Southwest Monsoon in the Indian Ocean – Comparison of 2006 and 2007 seasons

During the summer months in the Northern Hemisphere, Central Asia and the Indian Plateau warm. Due to the difference in the heat capacity of the land mass versus the ocean, the landmass warms to higher temperatures during these months than the ocean. Since surface interaction of the airmass over the land is prevented by the Himalayan mountain range, a temperature gradient forms across the hemisphere. As a result of this temperature gradient, broad low pressure develops across Central Asia, and onshore winds begin to blow across the North Indian Ocean.

As the temperature gradient strengthens, southwesterly conditions develop across the Arabian Sea, Bay of Bengal and Northern Indian Ocean. During April and May, the equatorial land mass over Africa heats, as well. The additive effect of the temperature gradients created over the African continent and Central Asia ensure that the Southwest Monsoon will always be stronger than the Northeast Monsoon.

The Southwest Monsoon begins in June and ramps up through August. The area of strongest winds develops in association with the Somali Low-Level Jet, which develops off the Somalia coast. During the height of the monsoon, persistent gale conditions develop north of 7N off the Somalia coast, with persistent 6-8m seas and swells in the area of highest winds/seas. Near gale to gale southwesterly conditions persist across the Arabian Sea to near 20N and 70E. Figure 1 shows the climatological mean of wind distribution across the Arabian Sea.

How, then, do recent monsoon seasons compare to one another?

In 2006, the onset of the monsoon was earlier than usual. It began on 27 April, as a monsoon depression over the northwestern Arabian Sea enhanced the developing pressure gradient. Figure 2 shows the composite mean vector wind for June-August 2006. On the whole, the monsoon season of 2006 was fairly close to average in strength and duration.

Breaking the season down month by month, you can see that June and August (Figures 3 and 5) saw slightly lighter conditions than average (Figures 6 and 8), with slightly less extensive areal coverage of rough and heavy conditions than average.

July (Figure 4) saw stronger conditions across the whole of the Arabian Sea than average (Figure 7), with a larger core area of heavy conditions that extended both further east and further south than average. Average wind speeds were near-gale to gale force or higher.

The tropical seasons of the Arabian Sea and Bay of Bengal bookend the monsoon season. In 2007, Super Cyclone Gonu developed in early June, delaying the onset of the Somali Jet and the monsoon to June 7.

As a whole, the 2007 monsoon (Figure 9) was weaker than both the 2006 monsoon and average. Although the core of heavy monsoon conditions was similar to both 2006 and average, the areal extent of the conditions was smaller, and kept to the southwestern quadrant of the Arabian Sea.

Breaking the 2007 monsoon down month by month, the month of June (Figure 10) saw stronger conditions than both 2006 and average, and the area of the core extended further south than average. The Somali Jet was displaced southward from average; this is likely due to the presence of Super Cyclone Gonu at the start of the month. July and August (Figures 11 and 12), however, were weaker than average, with both slower wind speeds and less areal extent of the core of monsoon conditions.

On the whole, 2007 'started out with a bang', but gradually diminished through the season. 2006 saw a more typical monsoon, with heaviest conditions occurring in the month of July, which is considered to be the climatological peak of the season.

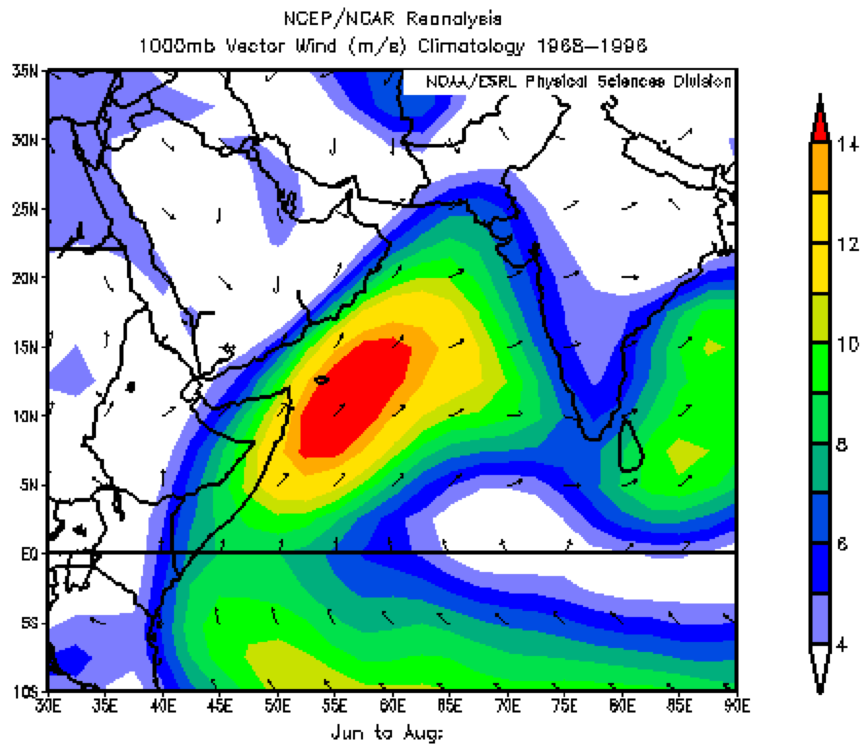

Figure 1. Vector wind composite mean (1000mb) for June – August 1968-1996. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

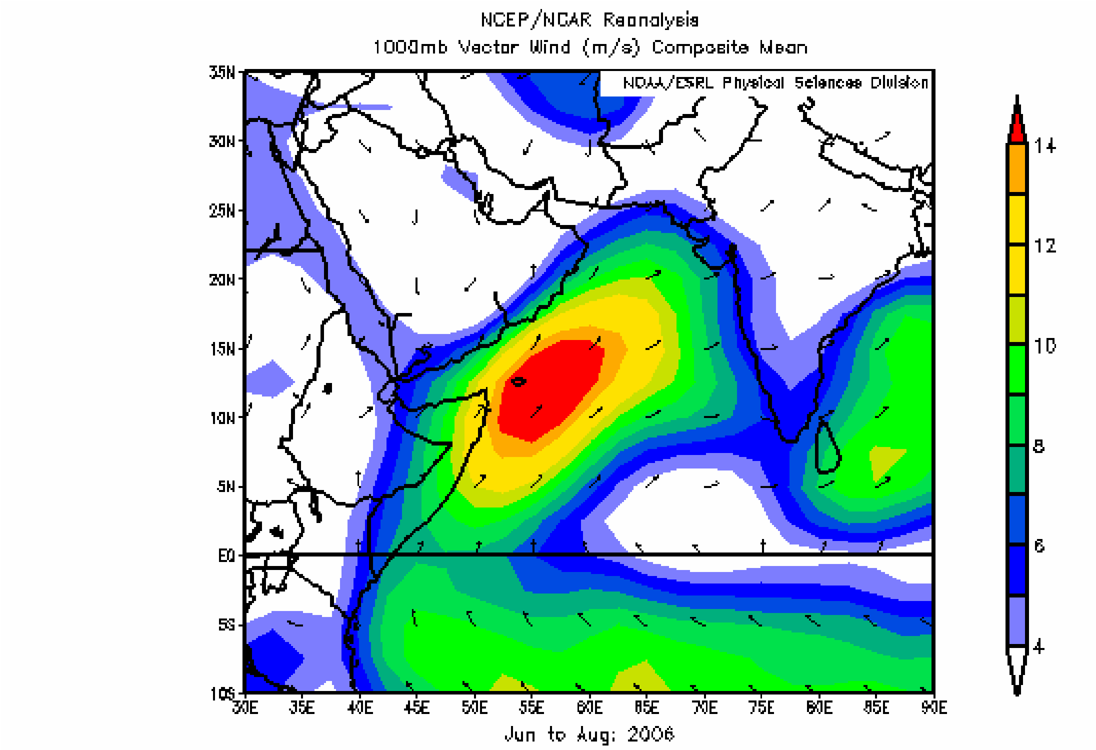

Figure 2. Vector wind composite mean (1000mb) for June – August 2006. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

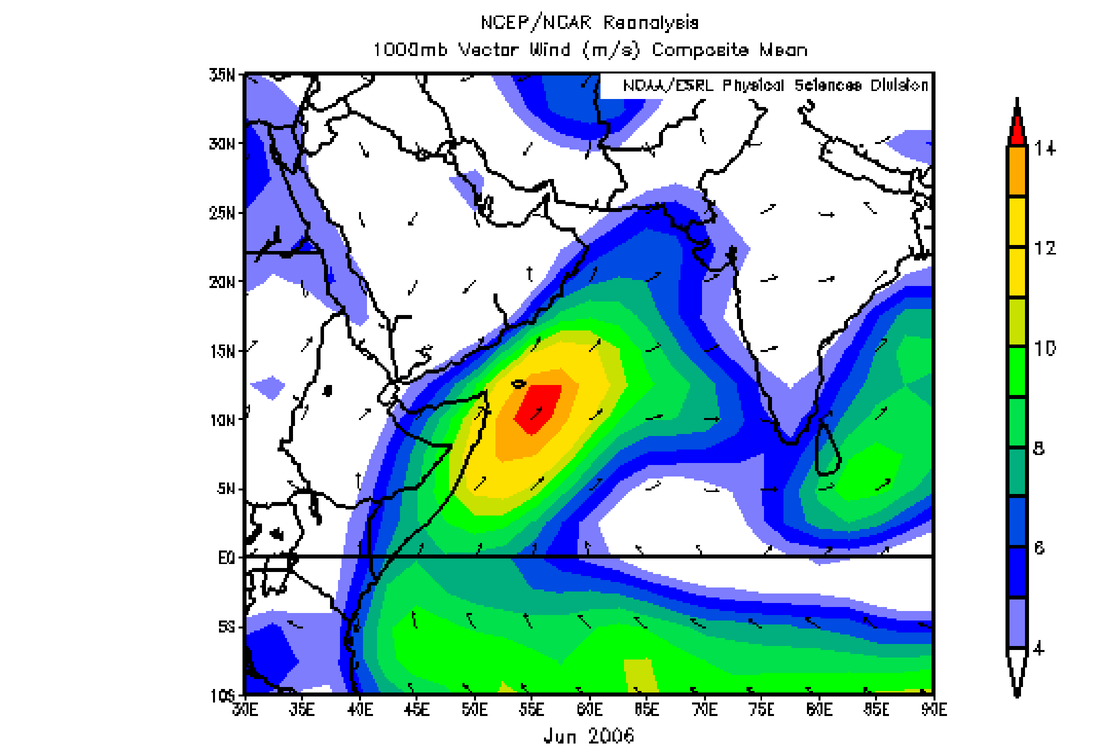

Figure 3. Vector wind composite mean (1000mb) for June 2006. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

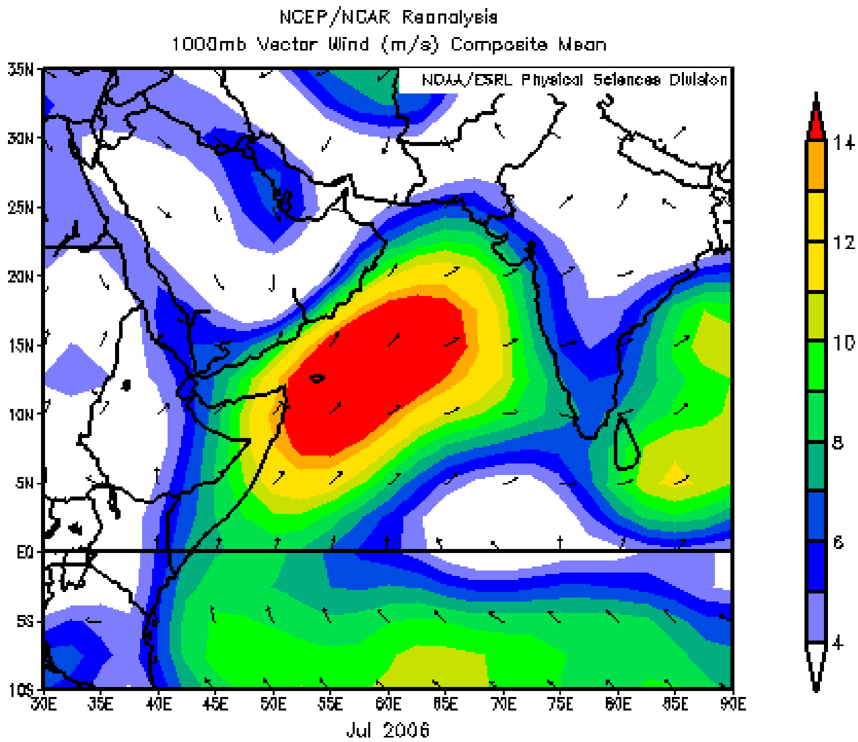

Figure 4. Vector wind composite mean (1000mb) for July 2006. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

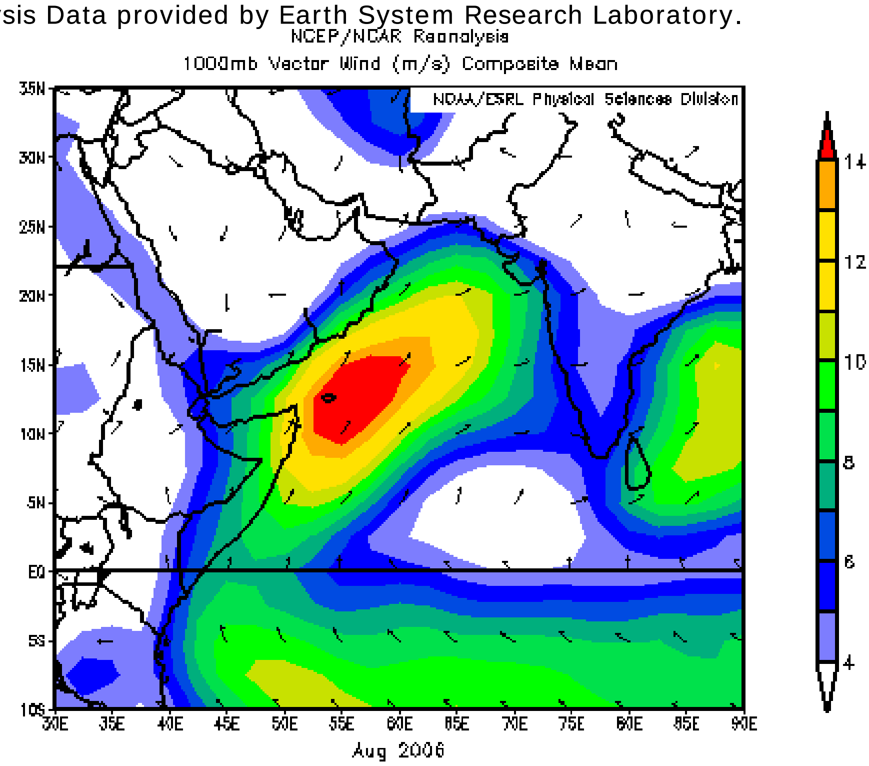

Figure 5. Vector wind composite mean (1000mb) for August 2006. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

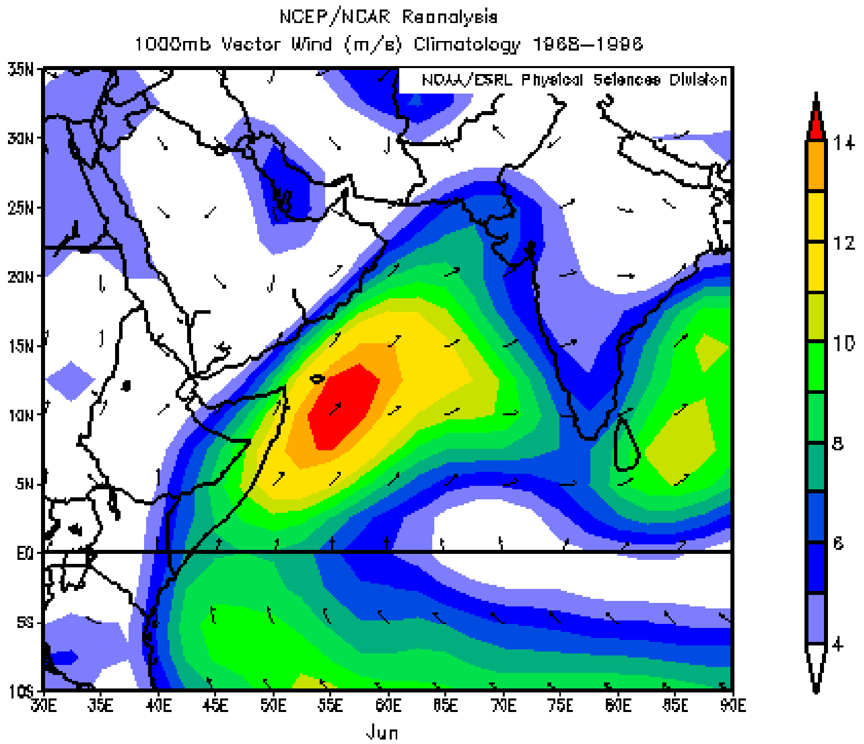

Figure 6. Vector wind composite mean (1000mb) for June 1968-1996. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

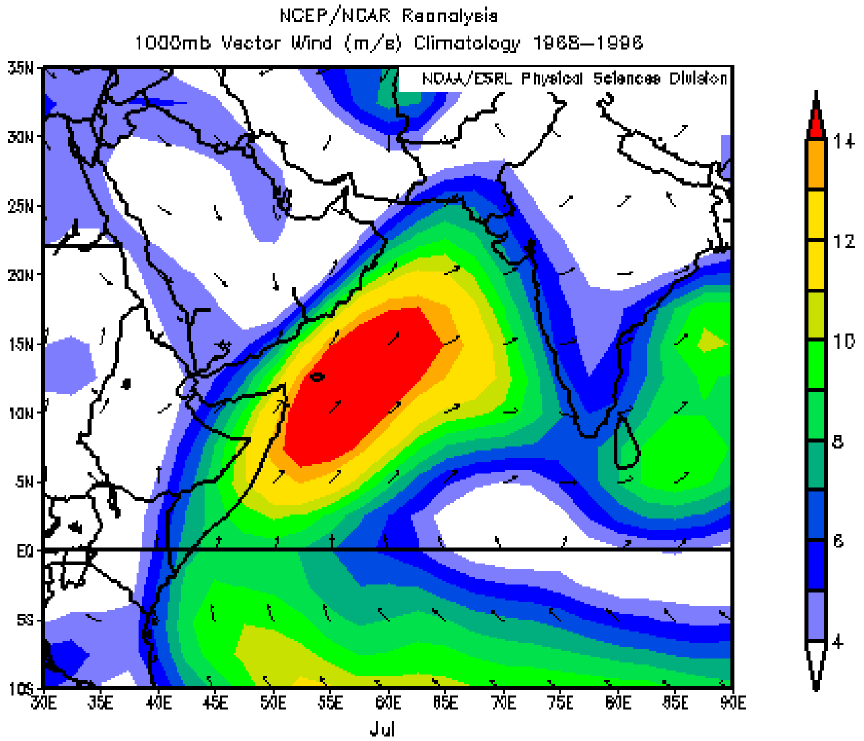

Figure 7. Vector wind composite mean (1000mb) for July 1968-1996. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

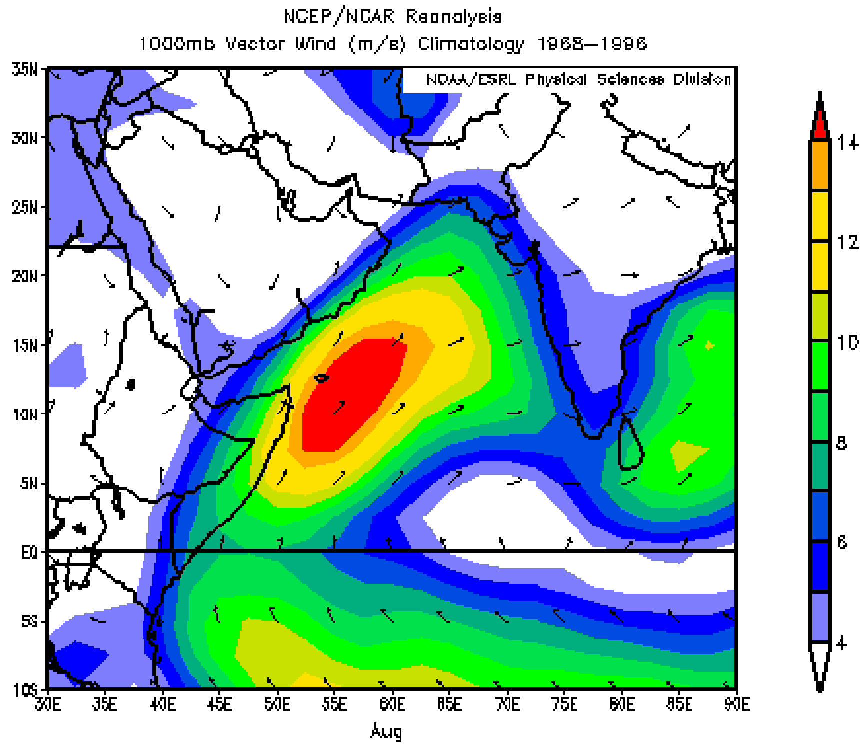

Figure 8. Vector wind composite mean (1000mb) for August 1968-1996. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

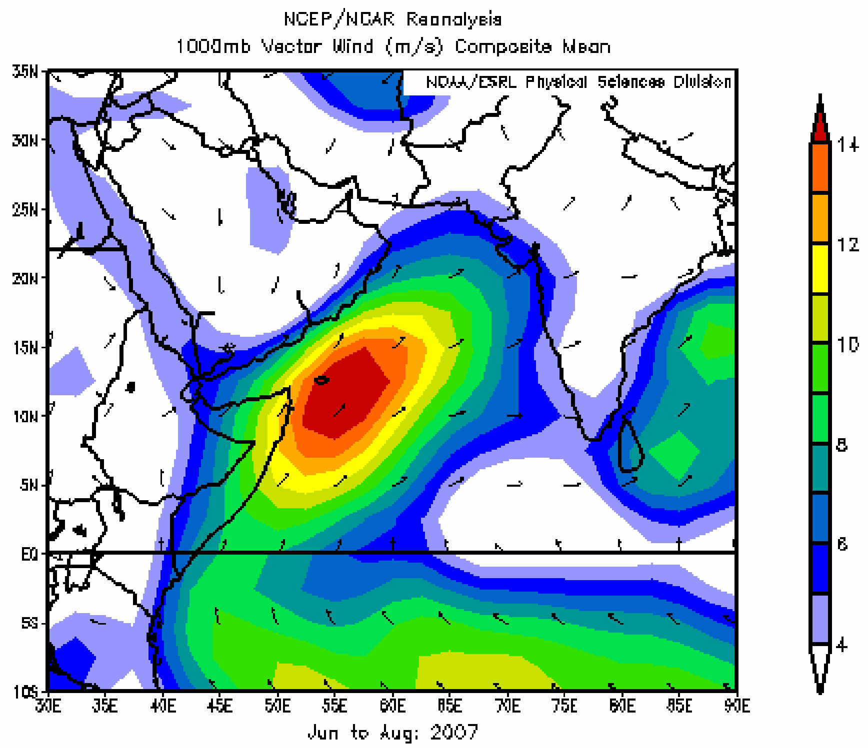

Figure 9. Vector wind composite mean (1000mb) for June-Aug 2007. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

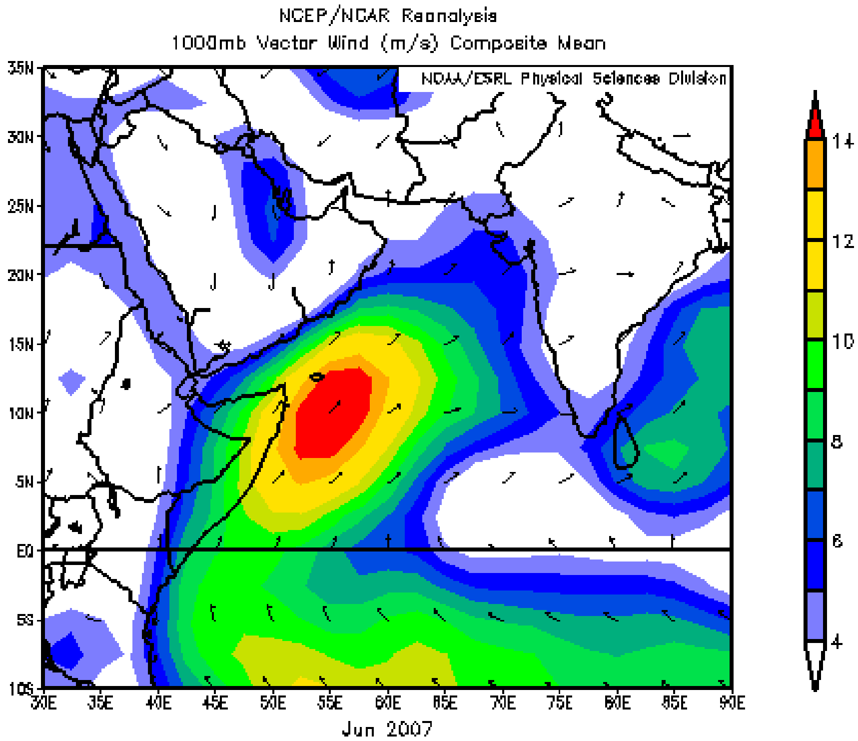

Figure 10. Vector wind composite mean (1000mb) for June 2007. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

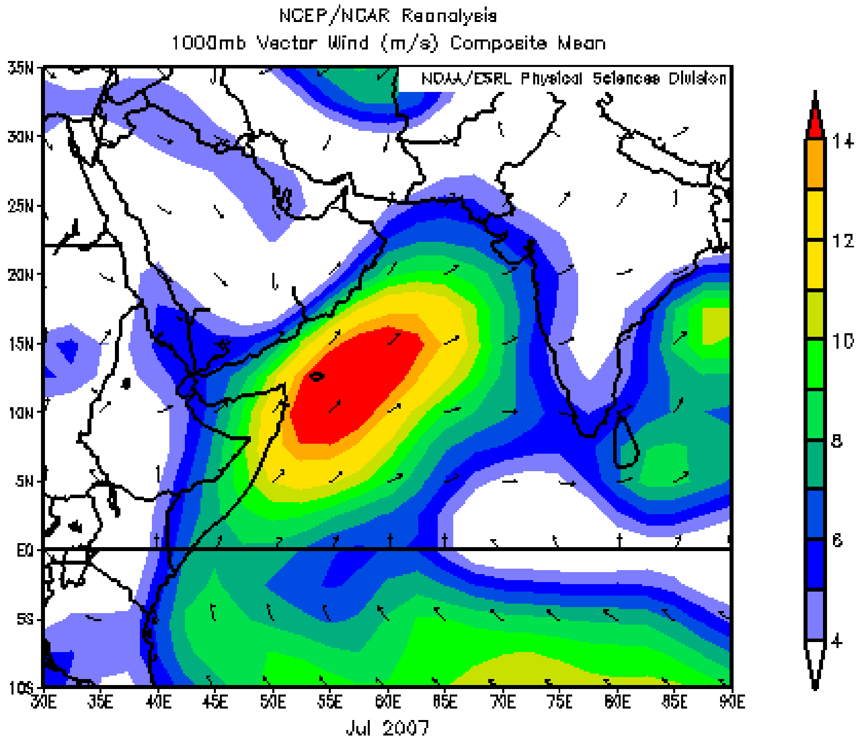

Figure 11. Vector wind composite mean (1000mb) for July 2007. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.

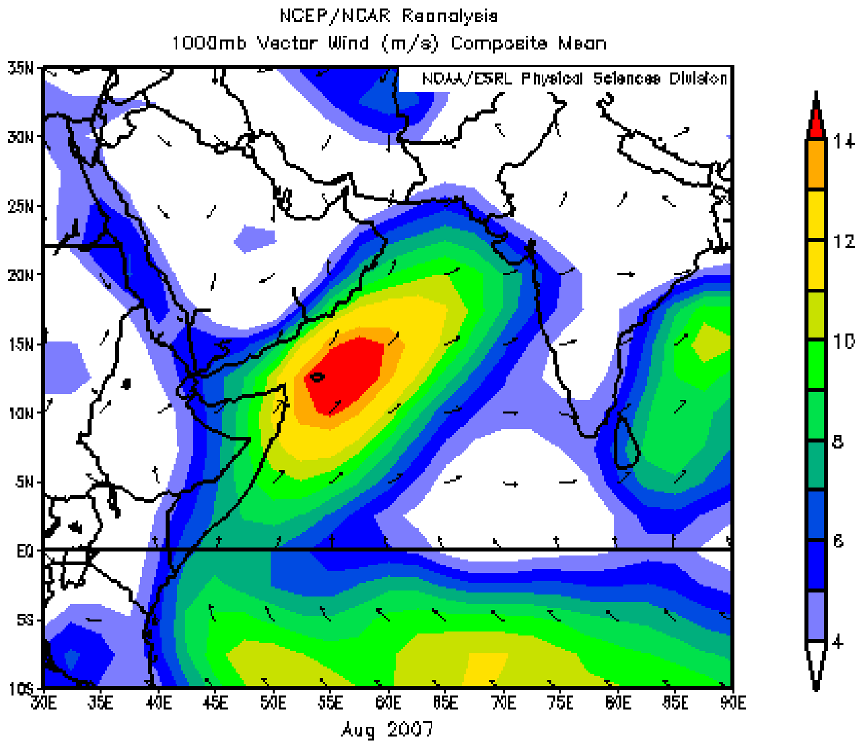

Figure 12. Vector wind composite mean (1000mb) for August 2007. From NCAR/NCEP global Reanalysis Data provided by Earth System Research Laboratory.