Mean Spectra of Various Mean Values

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We have referred previously [1] to the difference between a spectrum of mean values and a mean spectrum. To investigate it further in detail, we calculated various spectra from five-day, ten-day, fifteen-day and lastly thirty-day mean values, in which computations the isobaric values of 500-mb levels along 50°N lat. circle (May, 1951: Historical Weather Map) are taken. Numbers of spectra employed in making mean spectrum are thirty, six and three to one-, five-, and ten-day mean respectively. And the spectra obtained from twenty-five and thirty-day mean values differ little from each other. Apart from the generality of results obtained here, we will roughly explain them in the following (Fig. 1).

Fig. 1. The spectra of various mean values (one, five, ten and thirty day).

appears in the spectrum of ten-day mean value.

5) The spectra of fifteen-day or more show no regularities in distribution. We deduced the following from the above facts. Namely:

a) Long period variations as can be expressed by unit of one-month can approximately be determined by the components $n=1, 2$.

b) The distribution of disturbance energy, supposed to be generated by the baroclinic effect or some similar agent, has a maximum at $n=6$. If the disturbances are not random in time or space the propagation velocity of component $n=6$ as barotropic wave is considered to concentrate to (30°), 90°, (150°) long/10 day from the above facts 3) and 4).

1) Little change in the magnitude of components $n=1, 2$ can be found in all spectra.

2) In the regions of components $n \geq 3$ the magnitude of all components decreases with increasing number of days used in making mean values and the greater the wave number n the more rapidly they decrease.

3) The values of p 's in $F(n) \propto n^{-p}$ increase with the number of days used in making mean values in region $n \geq 6$ and approximately $p \approx 7/3$ in the ten-day mean.

4) Predominance of the component $n=6$ in the spectra of one-day and five-day mean values disappears in the spectrum of ten-day mean value.

Reference

- [1] KUBOTA, S. and M. IIDA, 1954: Statistical Characteristics of Atmospheric Disturbances. *Pap. Met. Geophys.* **5**, p. 22.