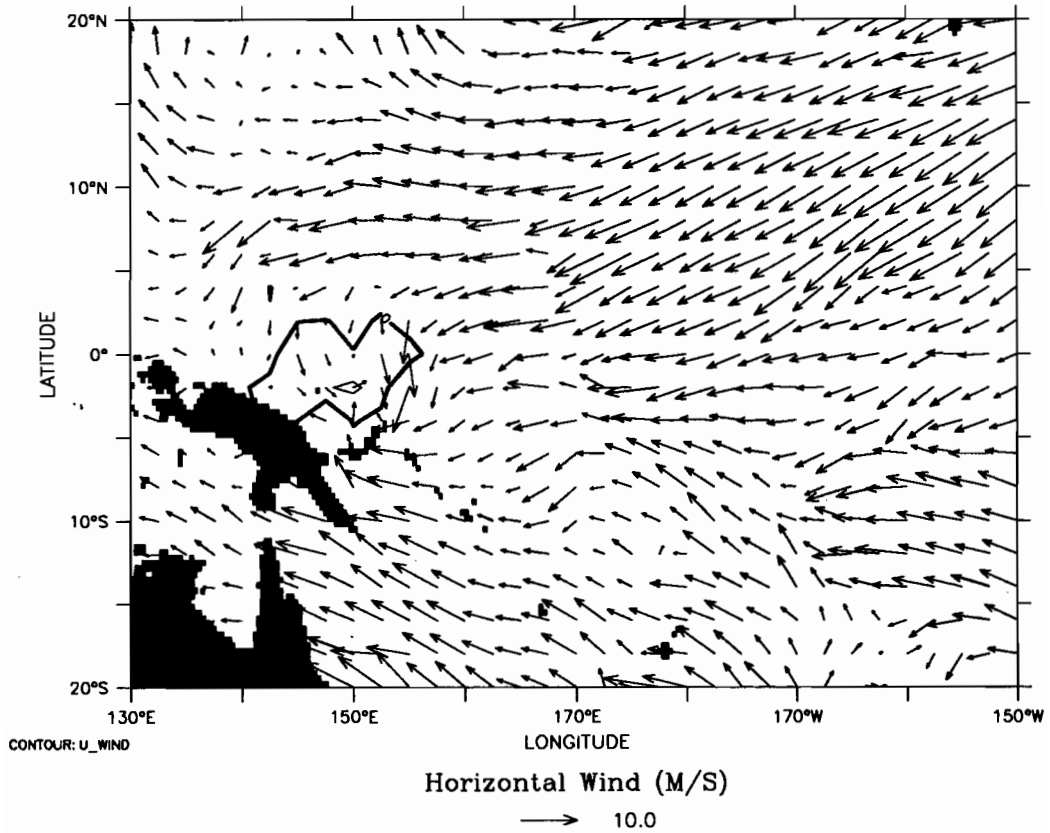
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





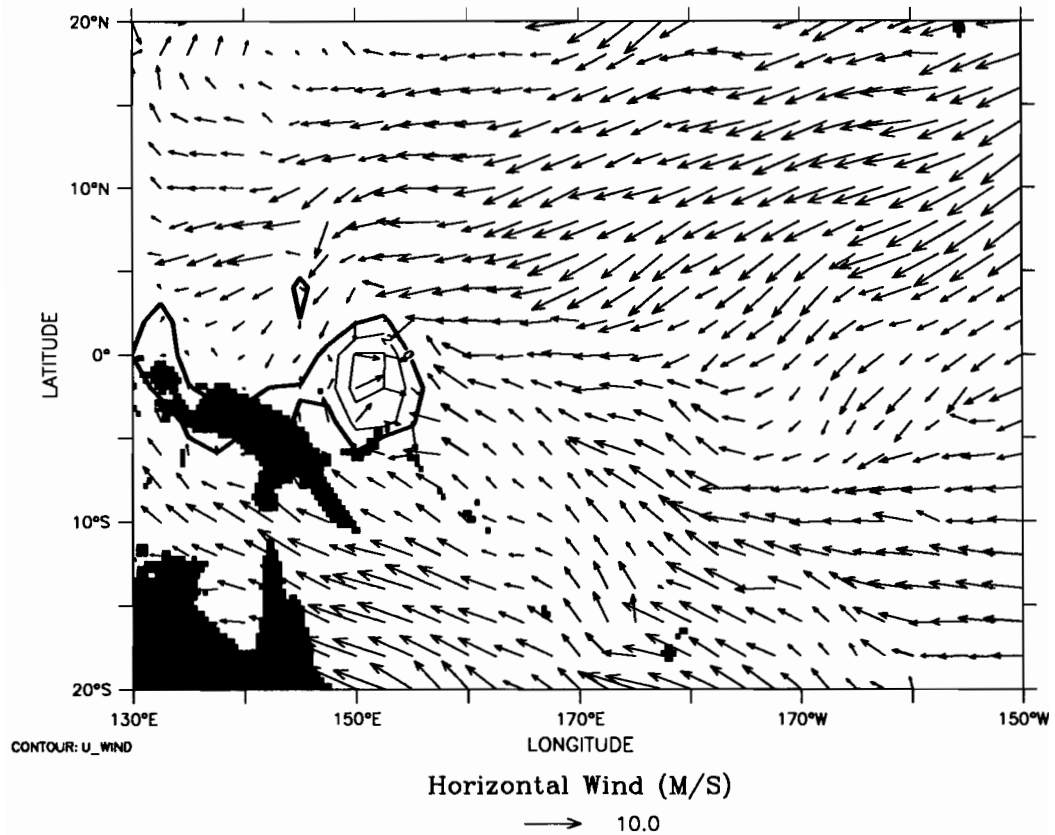
TIME : 22-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



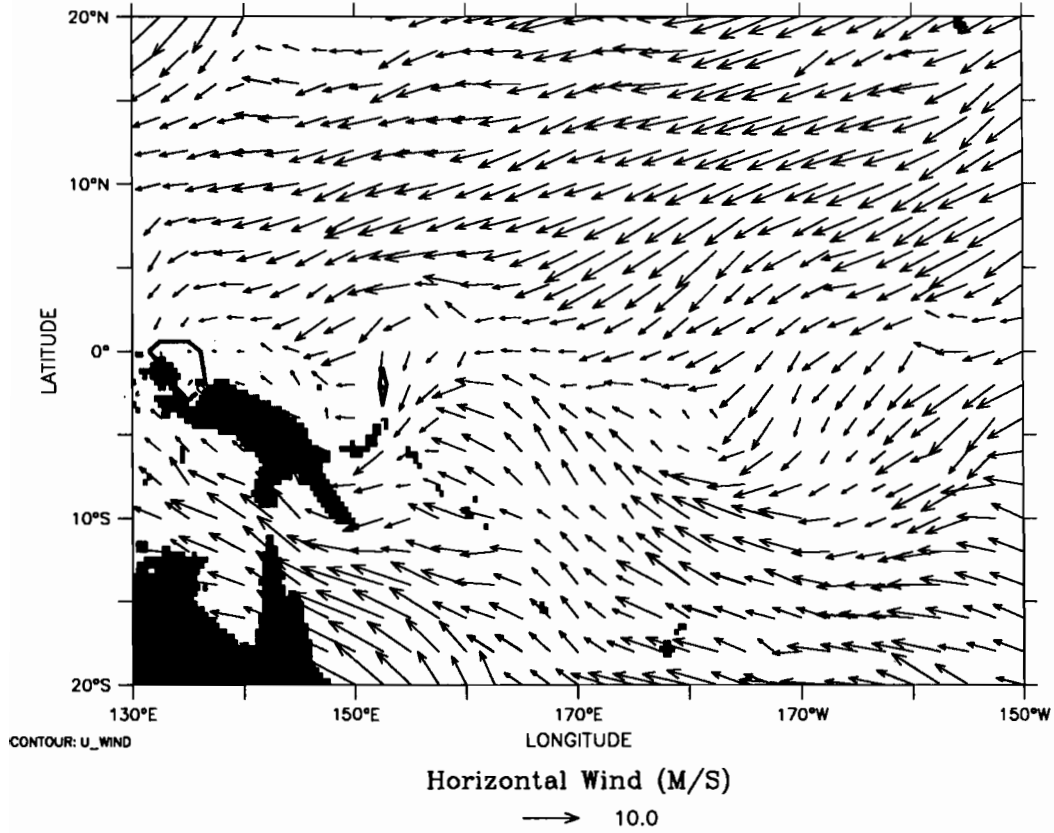
TIME : 23-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



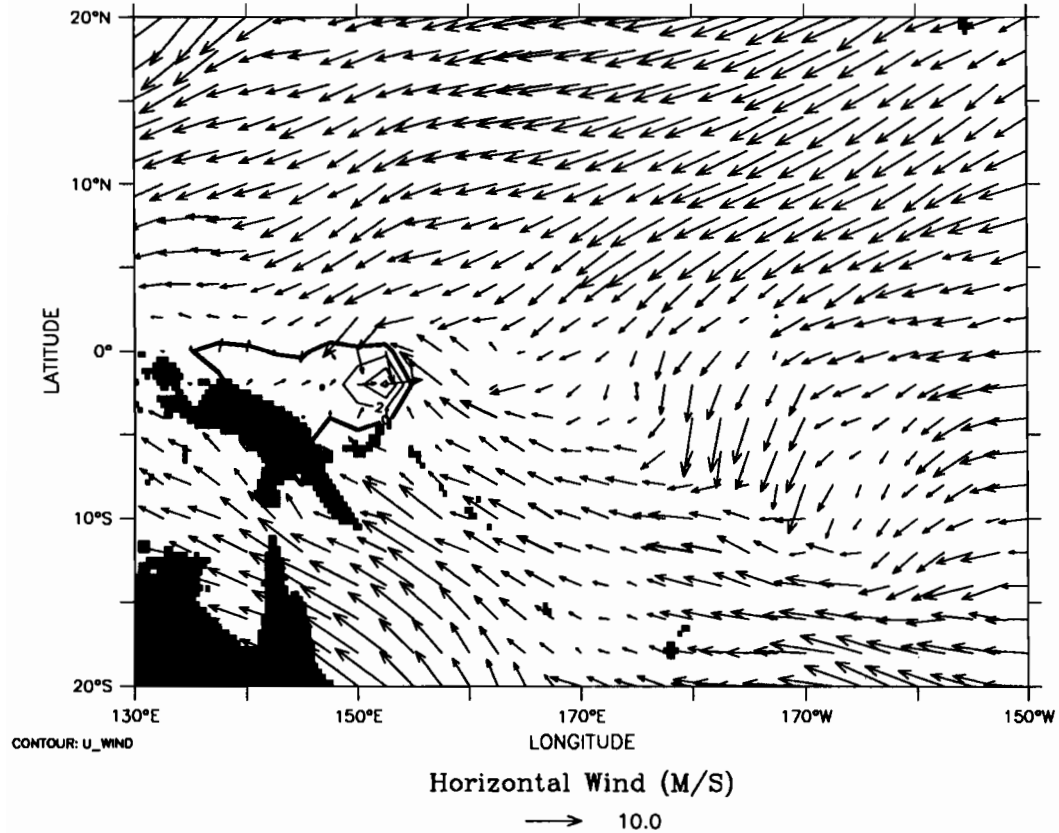
TIME : 24-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



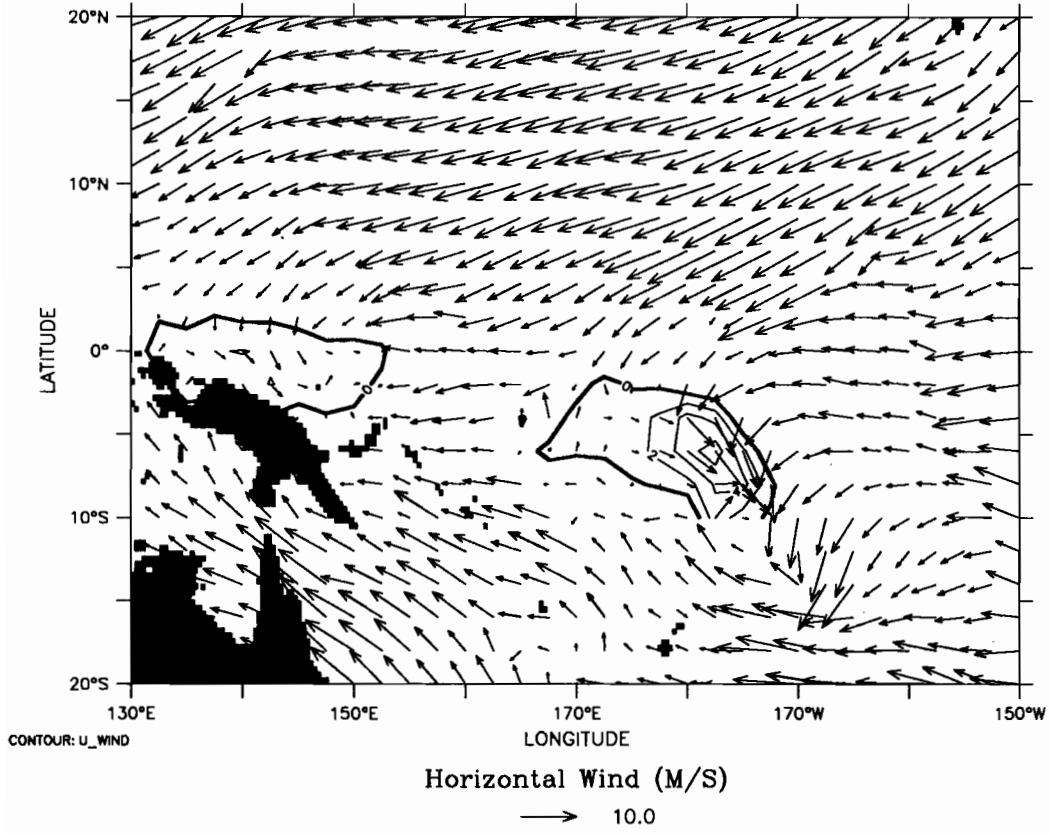
TIME : 25-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



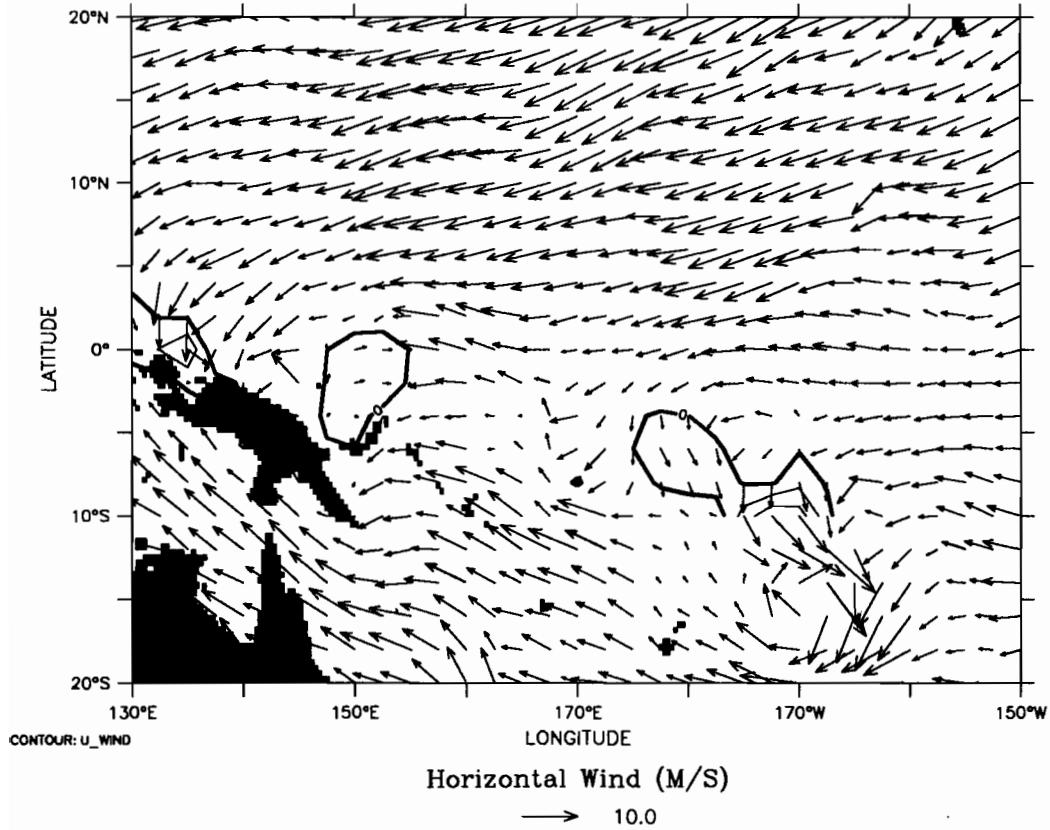
TIME : 26-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



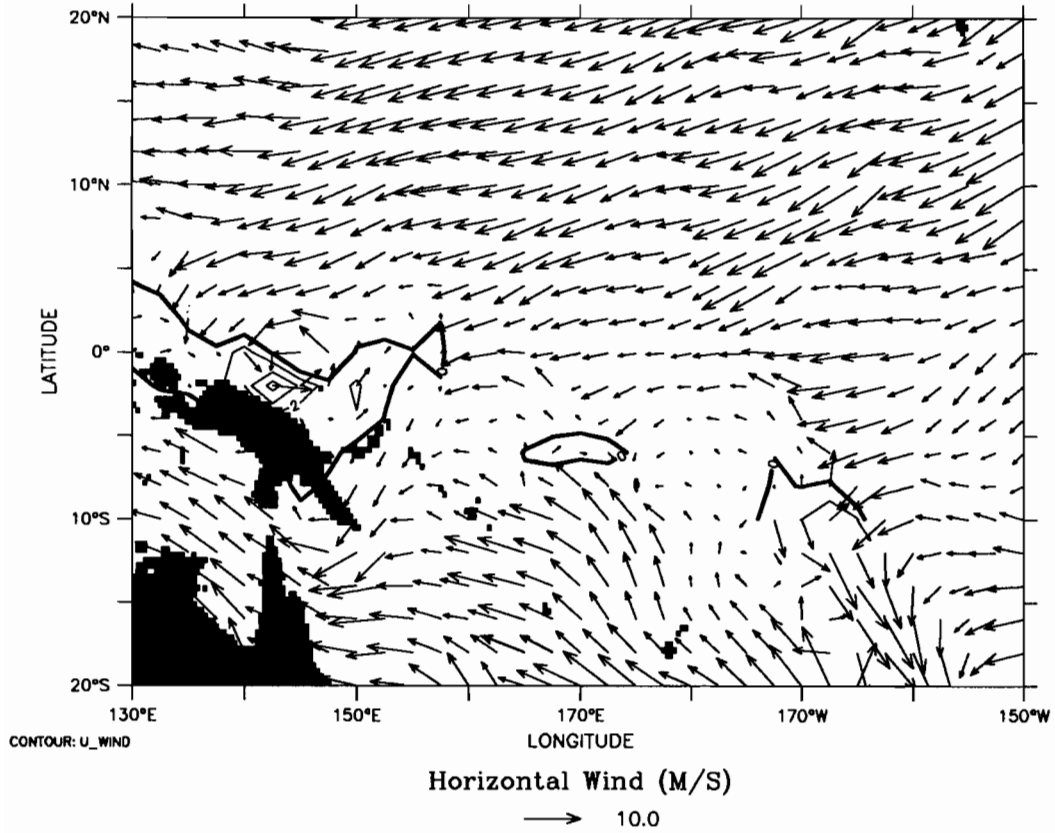
TIME : 27-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



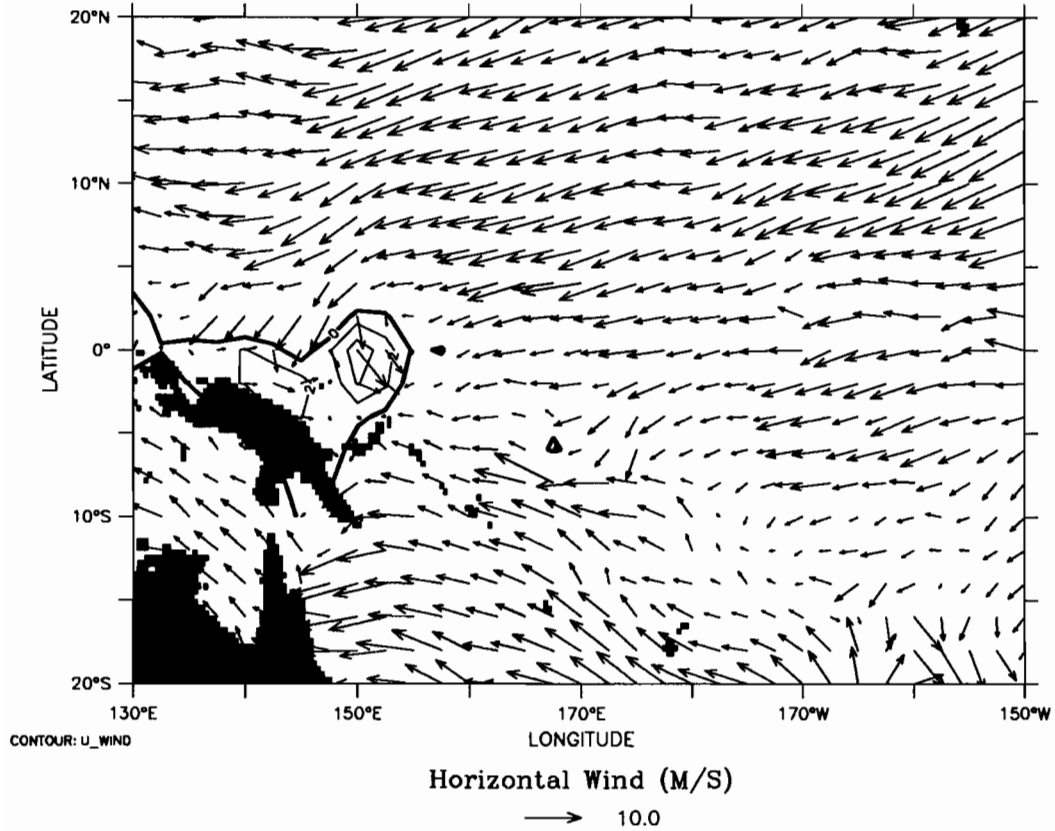
TIME : 28-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



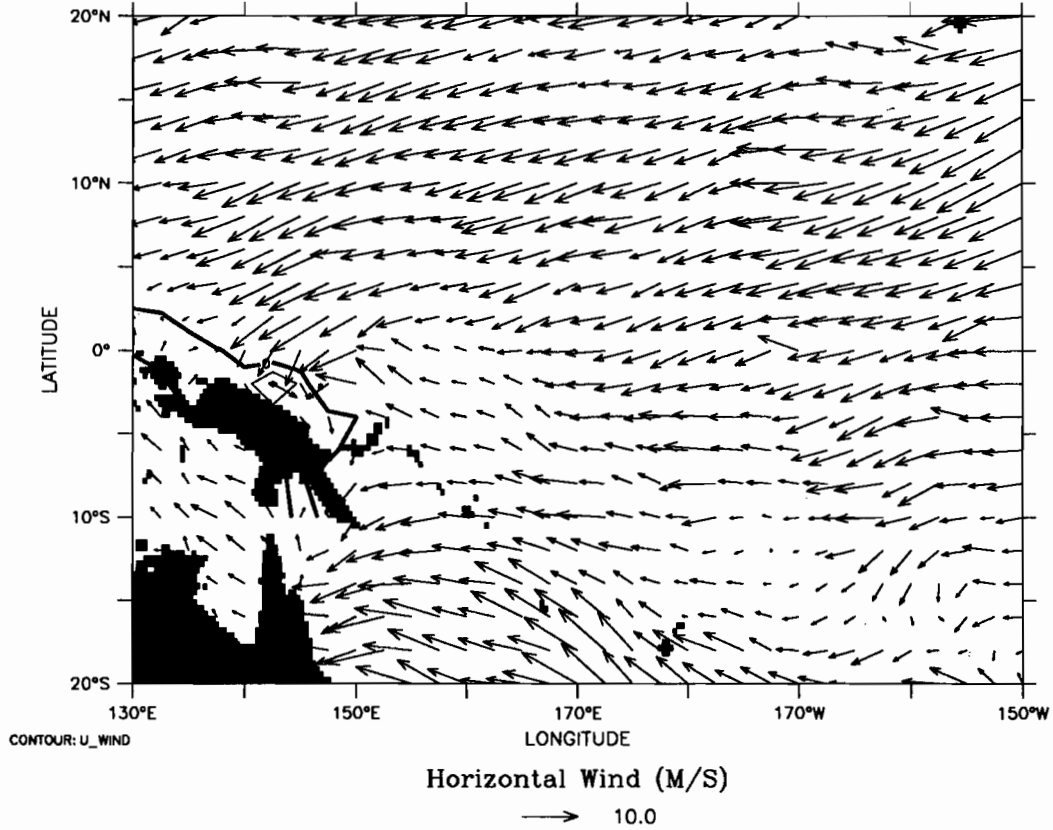
TIME : 29-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



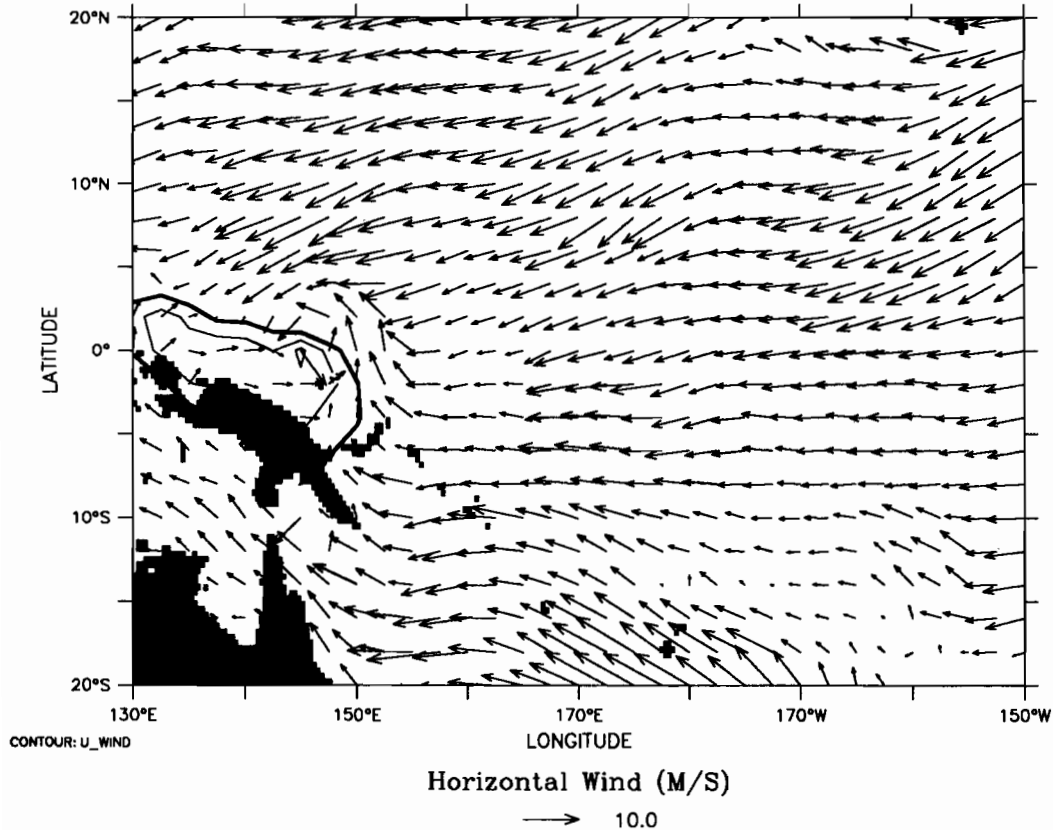
TIME : 30-APR-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



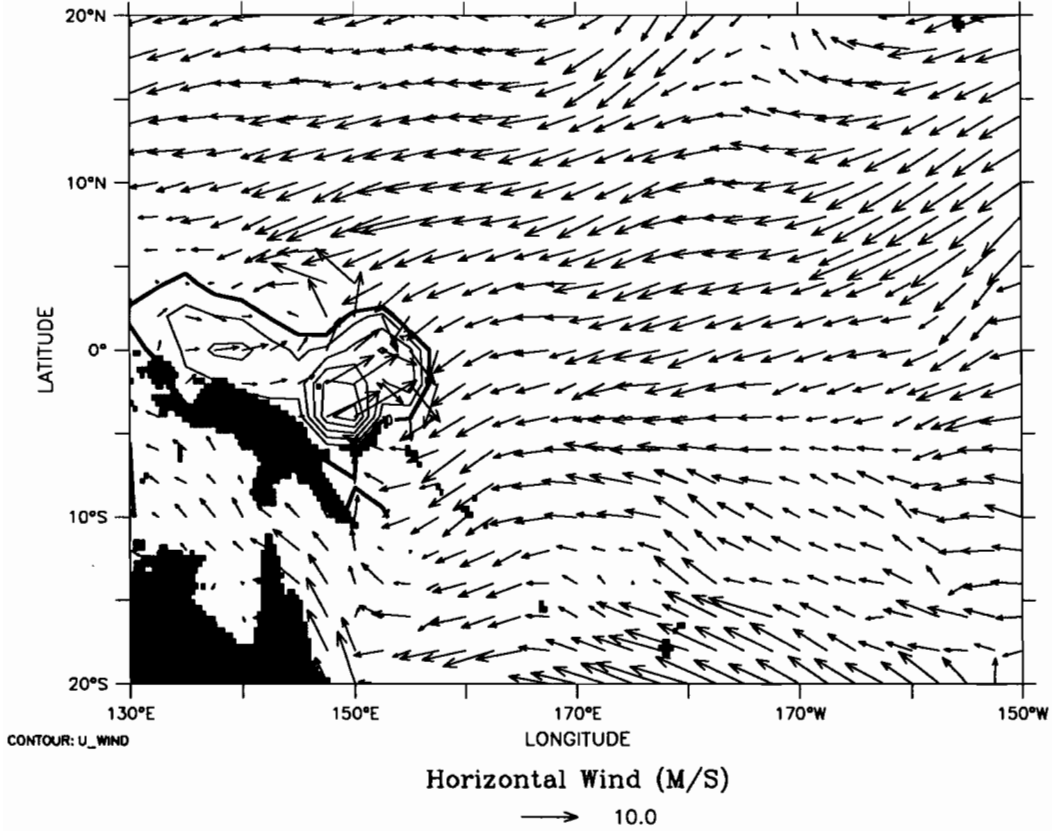
TIME : 01-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



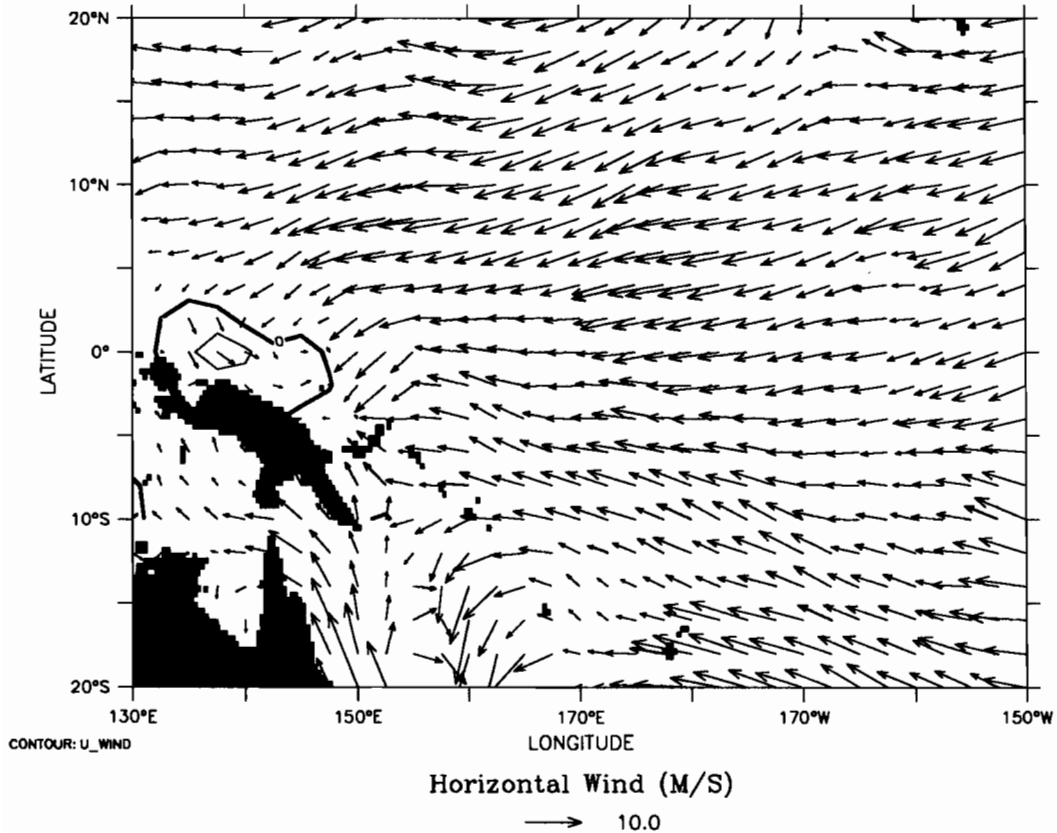
TIME : 02-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



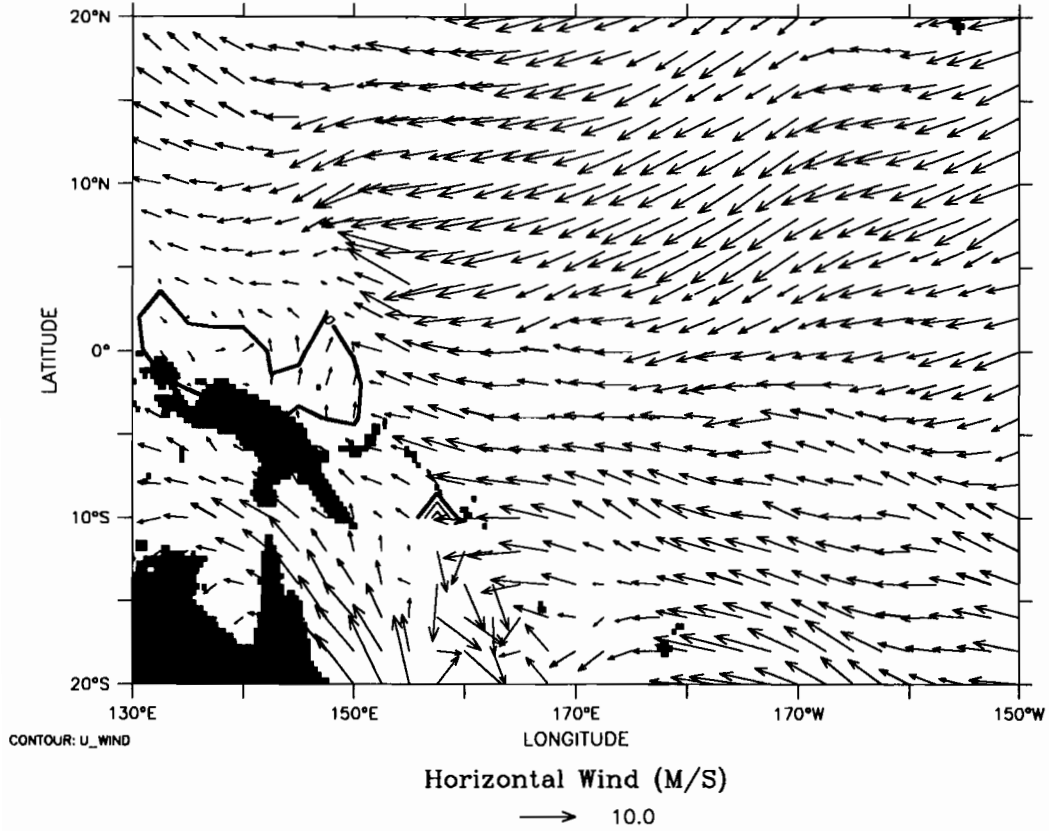
TIME : 03-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



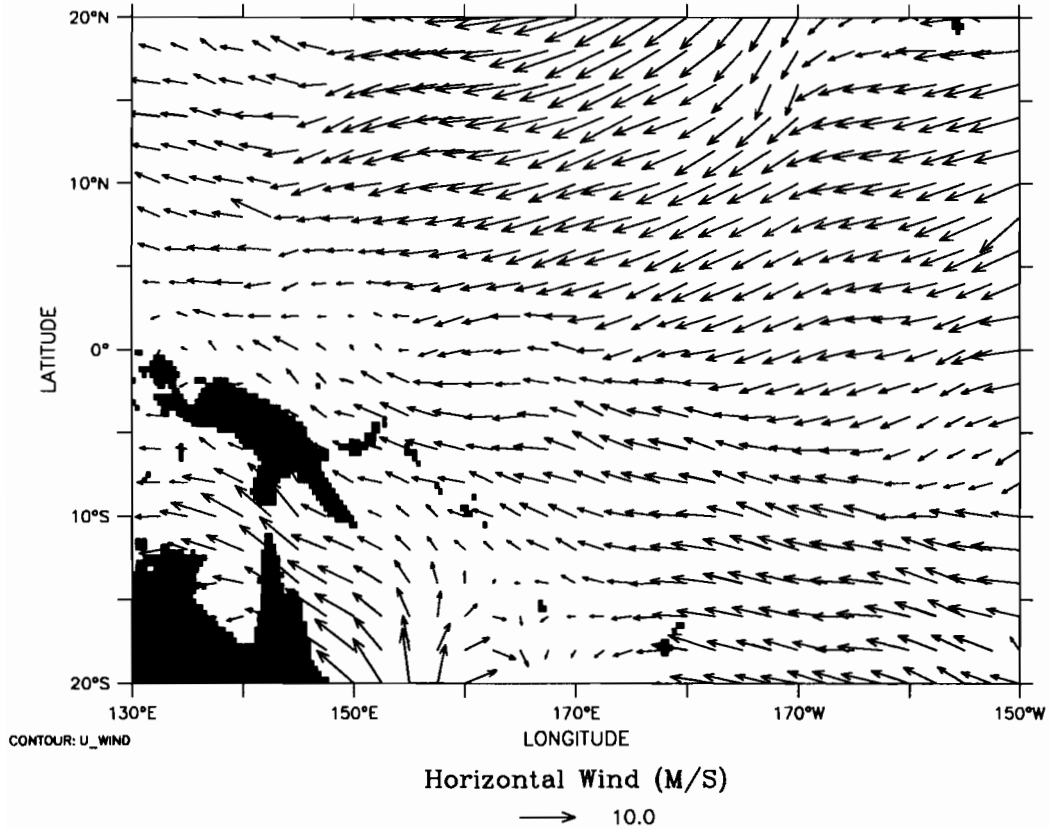
TIME : 04-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



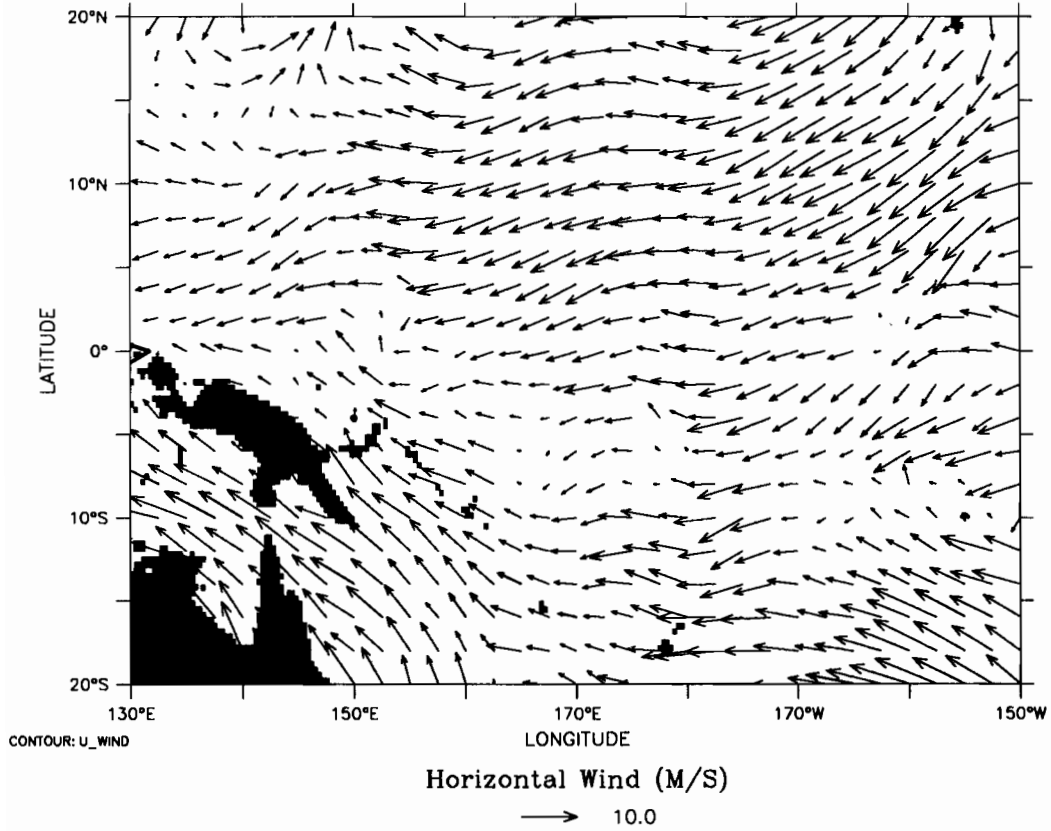
TIME : 05-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



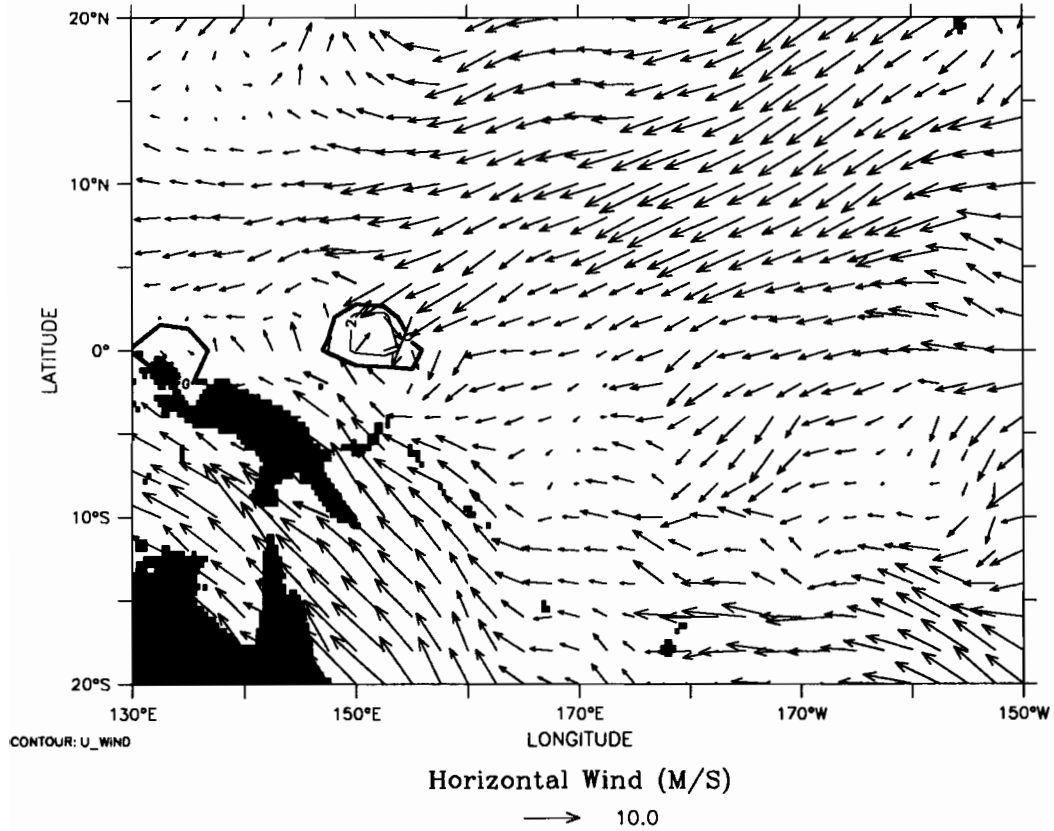
TIME : 10-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 11-MAY-1988 18:00

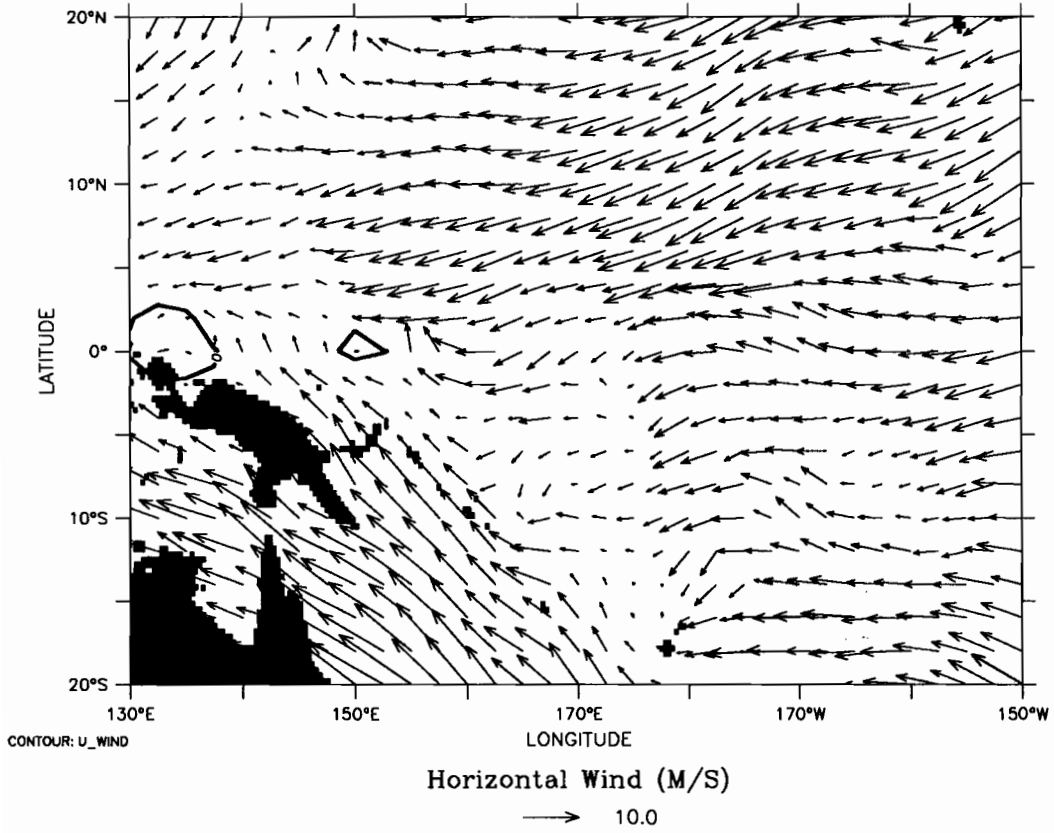
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





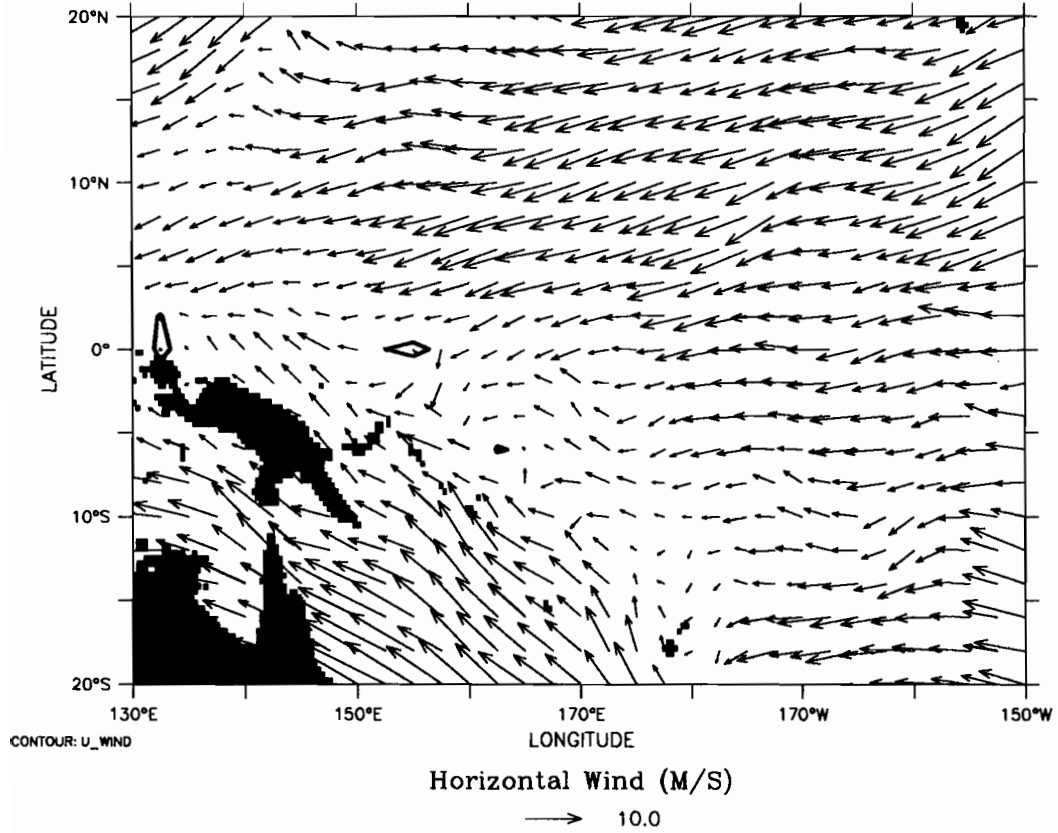
TIME : 12-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



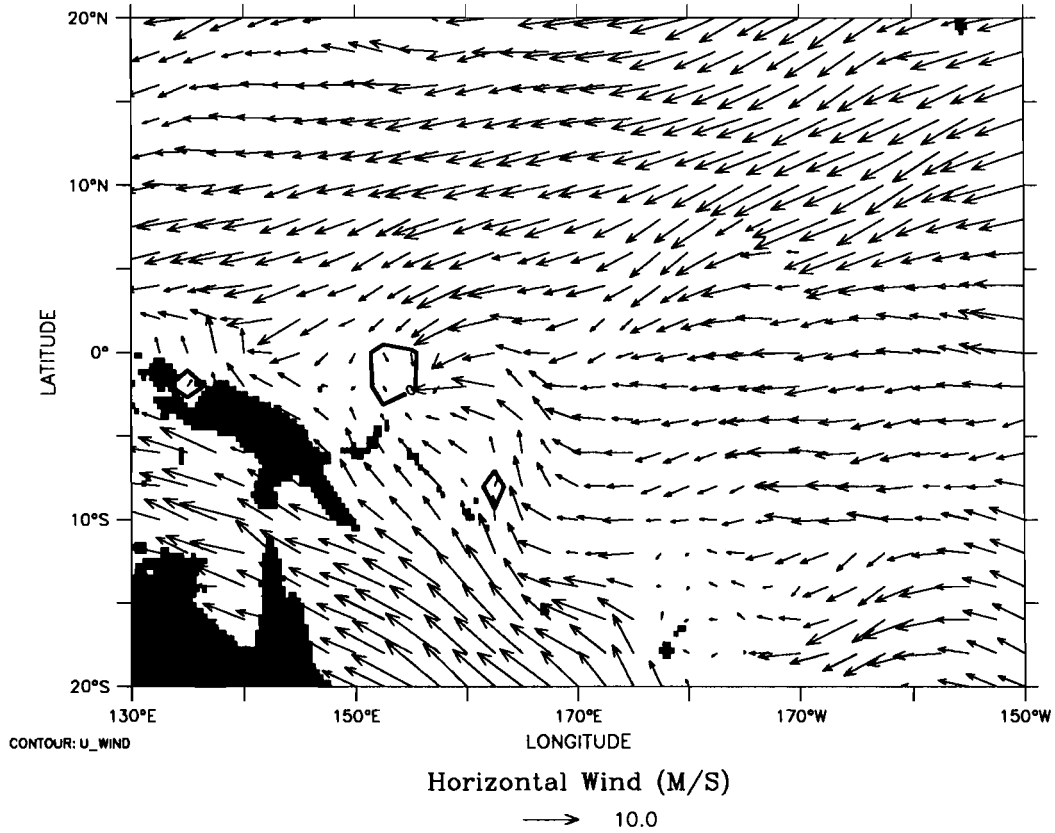
TIME : 13-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



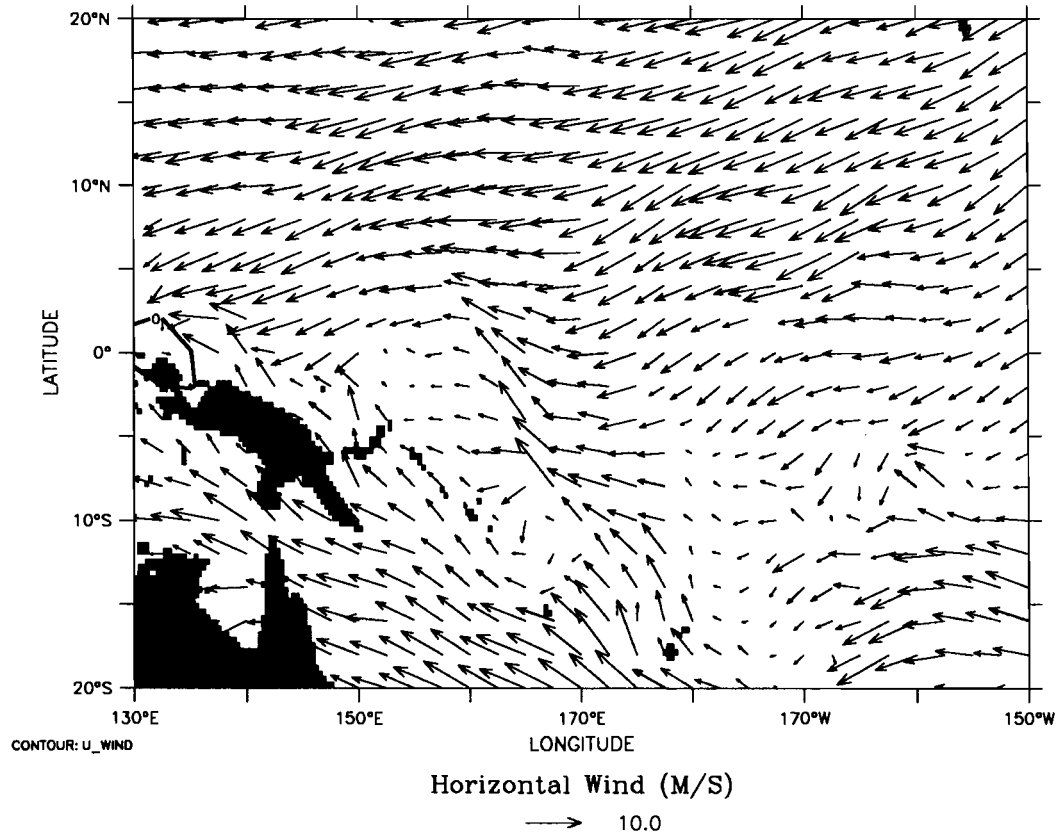
TIME : 14-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



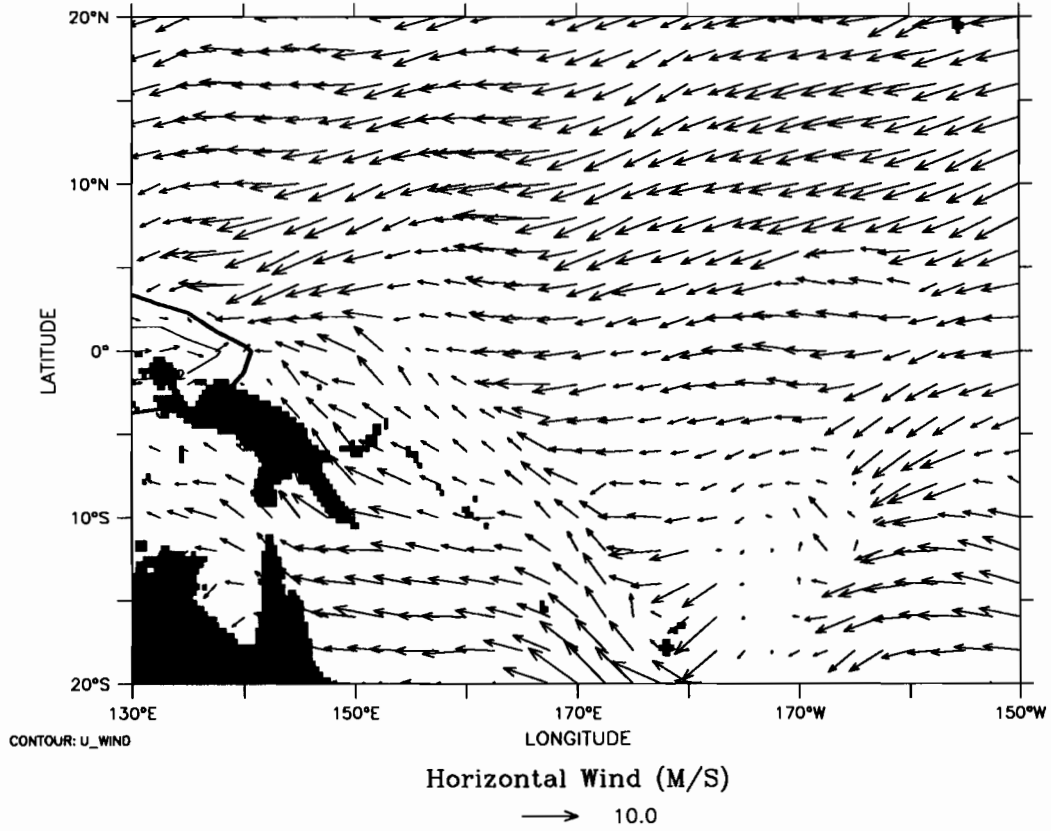
TIME : 15-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



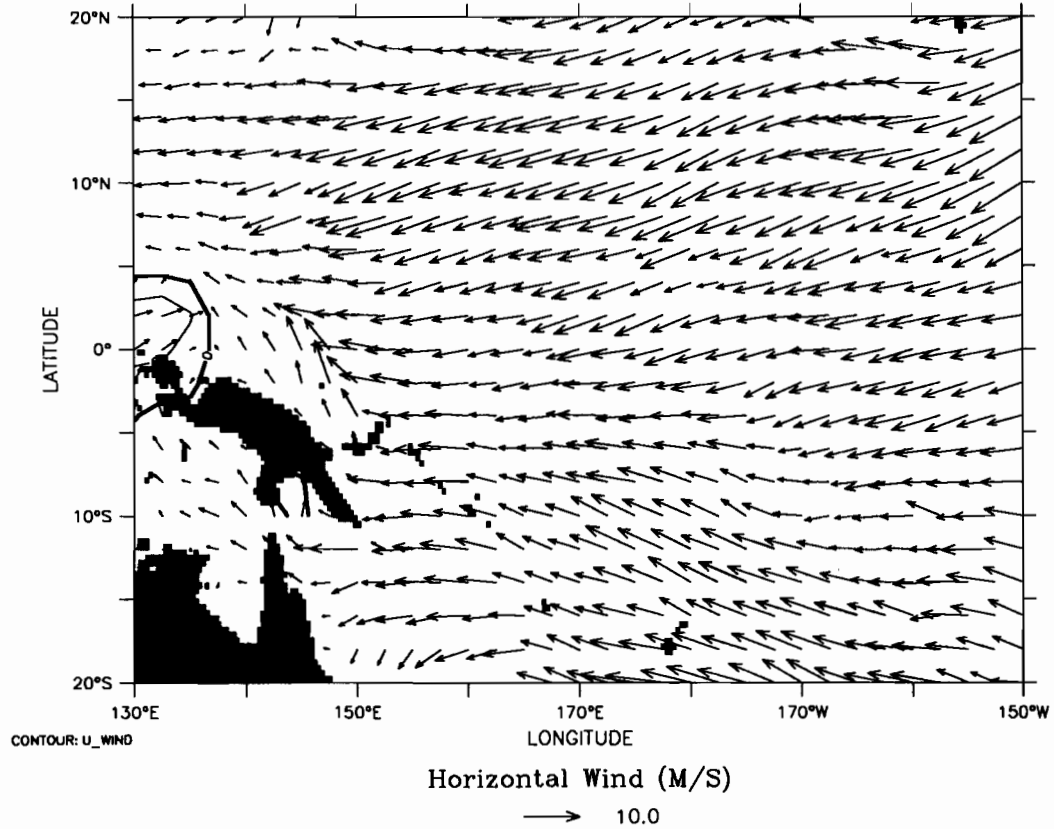
TIME : 16-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



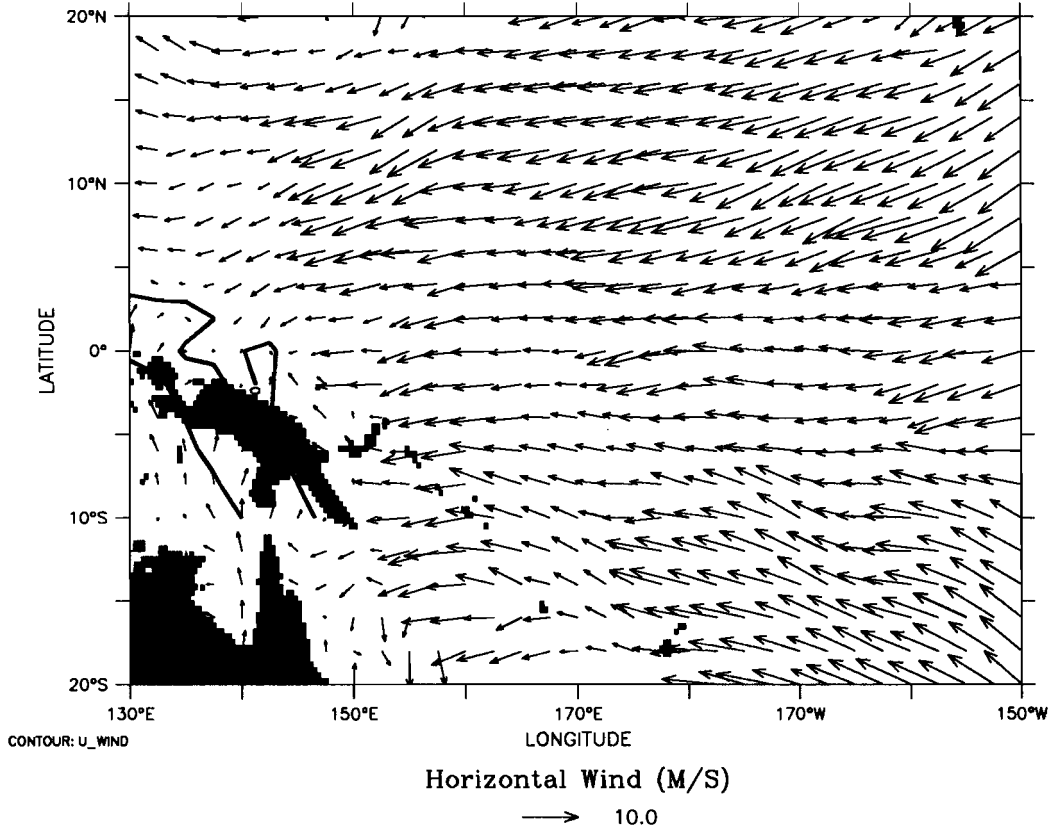
TIME : 18-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



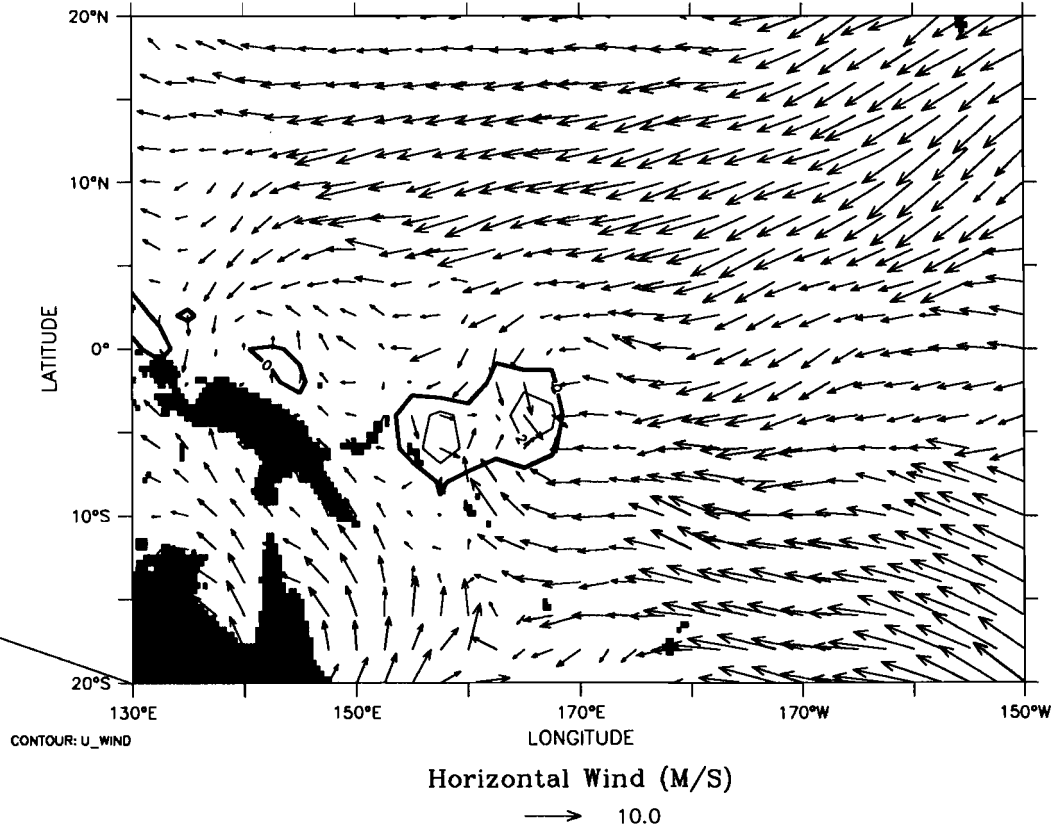
TIME : 19-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



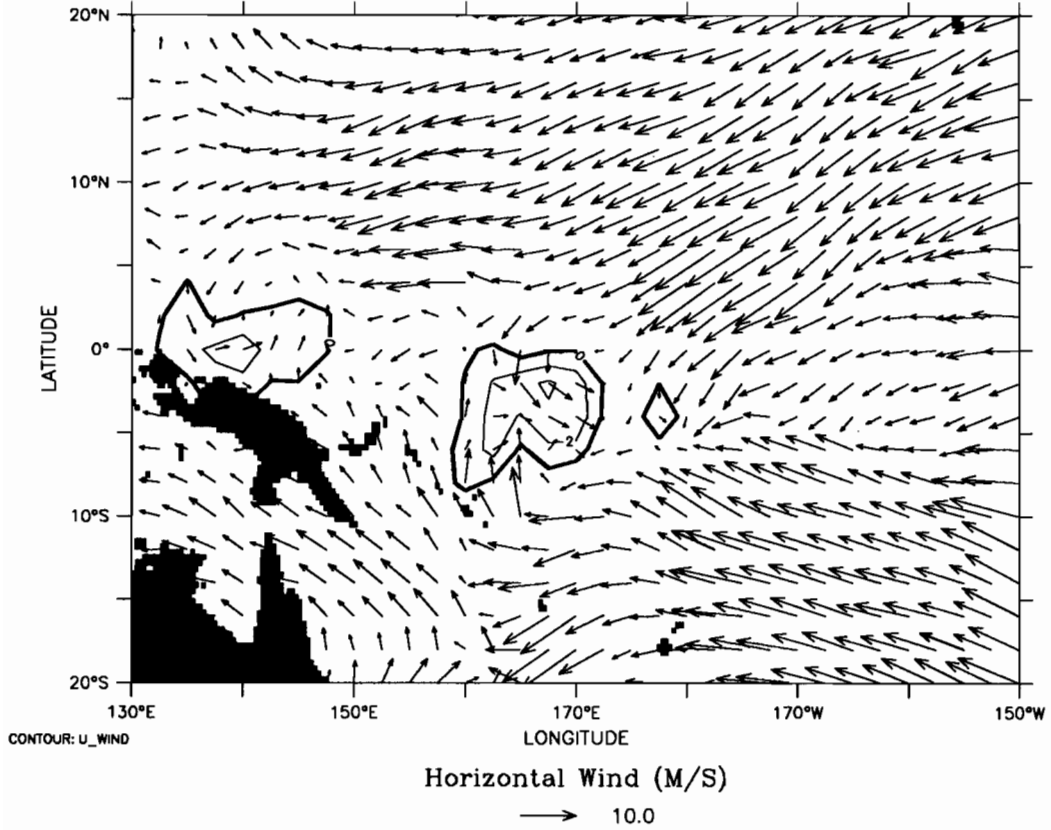
TIME : 20-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



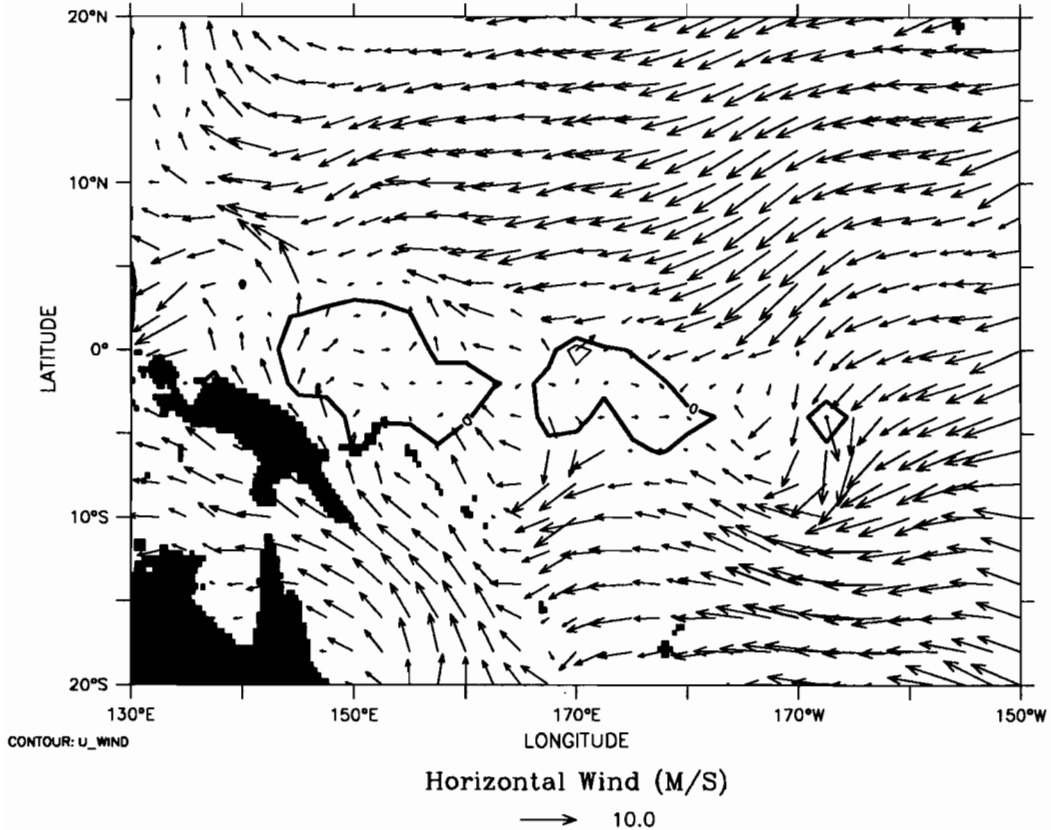
TIME : 21-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



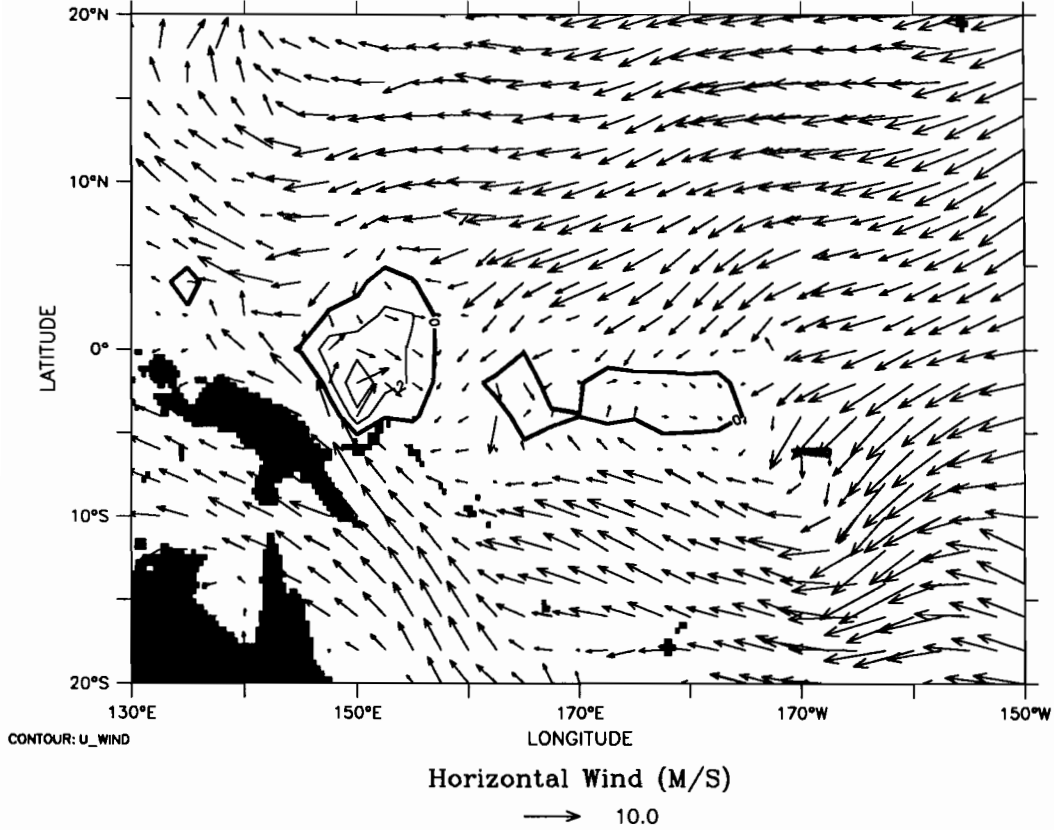
TIME : 22-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



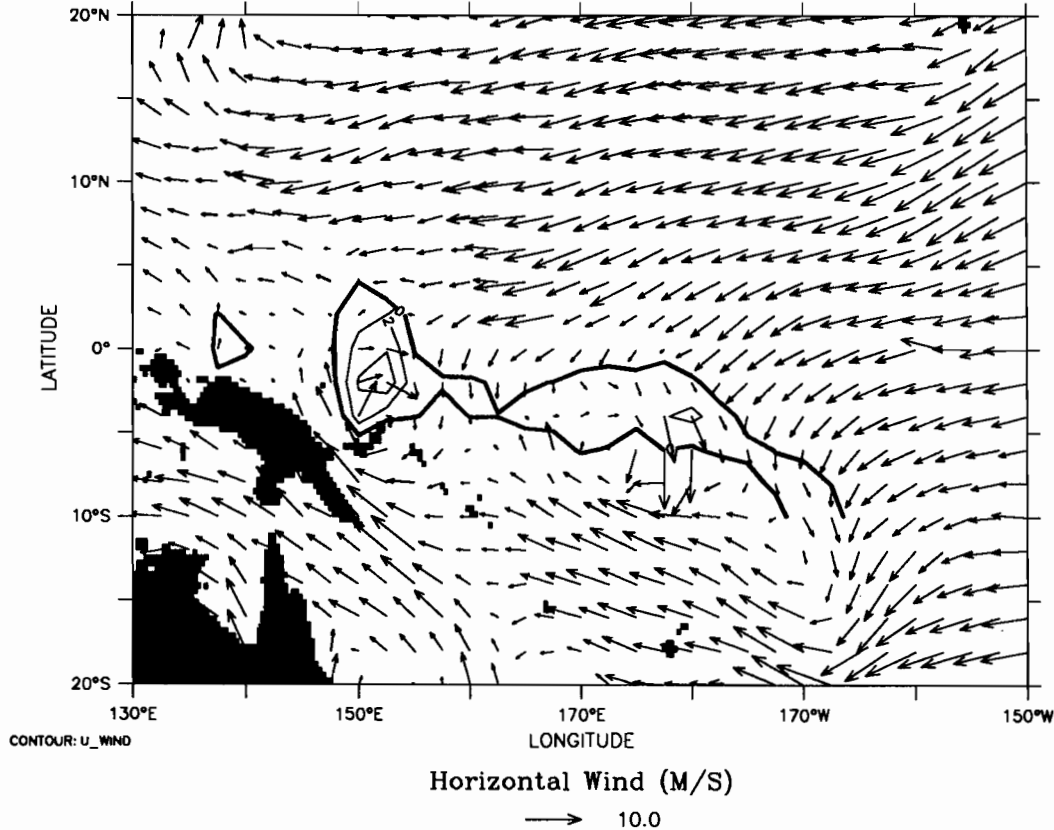
TIME : 23-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



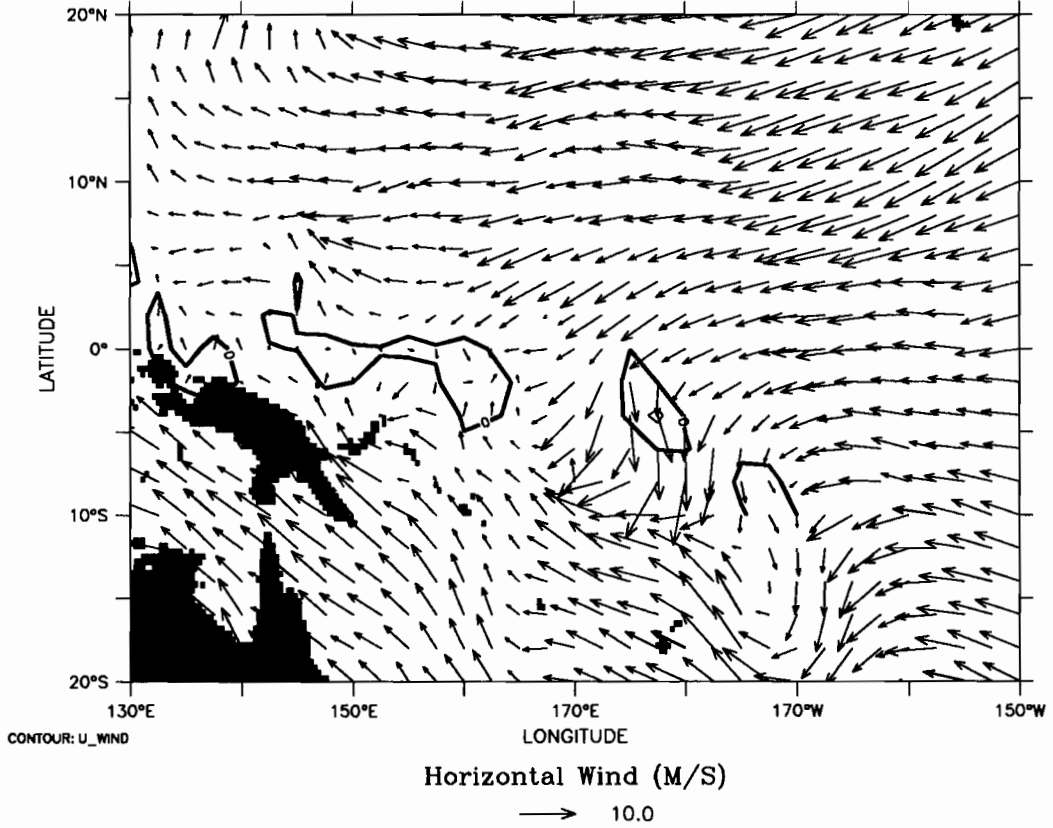
TIME : 24-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



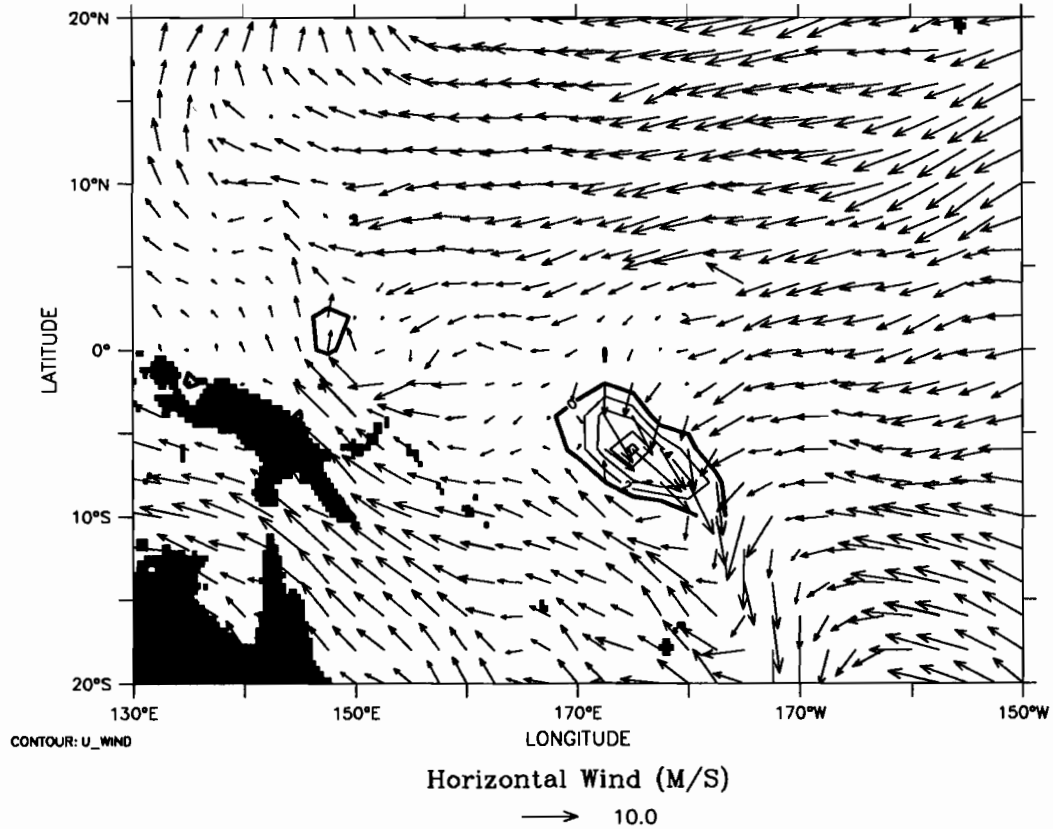
TIME : 25-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



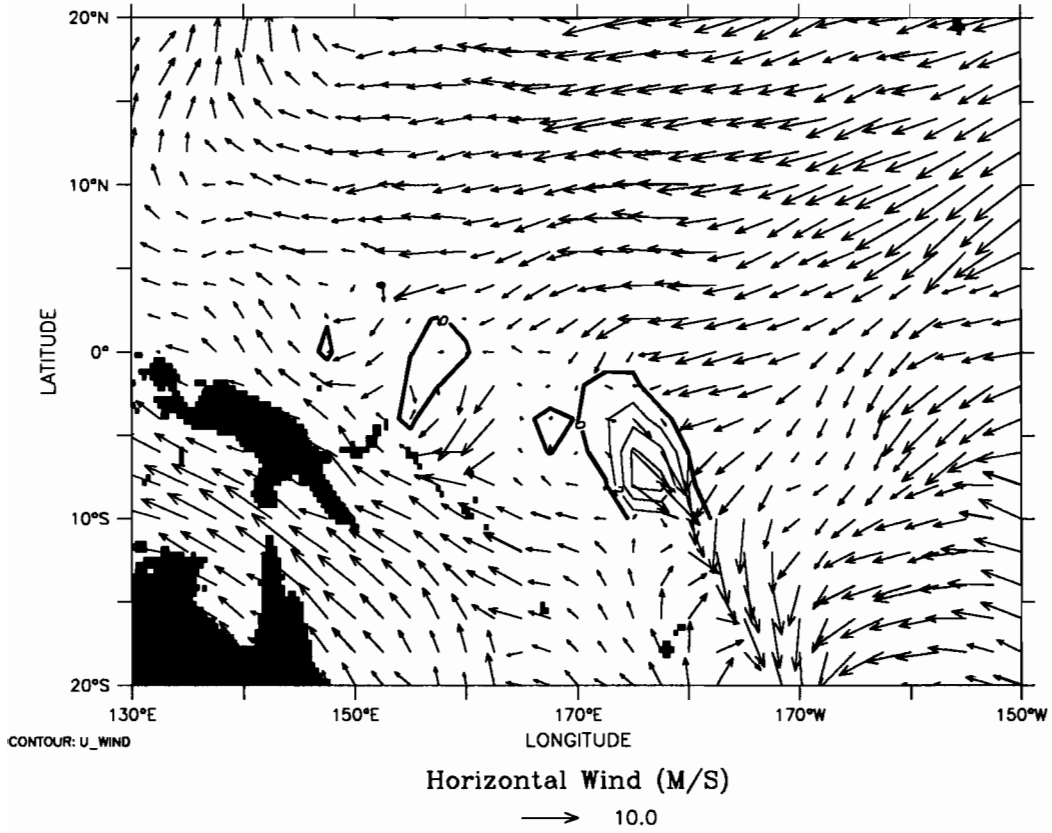
TIME : 26-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



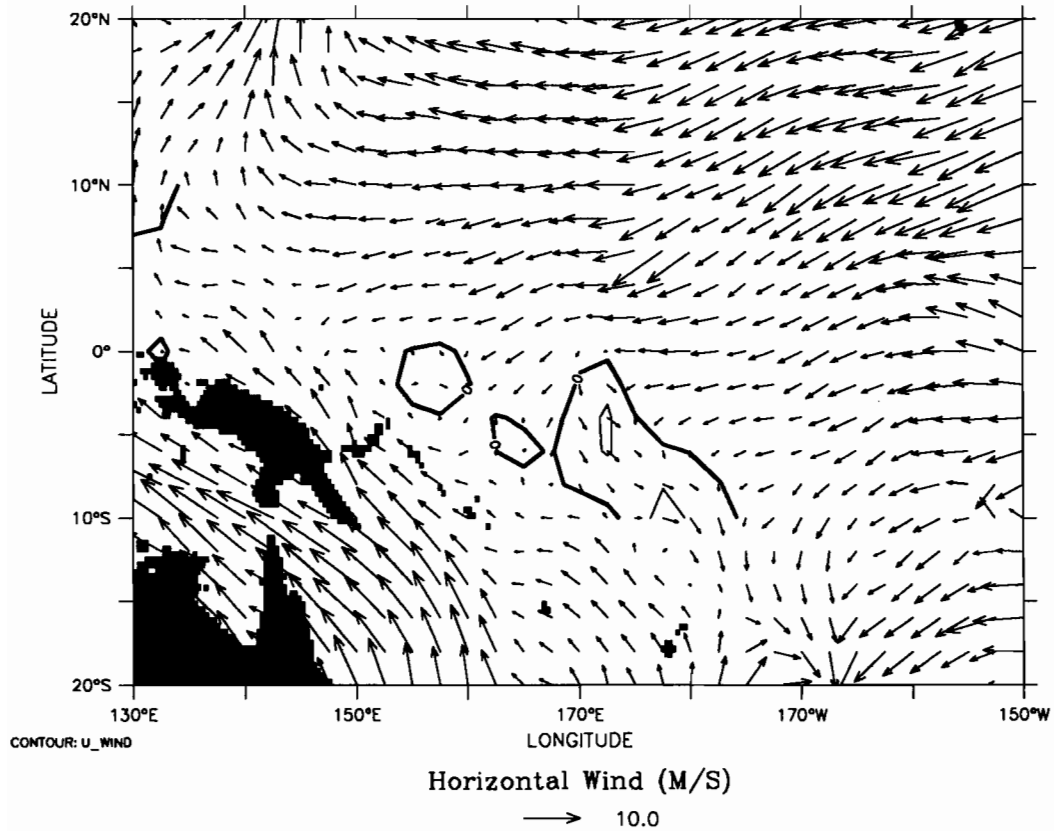
TIME : 27-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 28-MAY-1988 18:00

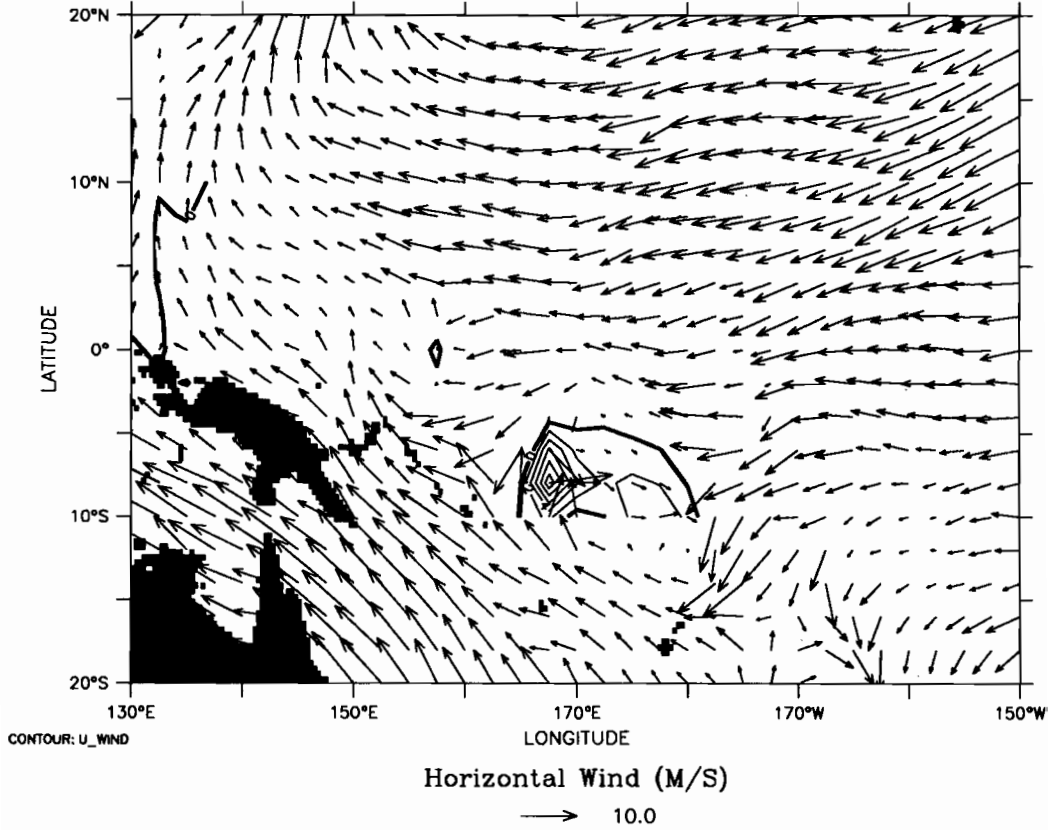
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





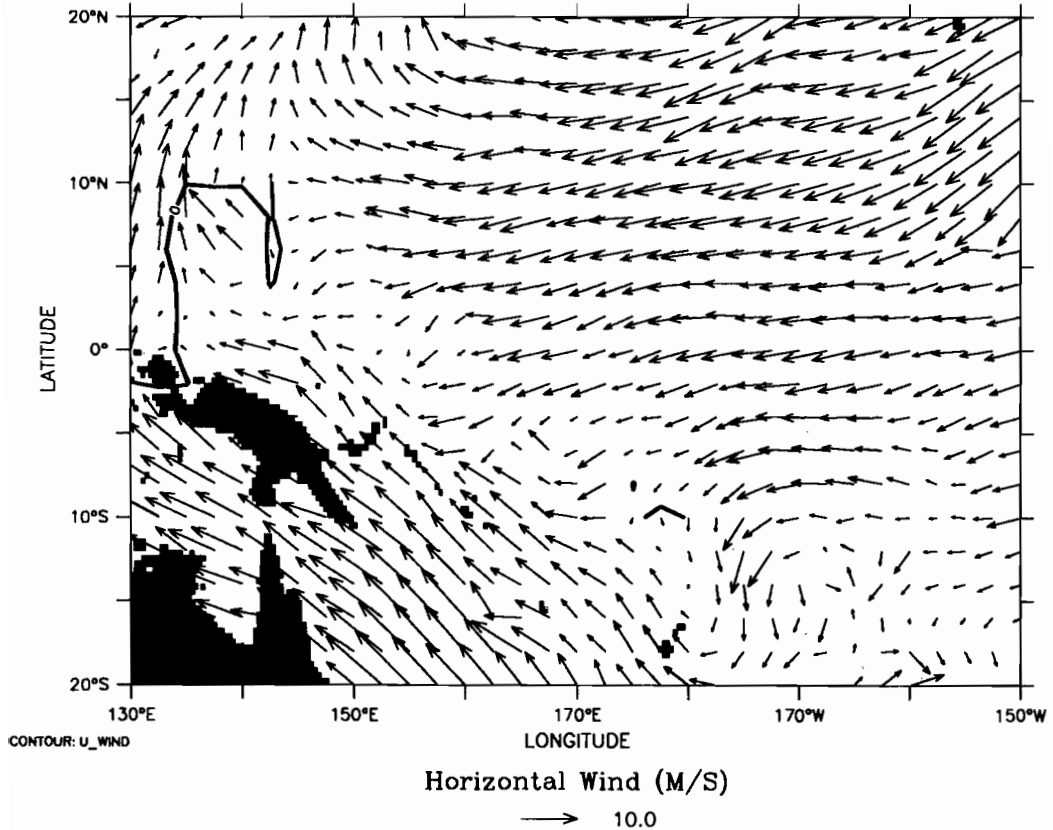
TIME : 29-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



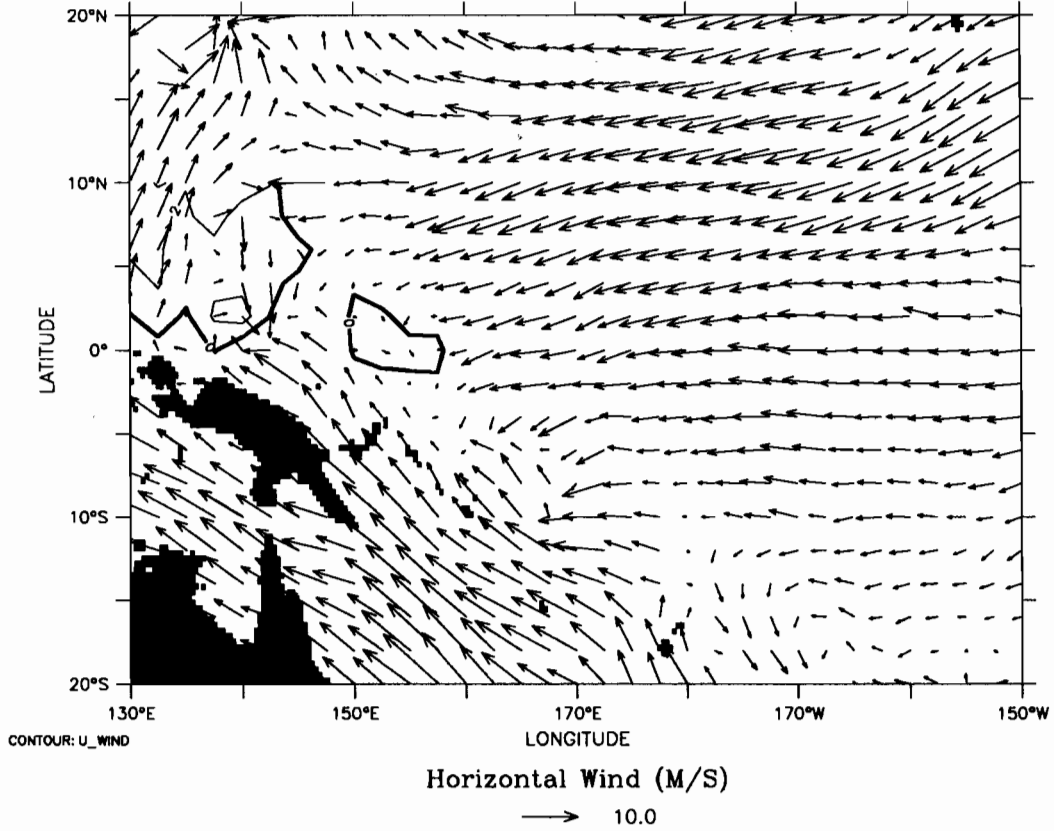
TIME : 30-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



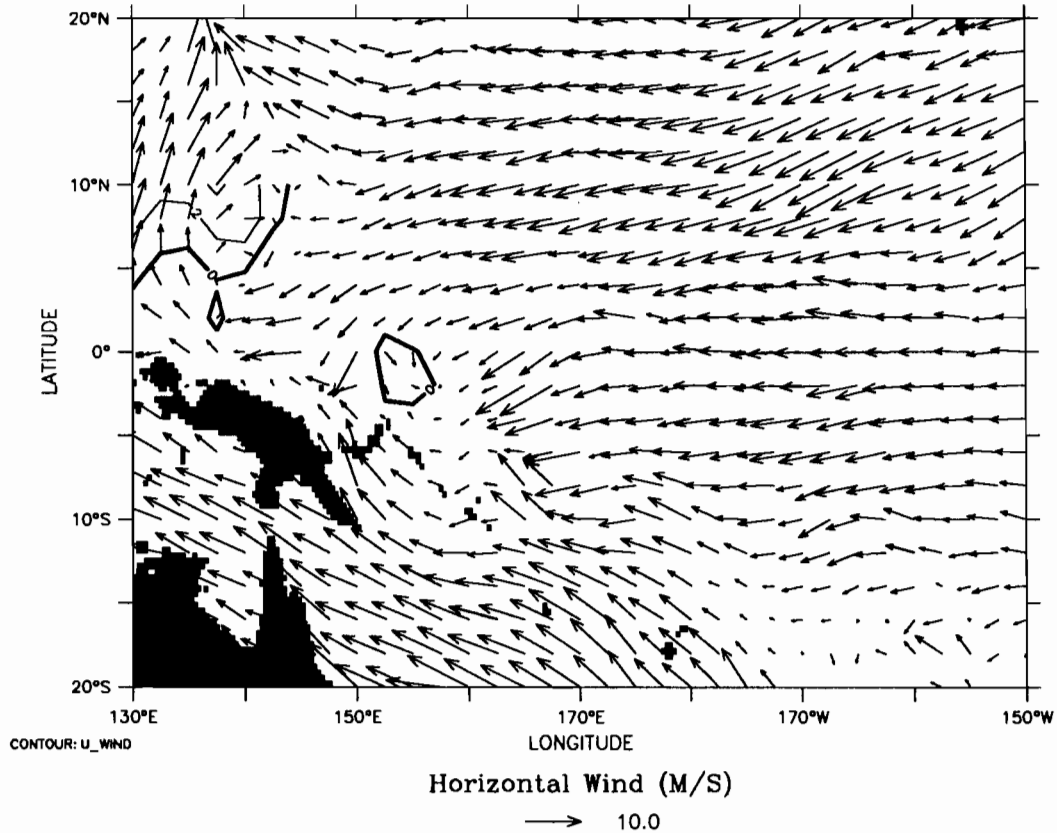
TIME : 31-MAY-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



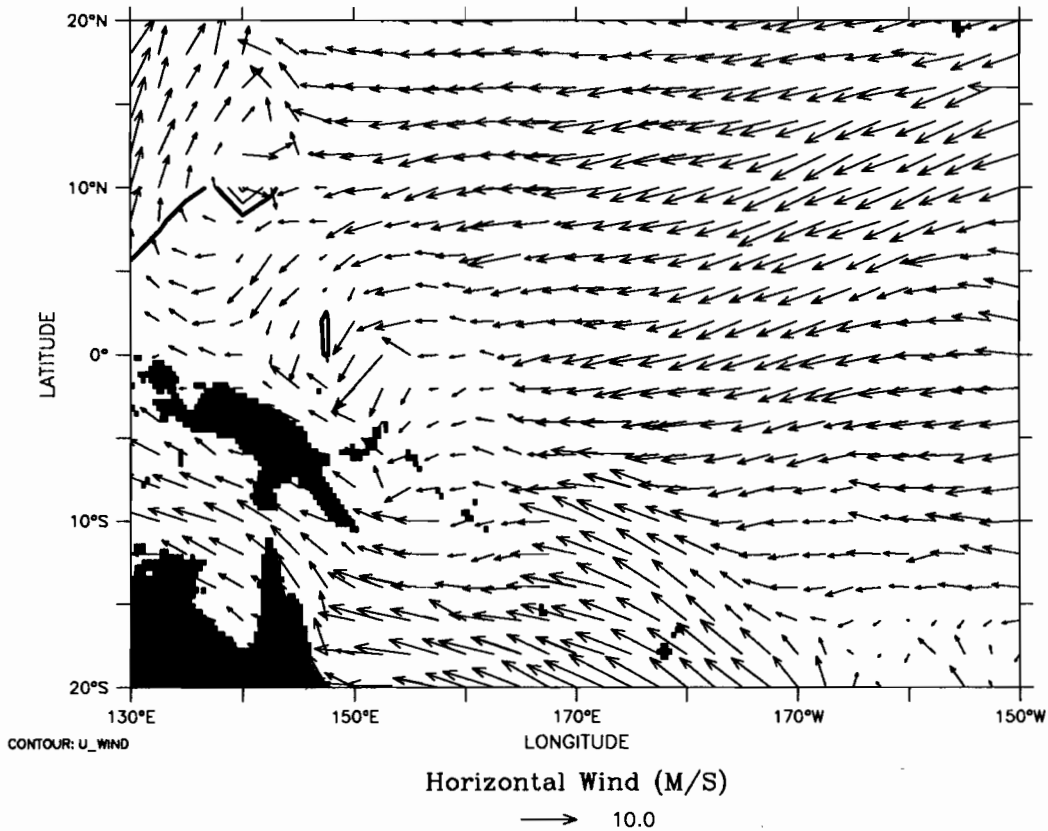
TIME : 01-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



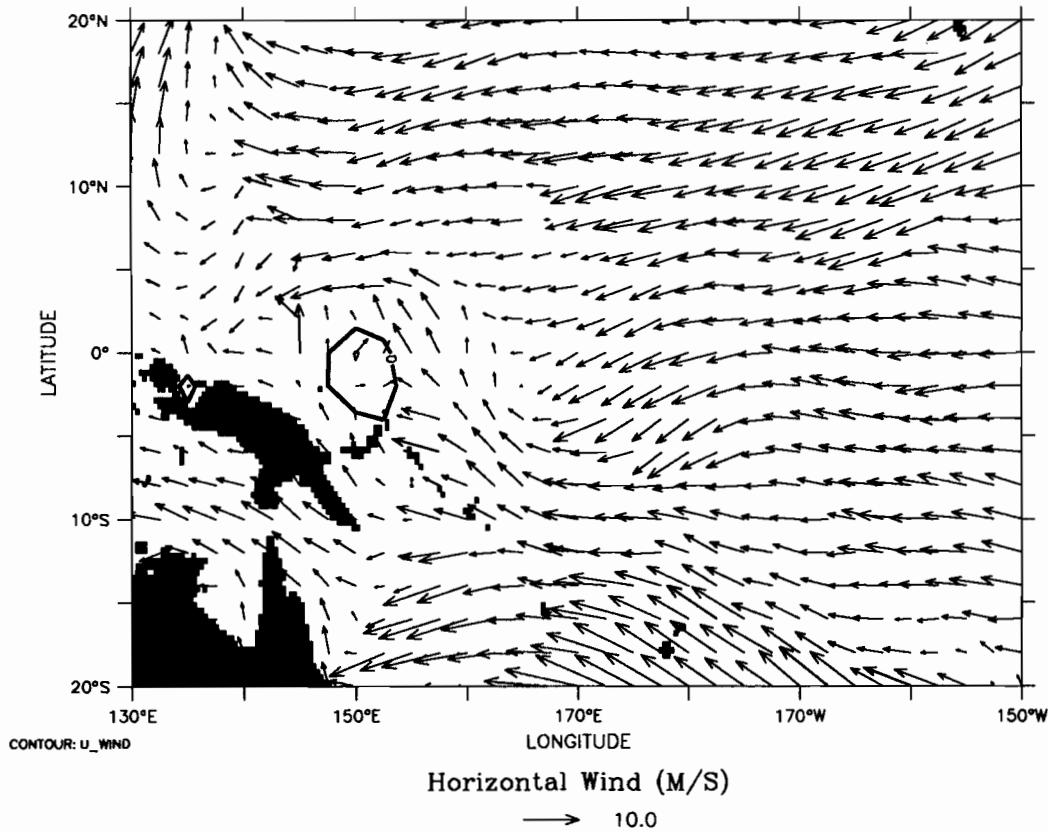
TIME : 02-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



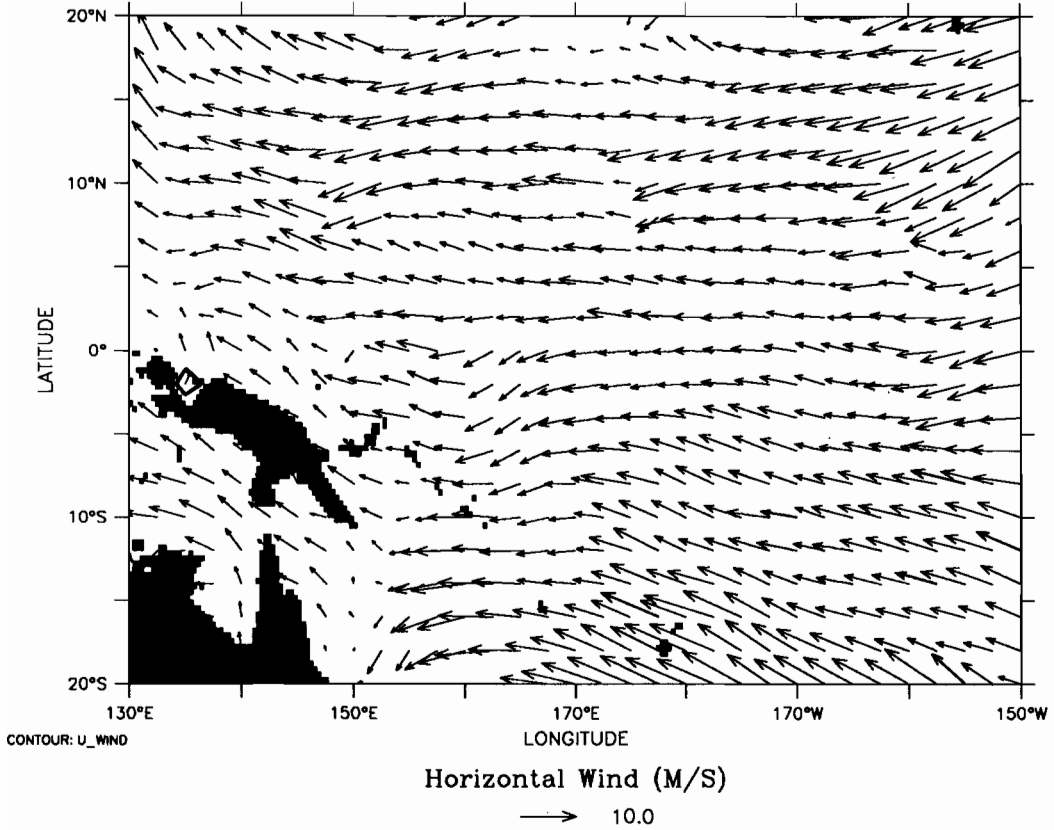
TIME : 03-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



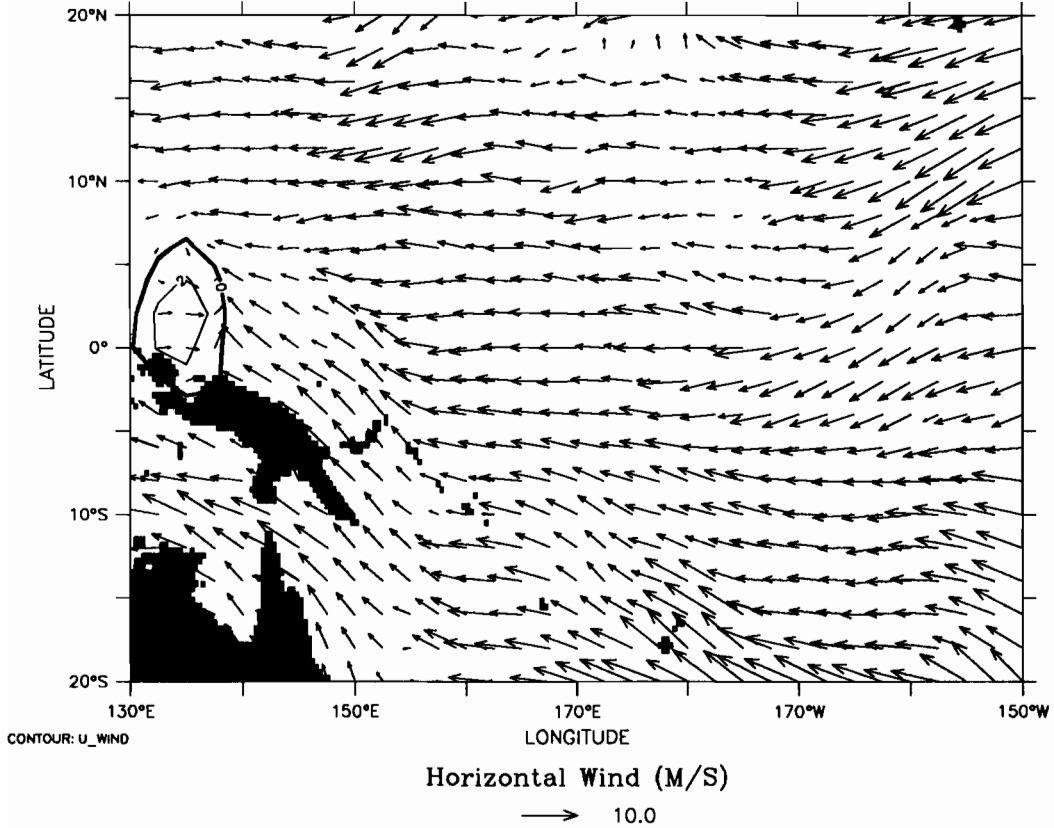
TIME : 04-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



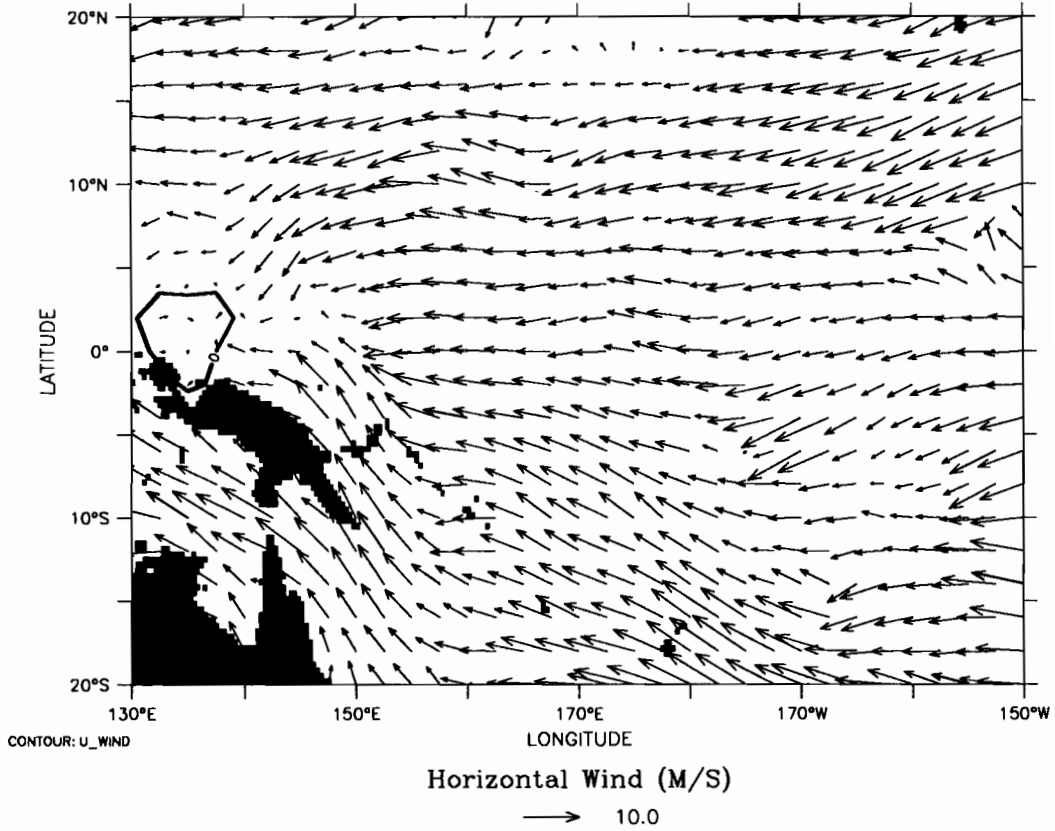
TIME : 05-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



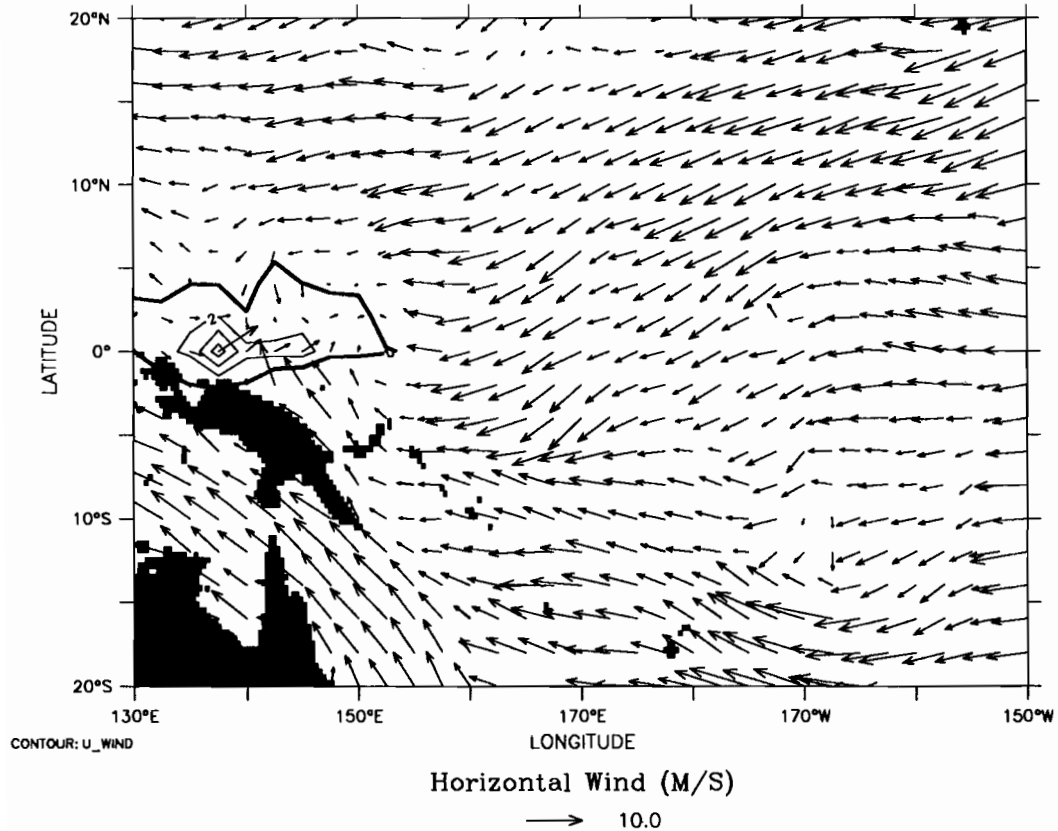
TIME : 06-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSML/Atlas gridded winds



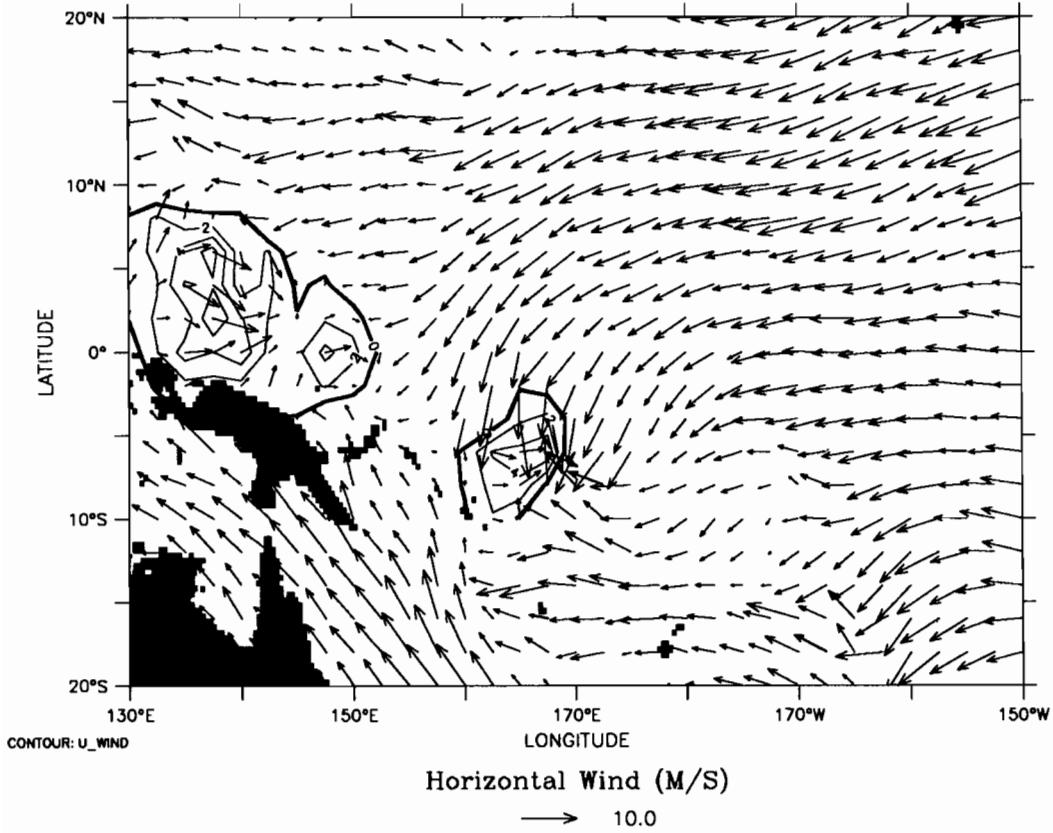
TIME : 07-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSML/Atlas gridded winds



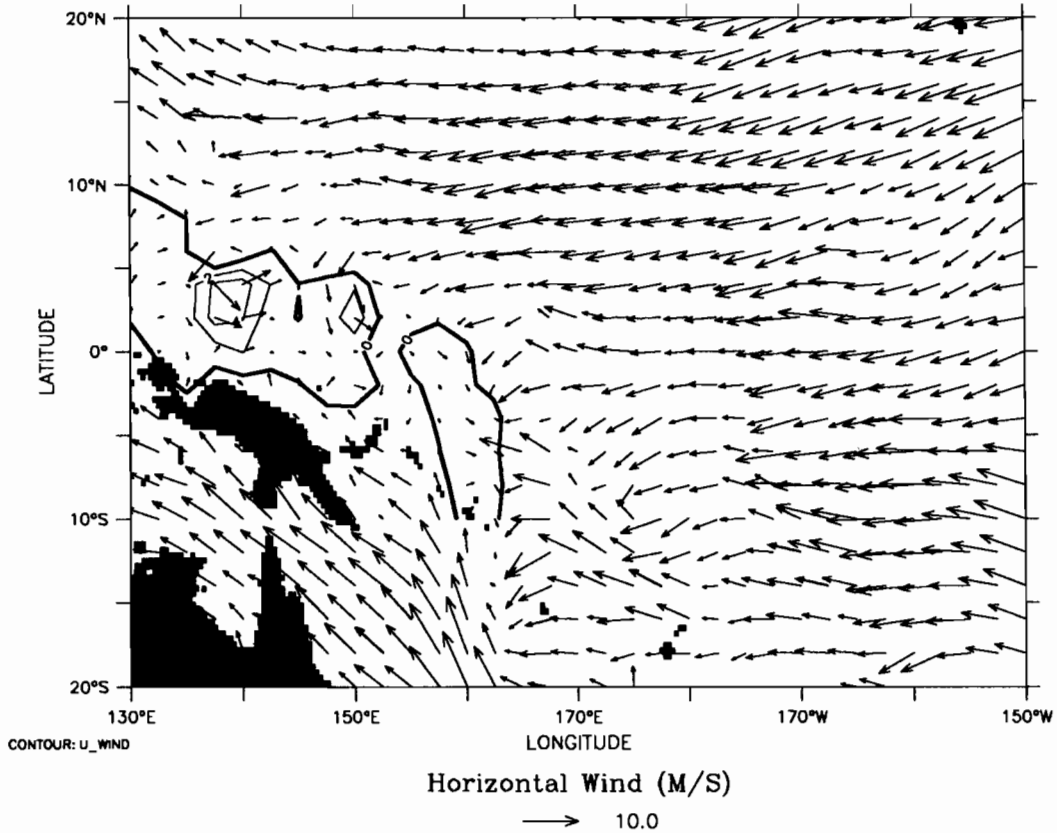
TIME : 08-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



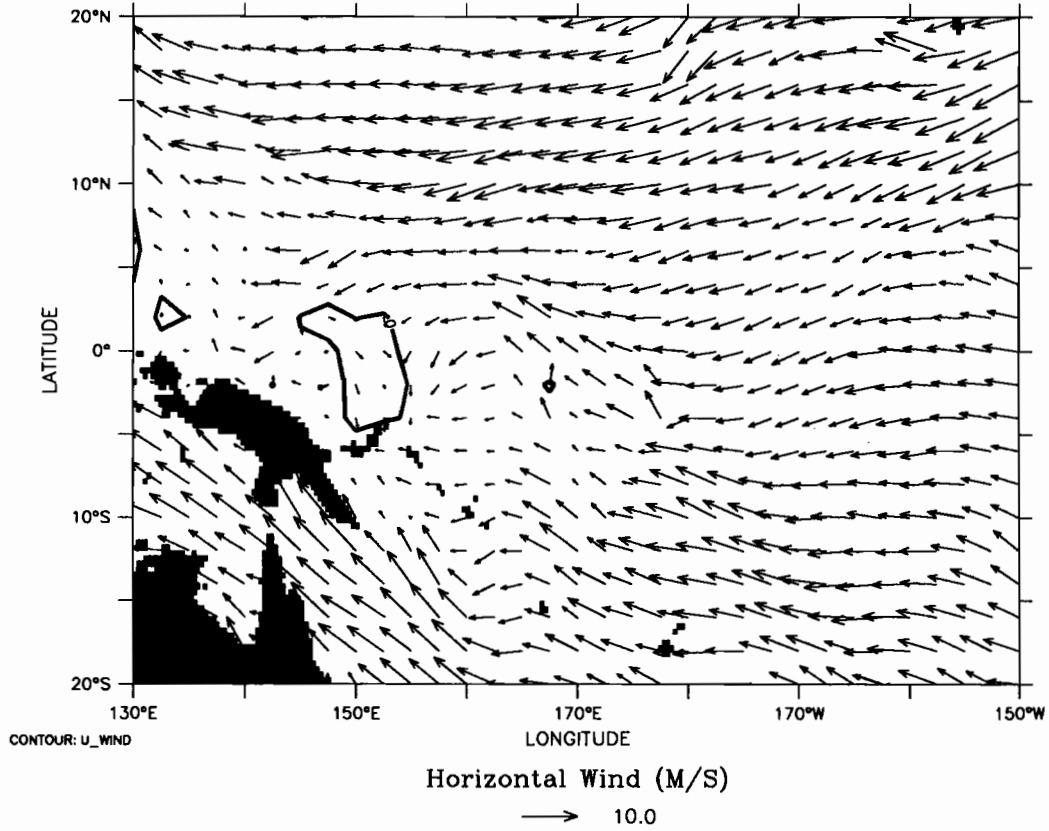
TIME : 09-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



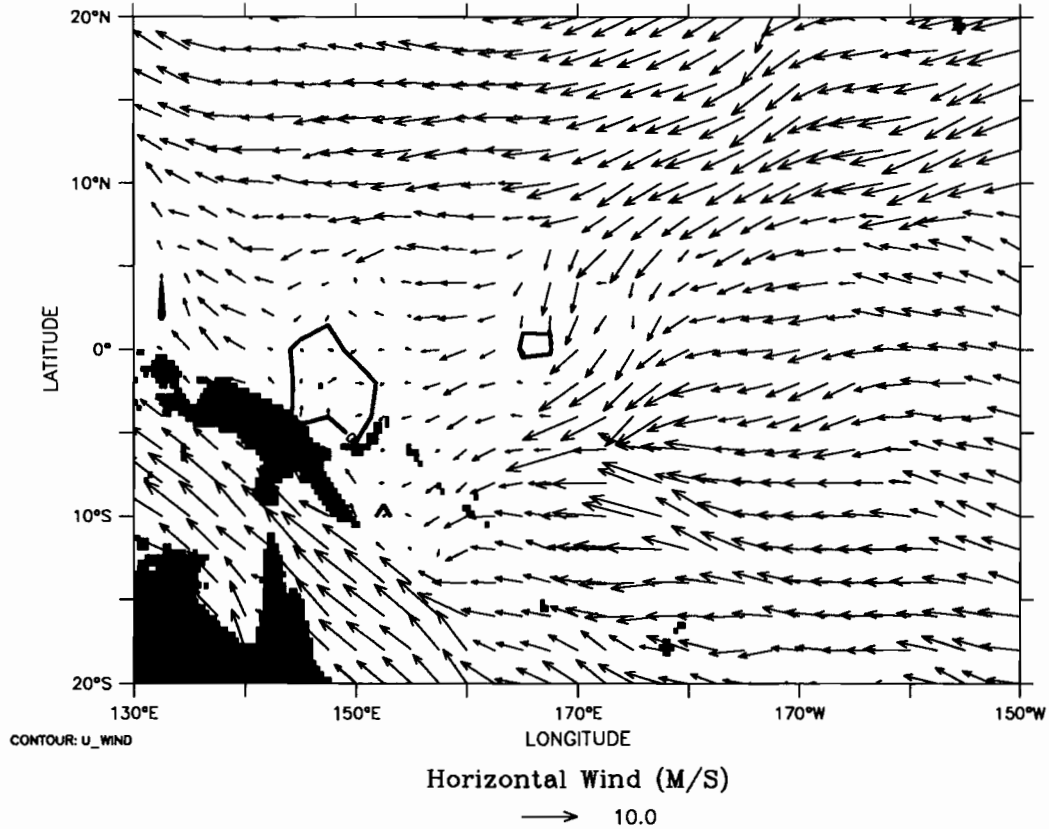
TIME : 10-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



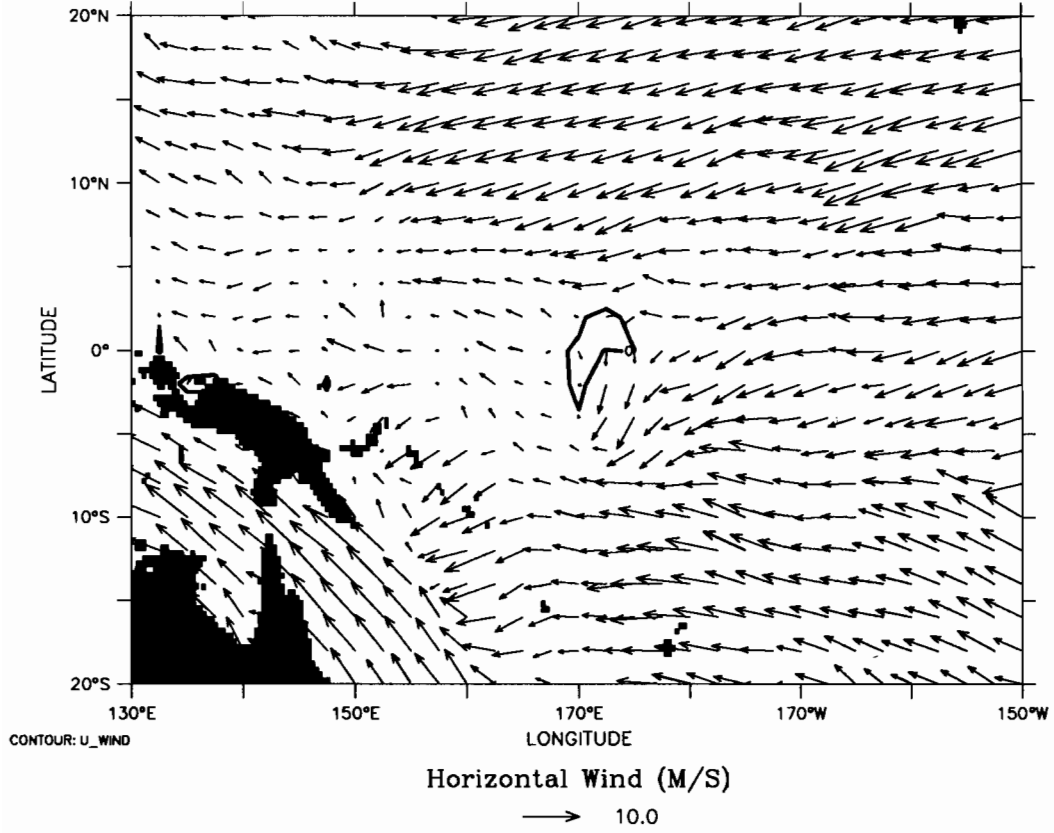
TIME : 11-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



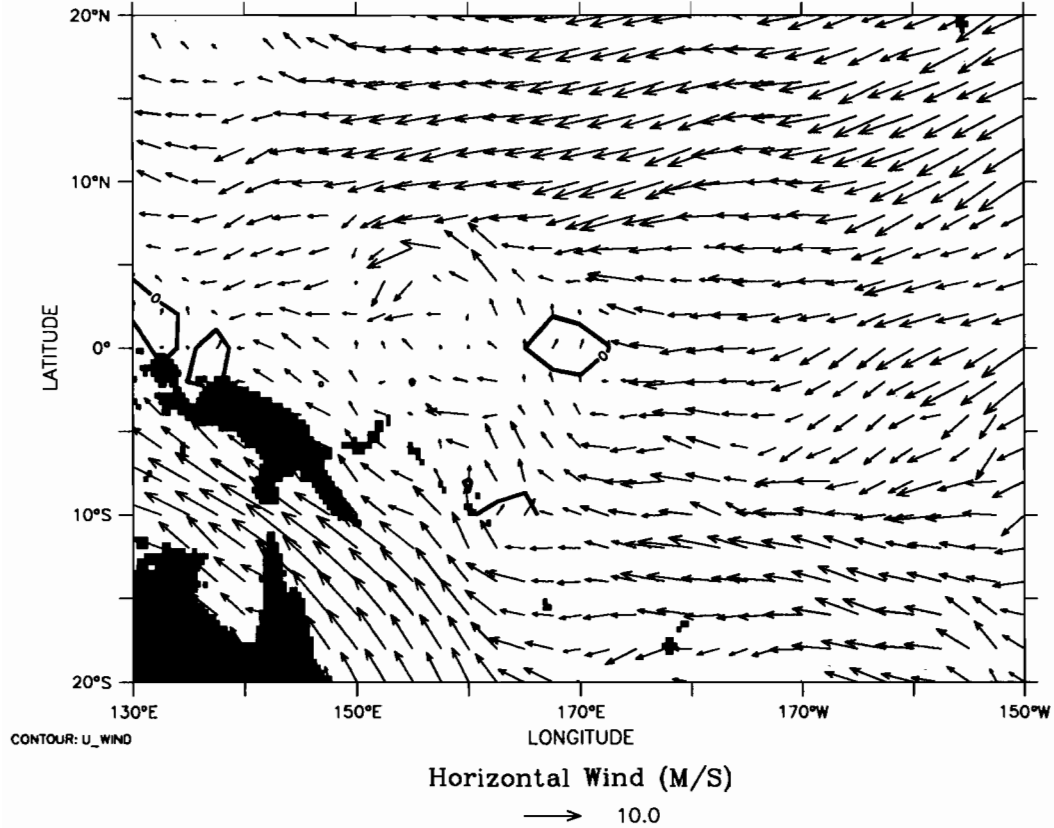
TIME : 12-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 13-JUN-1988 18:00

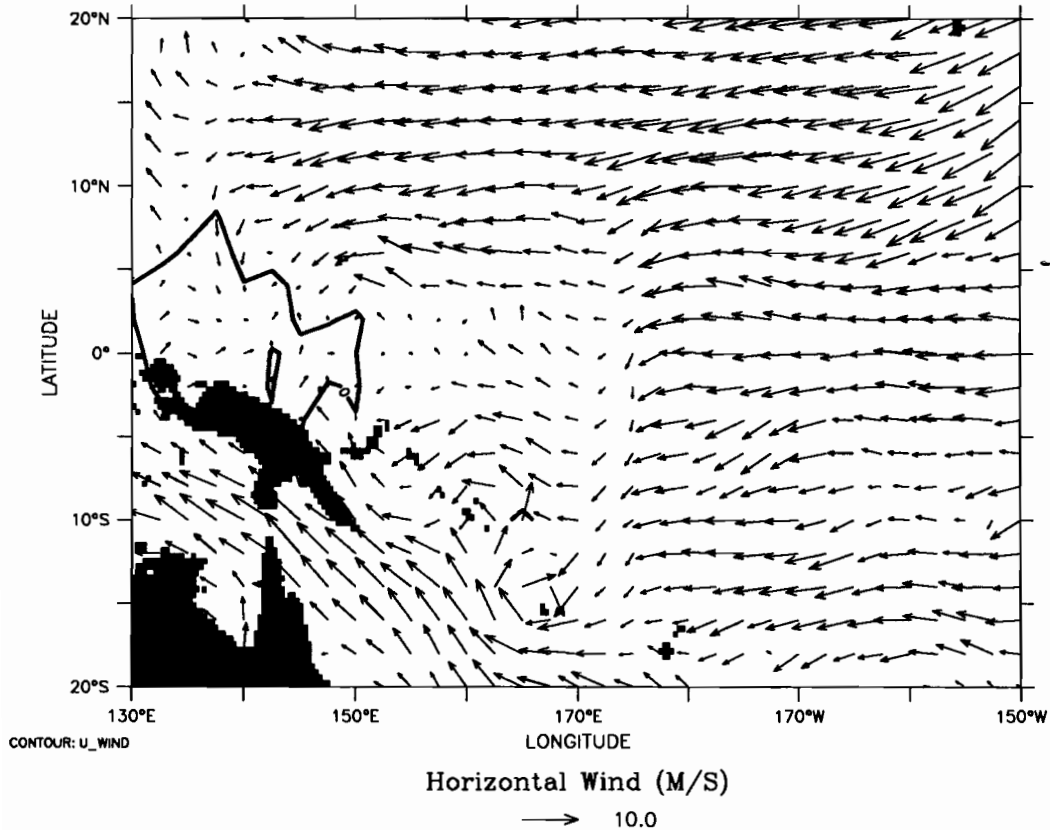
6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





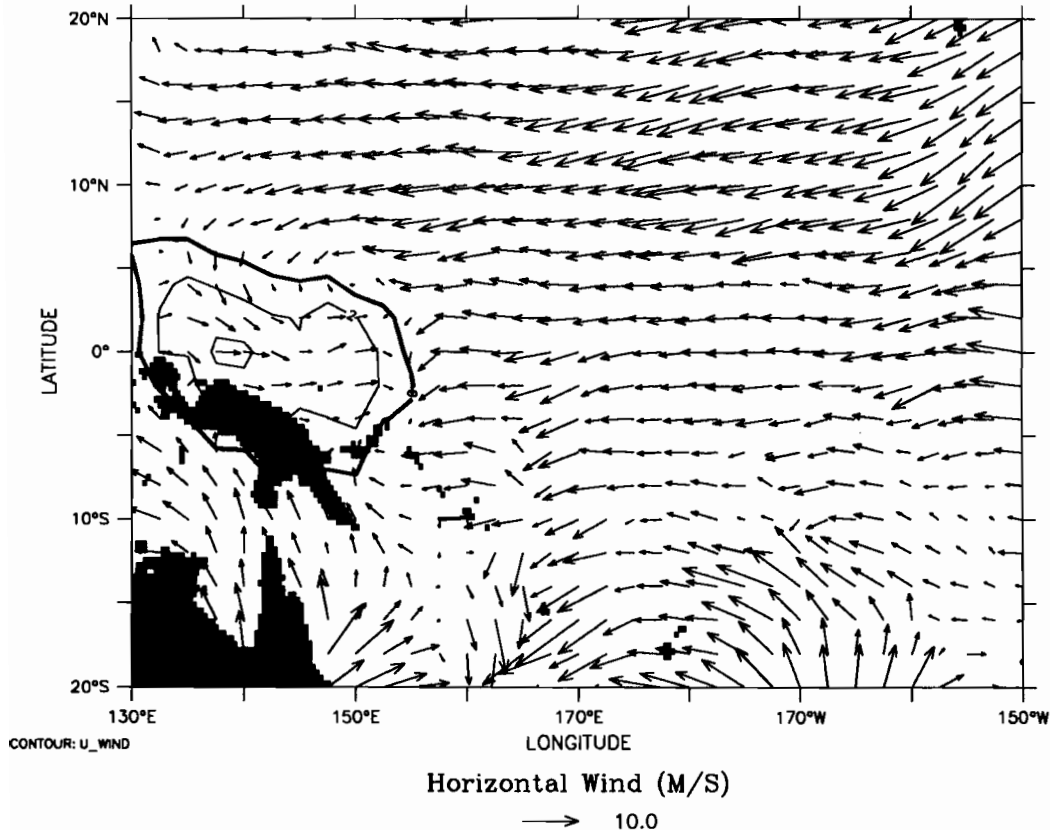
TIME : 14-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



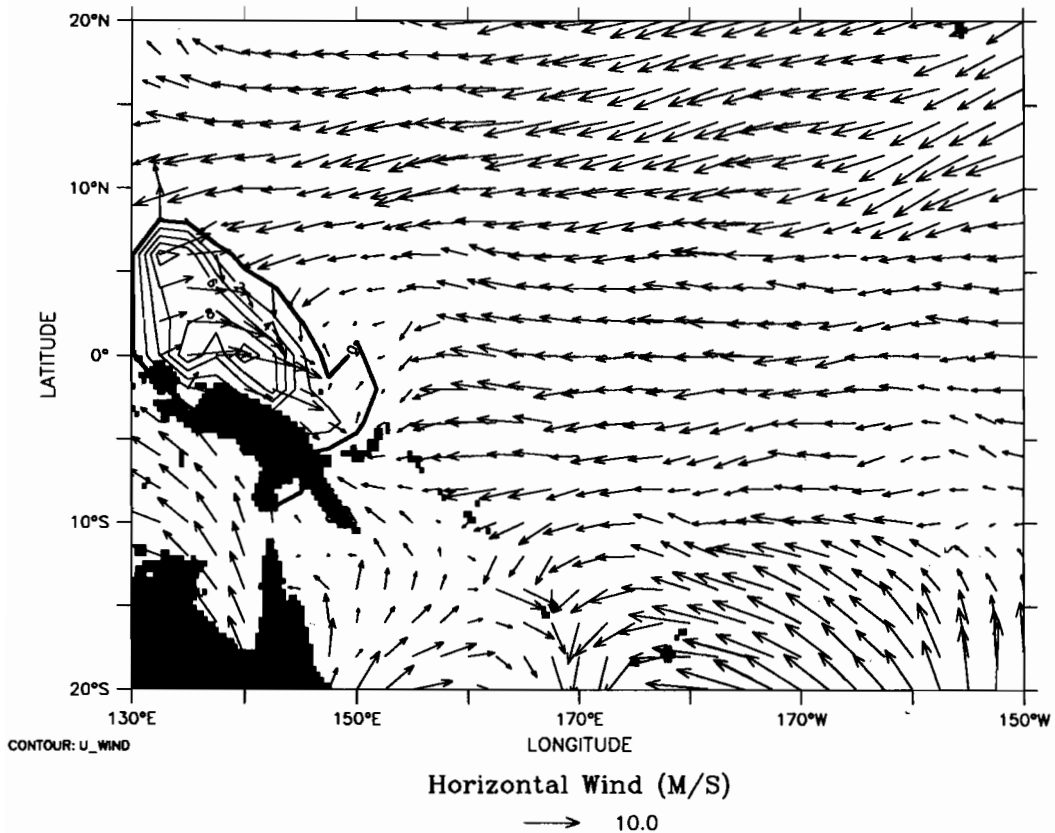
TIME : 15-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



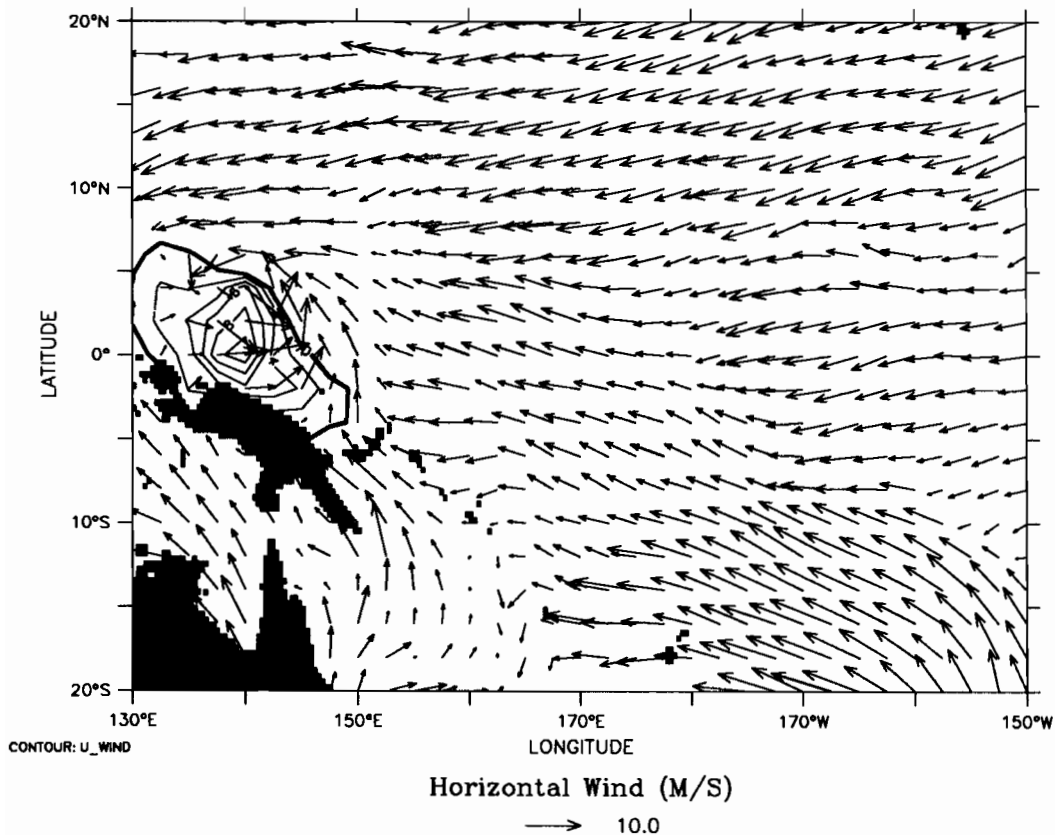
TIME : 16-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



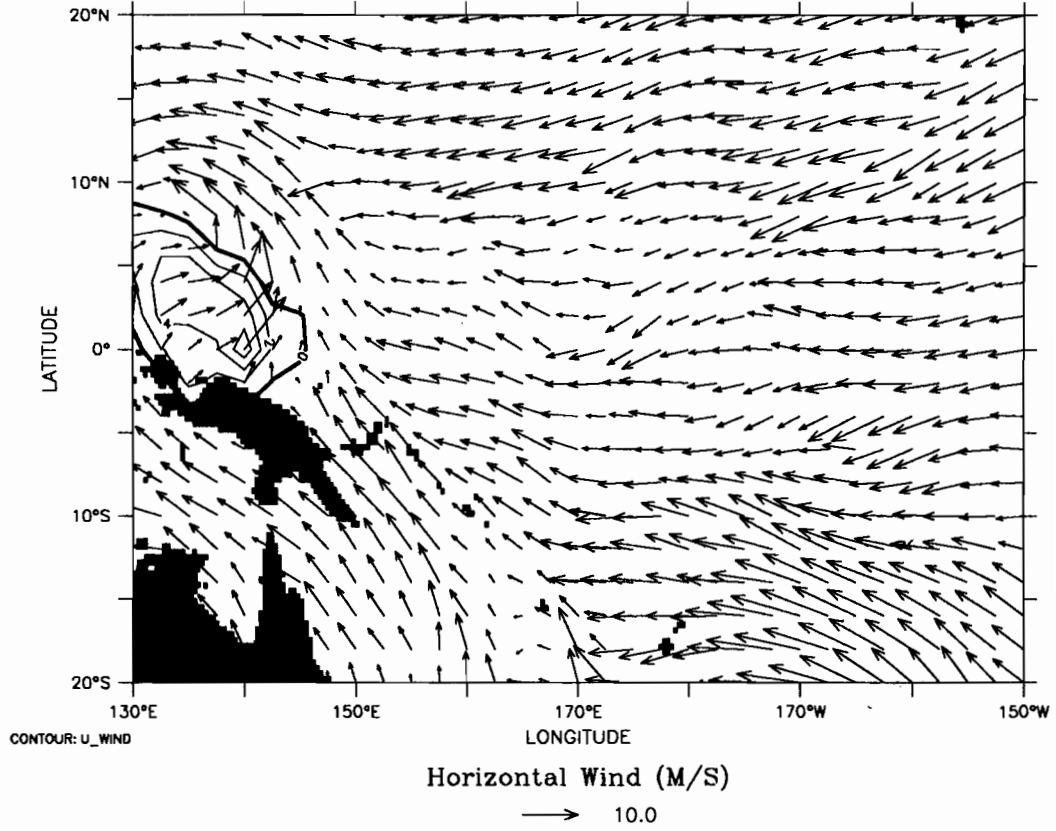
TIME : 17-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



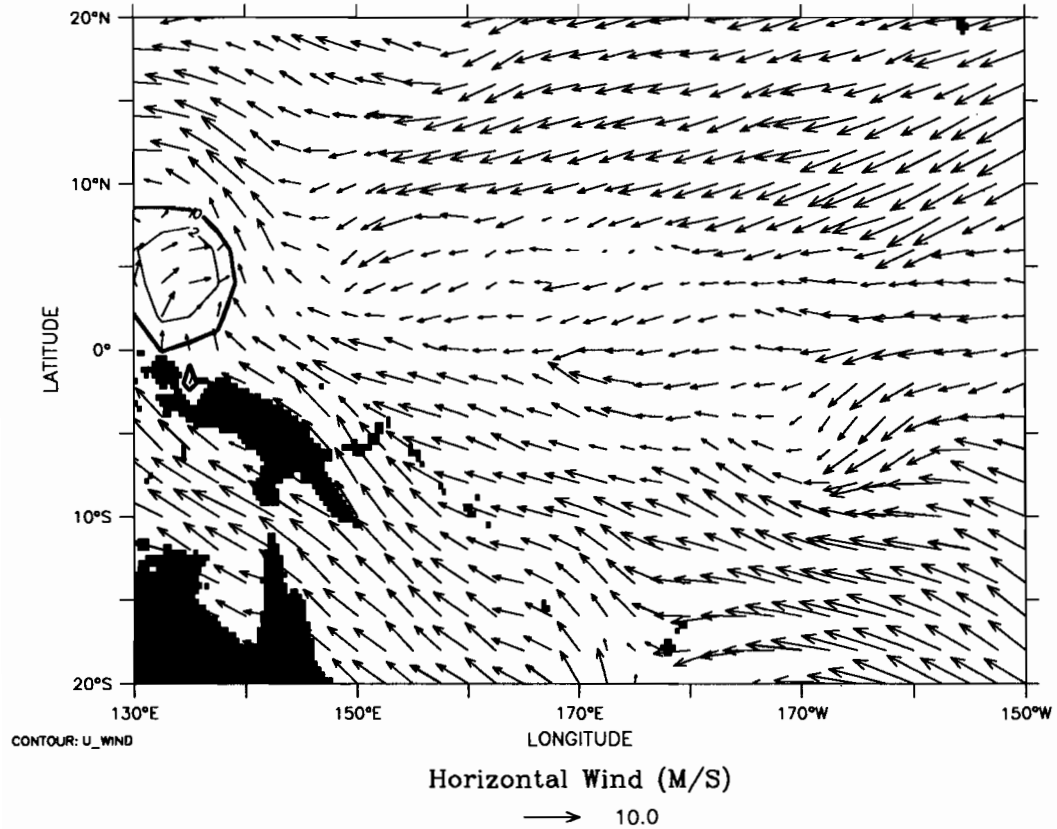
TIME : 18-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



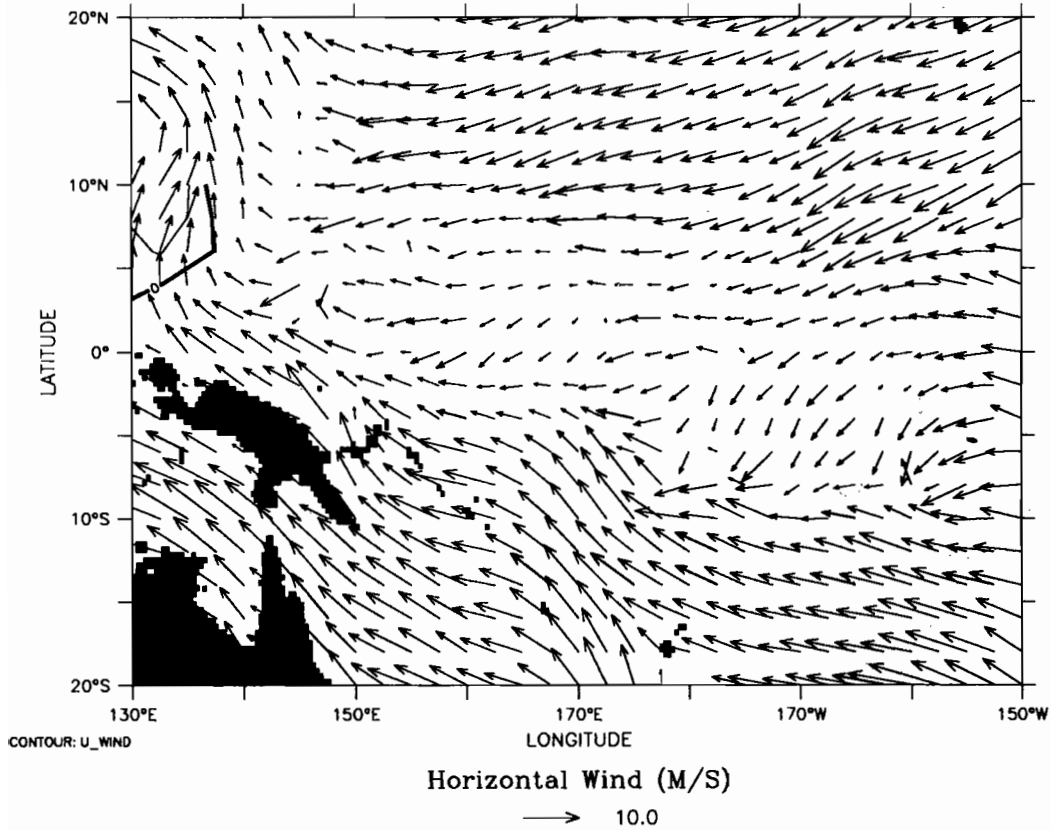
TIME : 19-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



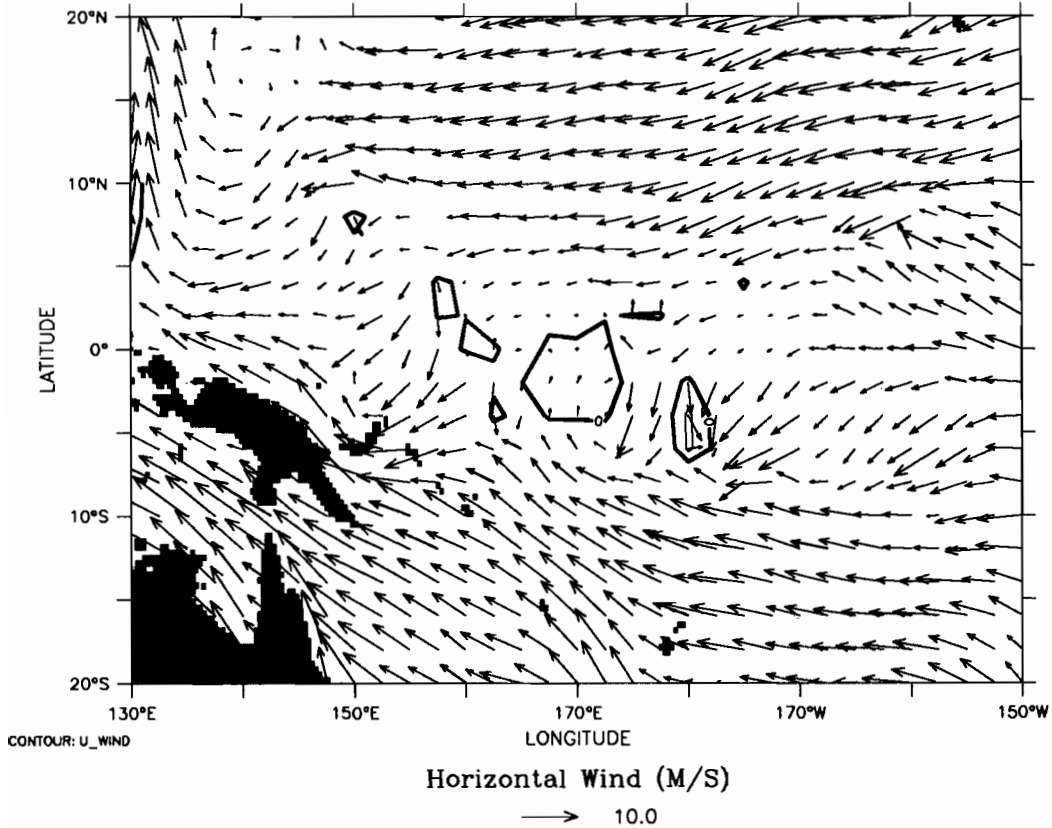
TIME : 20-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



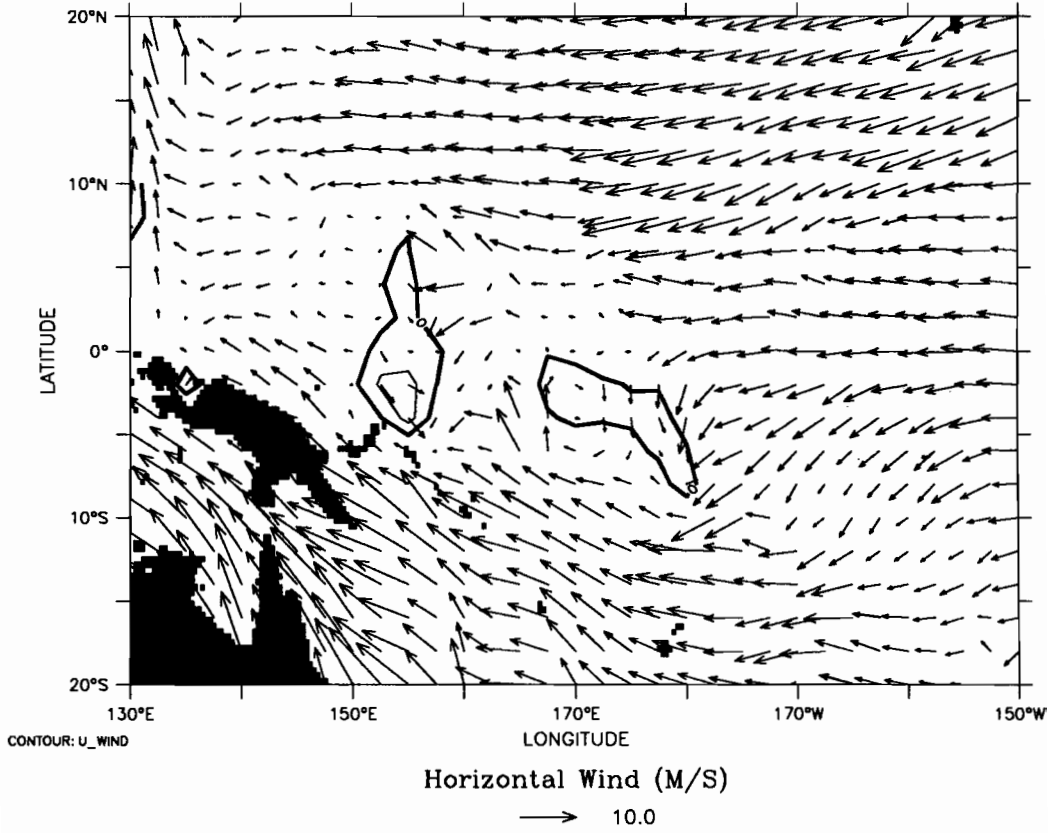
TIME : 21-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



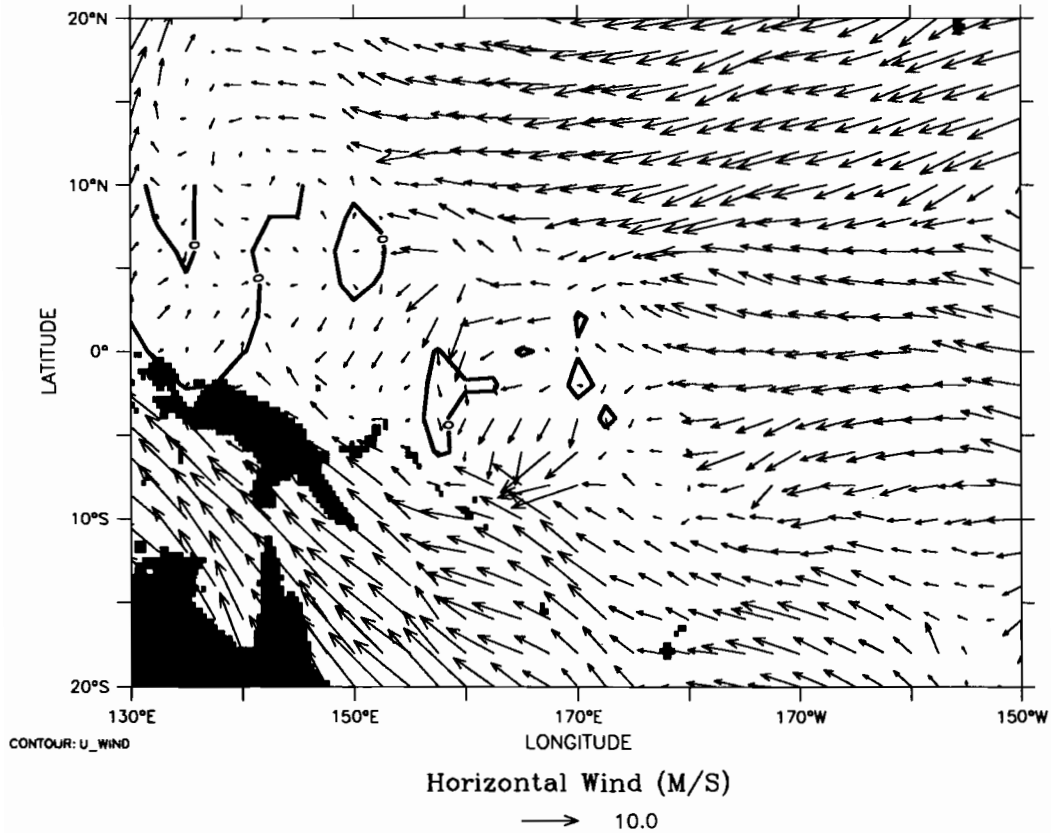
TIME : 22-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



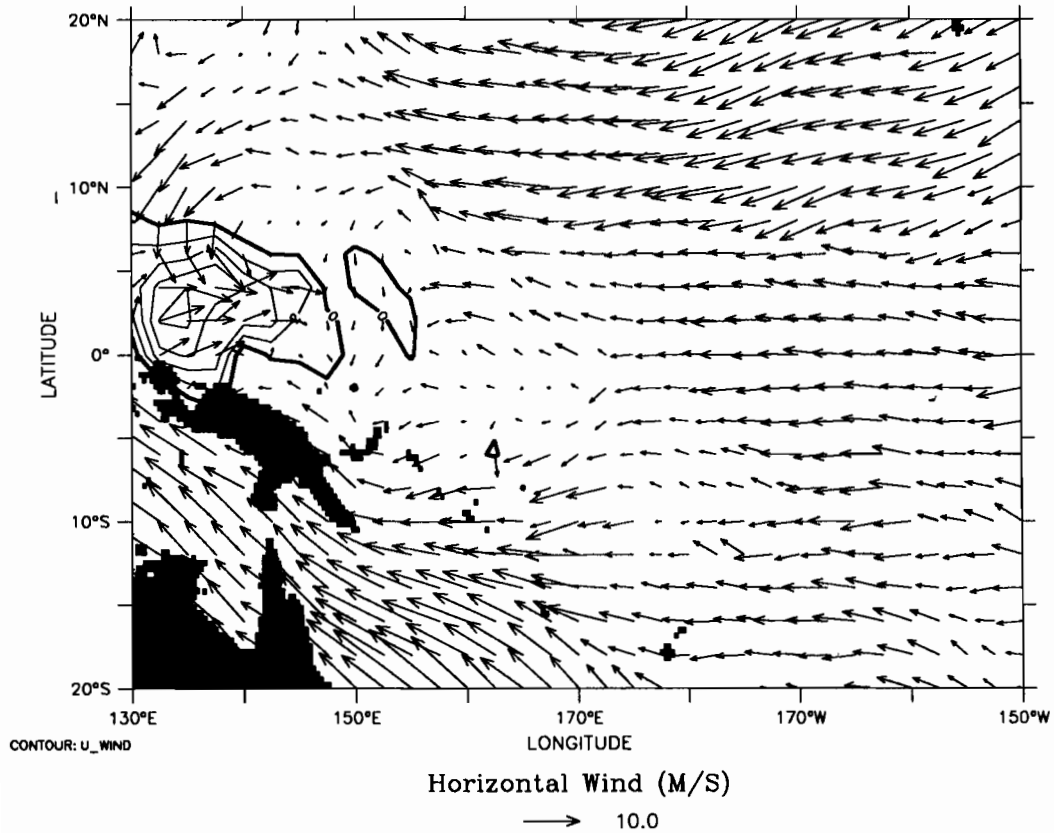
TIME : 23-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



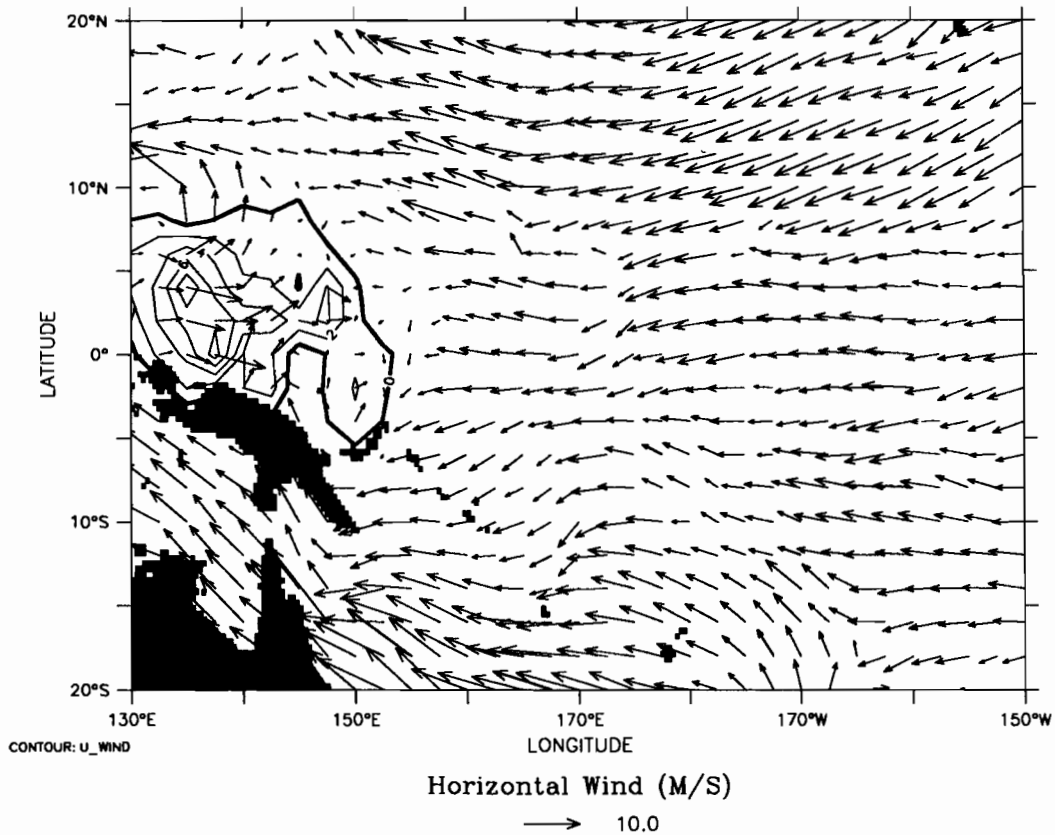
TIME : 24-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



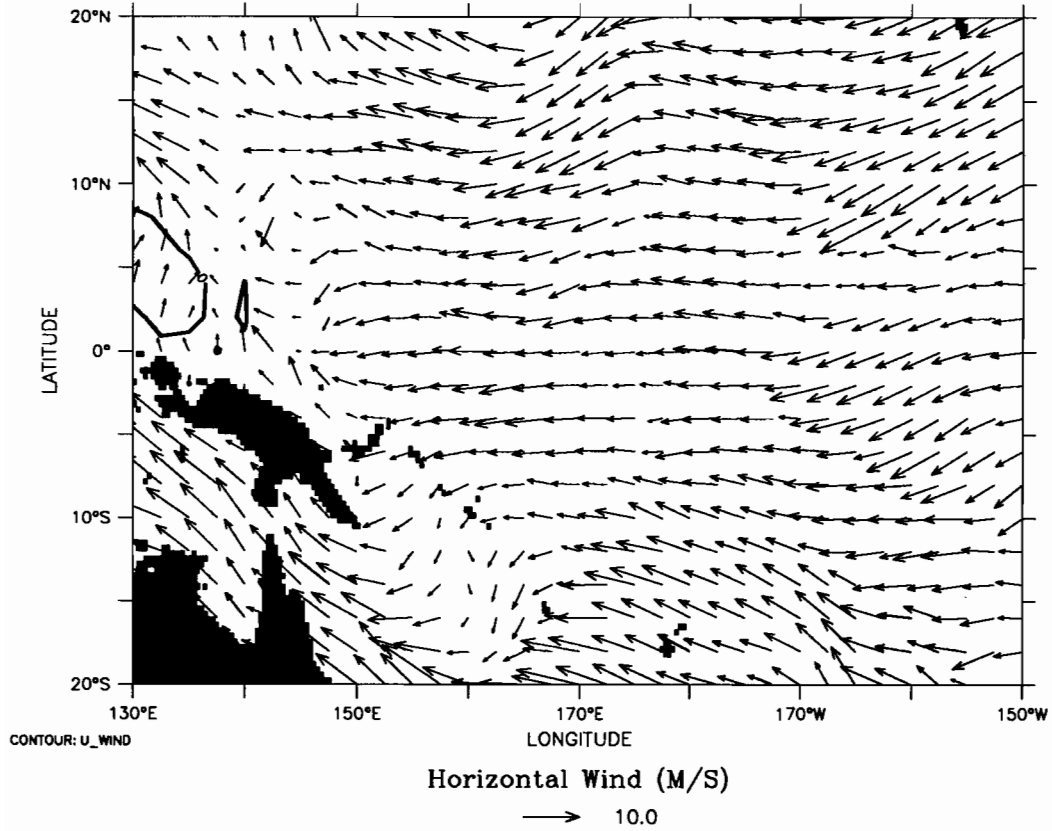
TIME : 25-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



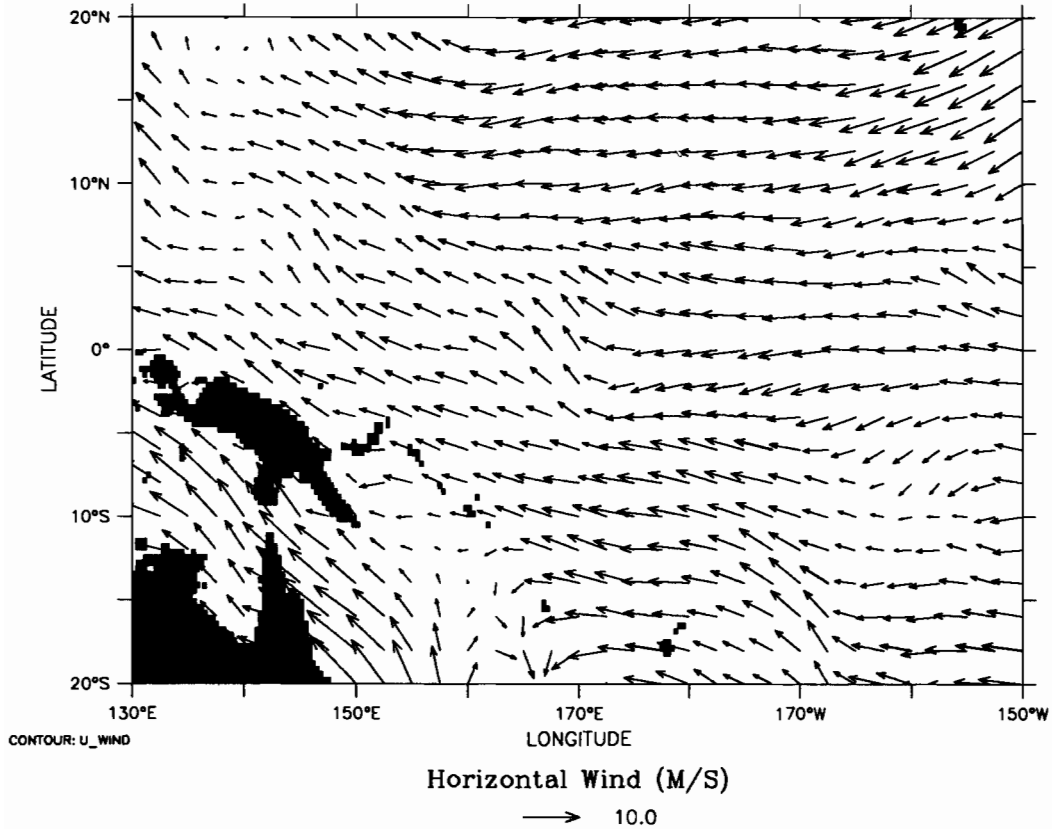
TIME : 26-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



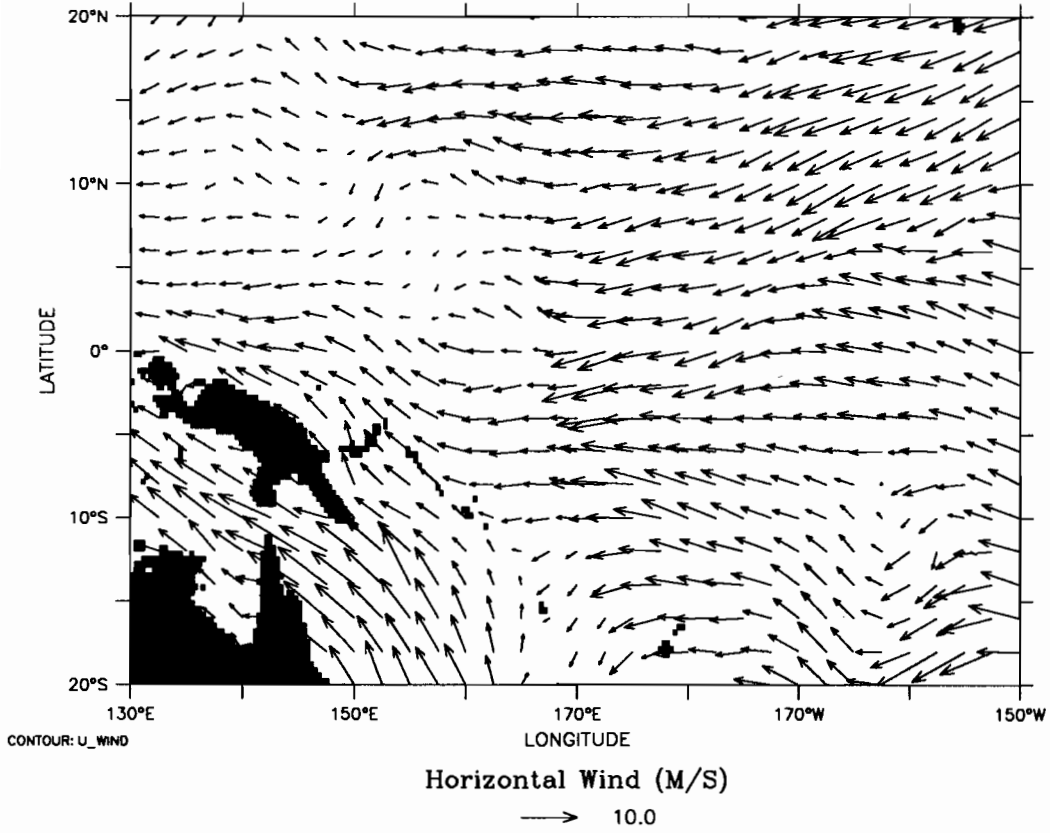
TIME : 27-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



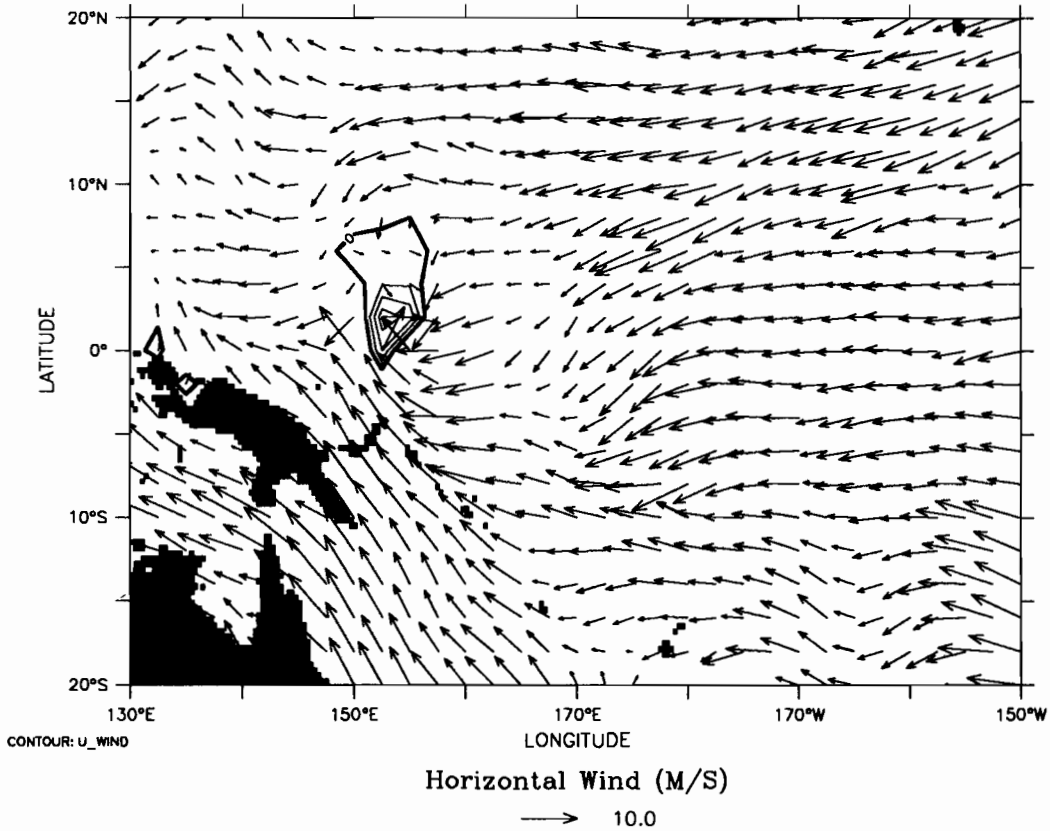
TIME : 28-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds



TIME : 29-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds





TIME : 30-JUN-1988 18:00

6 hrly 2.5x2.0 degree SSMI/Atlas gridded winds

