VLB ARRAY MEMO No. 143

Nov. 12, 1982

To: VLBA Configuration Group

From: Craig Walker

Subject: A possible configuration.

This memo is a response to the call for possible arrays to discuss in the November configuration group meeting. The array presented here is my choice from among the best arrays found with the program ARTEST under the US territory and include Puerto Rico constraints. ARTEST and results derived with it are described in another memo (same date as this memo). The coordinates for the stations are given in that memo. The top 40 of the approximately 2850 arrays in one run of ARTEST were examined with u-v plots and the top 20 were analyzed using Mutel and Gaume's program (Memos 84 and 124). I have chosen the array AR31-14 as the most promising from which to derive a final configuration. Plots of the u-v coverage of AR31-14, with maximum scales of 8000, 2000, and 500 km are presented in Figures 1-3. Four VLA antennas are included in the 500 km plot. Figure 5 shows the coverage with BONN added to show the interaction with Europe. Figure 6 shows AR31-14 plus one of the possible configurations of the Canadian Long Baseline Array (CLBA).

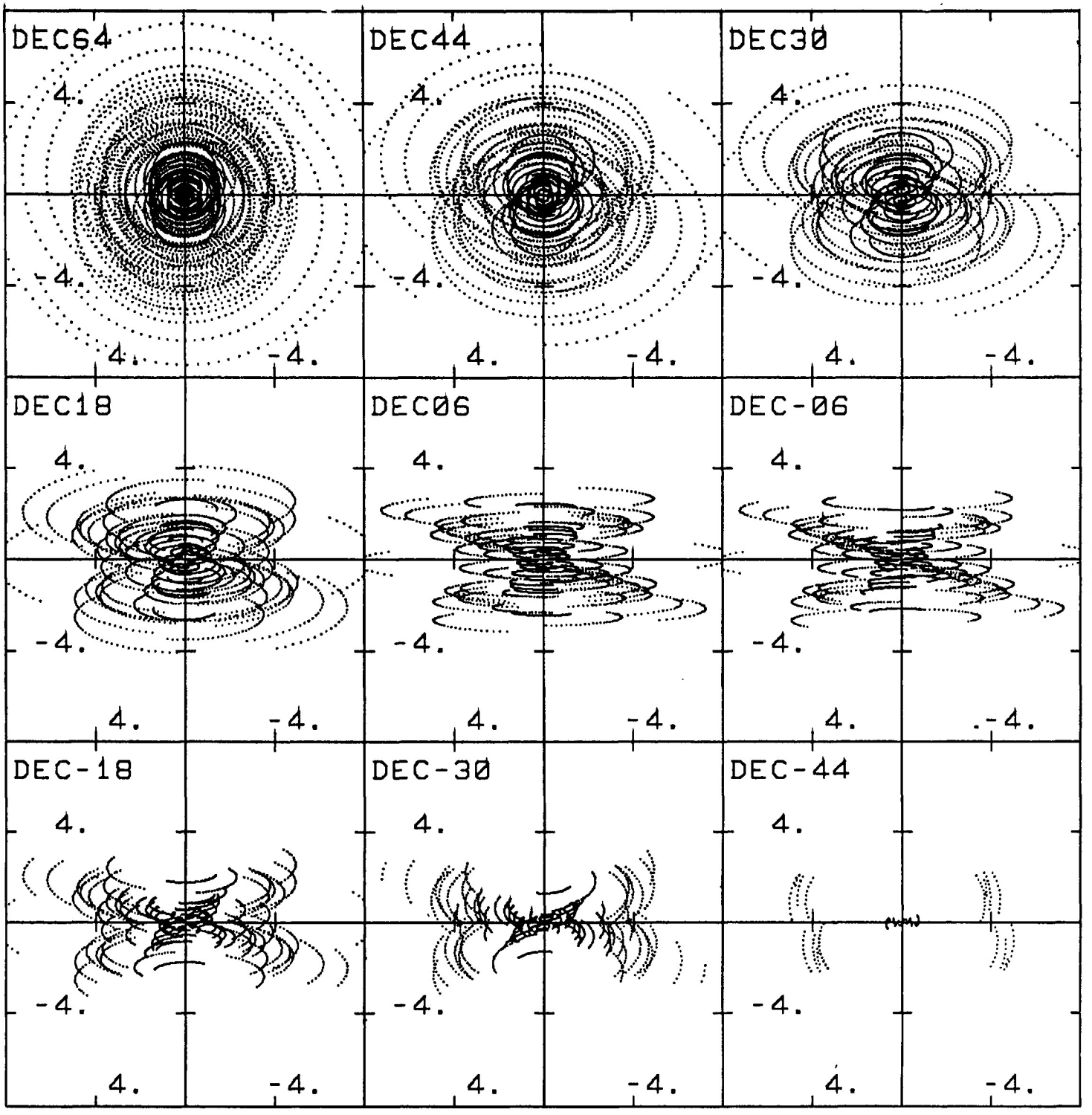
There is considerable freedom in choosing some of the sites of AR31-14. As can be seen in the memo on the ARTEST results, there is little change in performance if IOWA replaces ILLN, if MISSOULA replaces WENATCH, or (if IOWA is used) if Tucson replaces Kitt Peak. The main consideration is probably that stations be kept at about the same latitude as those for which the calculations were made. Unfortunately, there seems to be less fredom to change the sites near the VLA where one of the configurations greatest weaknesses lies. The RT107NM site works well as an outrigger to the VLA, but the Las Vegas, New Mexico site is too far from the VLA for a good second station and the distance from it to the VLA and to RT107NM are about equal, leading to unnecessary redundancy. I am working on trying to find a better combination near the VLA.

AR31-14 is attractive from the point of view of finding developed sites. Owens Valley, Haystack, Fort Davis, Illinois (Vermillion River), Kitt Peak, and RT107NM (near VLA) are at existing observatories. The Puerto Rico site is shown as at Arecibo Observatory although it may be desirable to use a drier location. Las Vegas, NM is close enough to the VLA to get maintenance from there. That leaves only Hawaii and Wenatche (Washington) as new sites. In Hawaii, we may be able to find a site near the astronomical facilities related to Mauna Kea. There are universities in the Wenatche area.

Most of the sites in AR31-14 are reasonably dry. Using Fort Davis instead of Laredo or Brownsville should have considerable advantage in this regard and allows better coverage of short spacings (although some N-S coverage at the lowest declinations is lost). Wenatche is east of the mountains in Washington and should be dry. The main concern is Puerto Rico. If we cannot find an acceptable site in Puerto Rico, we will need an Alaskan site and a somewhat different configuration in the 'lower 48'.

HAWAII
OVRO
HSTK
ARECIBO
FDVSNEW
ILLN
WENATCH
KITT
RT107NM
LVNM

Scale in km
(kilometers x 10^3)



HAWAII
OVRO
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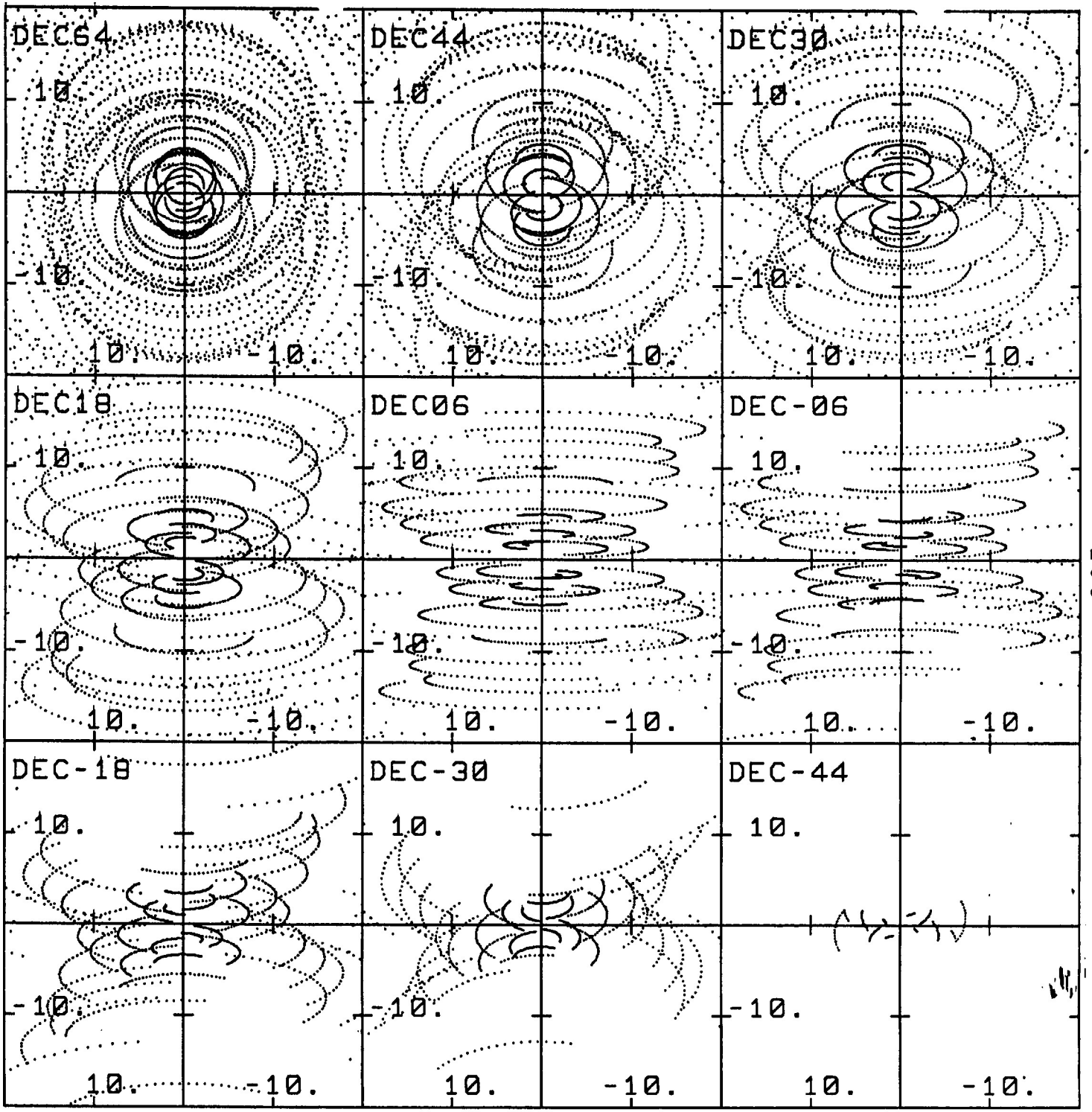
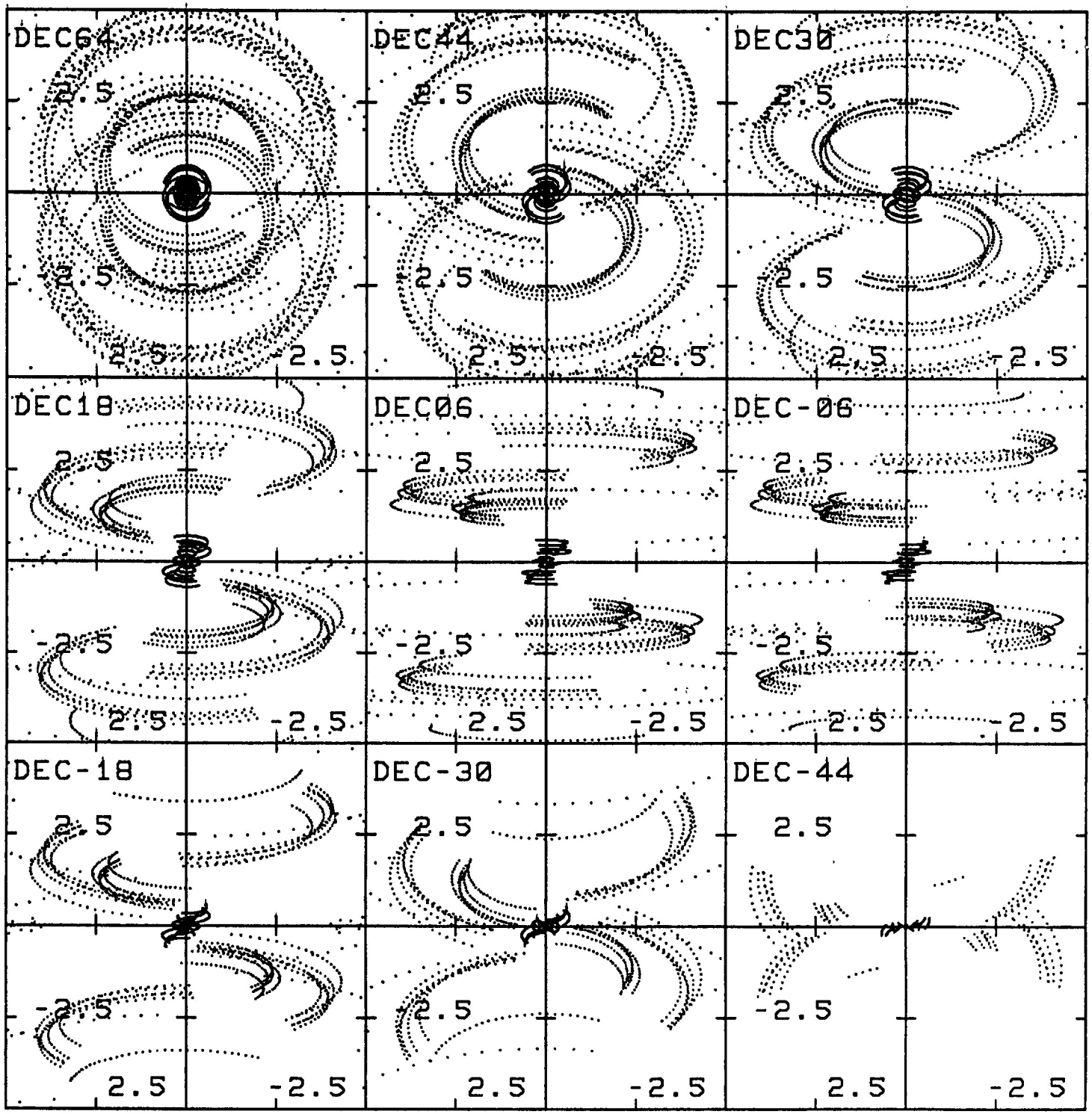
FDVSNEW
ILLN
WENATCH
KITT
RT107NM
LVNM

Scale in km
(kilometers x 10^2)



HAWAII
OVRO
HSTK
ARECIBO
FDVSNEW
RT107NM
LVNM
ILLN
WENATCH
KITT
AN9
AW9
AE9
AN3

Scale in km
(kilometers x 10^2)



HAWAII
OVRO
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RT107NM
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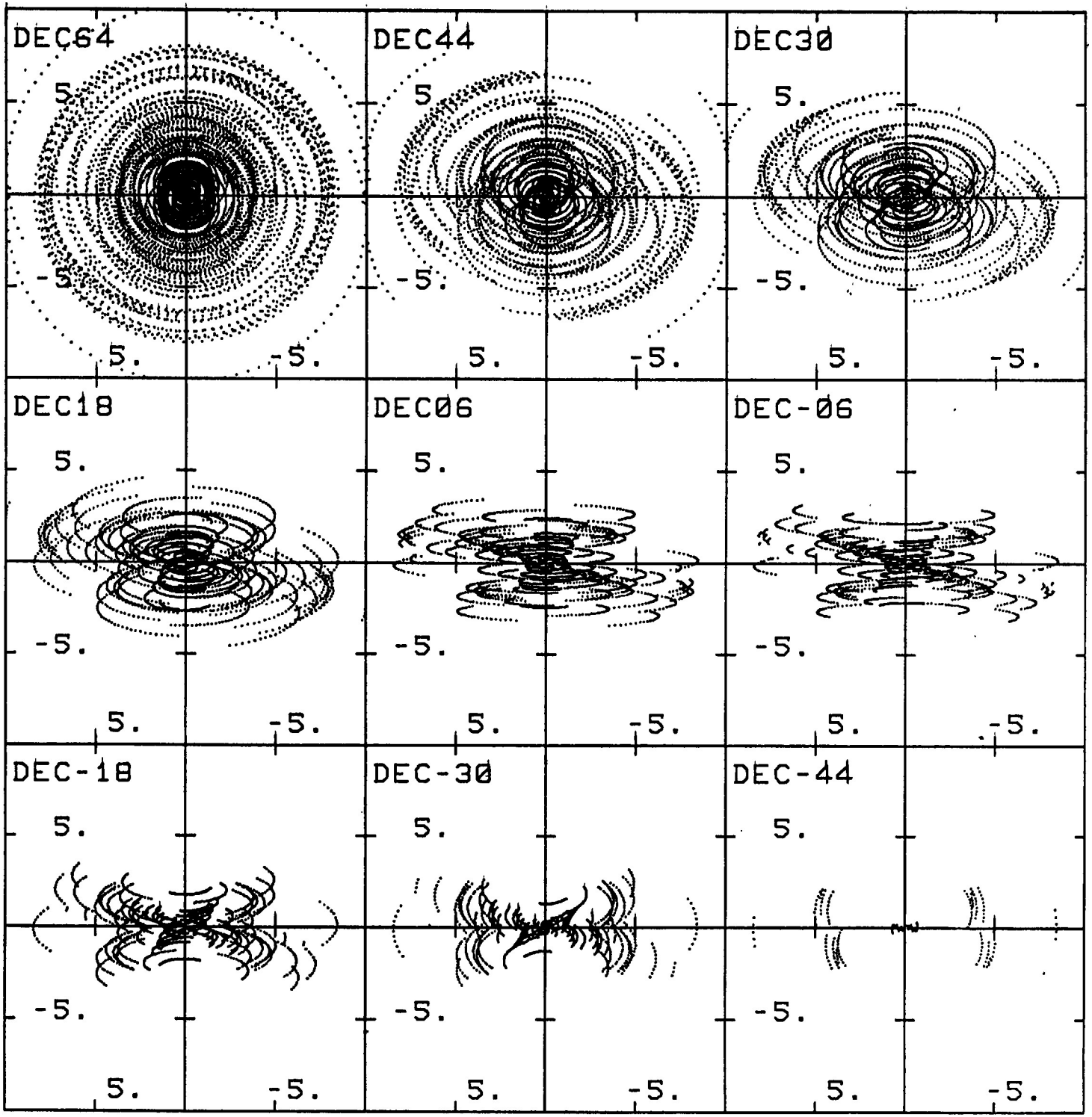
ILLN
WENATCH
KITT
BONN

Scale in km
(kilometers x 10^3)



HAWAII
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J3M-1
J3M-2
J3M-3
J3M-4
J3M-5
J3M-6
J3M-7
J3M-8

Scale in km
(kilometers x 10^3)