Supplemental Appendix: Low-level Polarimetric Radar Data for Pre-tornado, Tornado, and Tornado Demise Cases

A Supplement to

Polarimetric radar observations at low levels during tornado life cycles in a small sample of classic Southern Plains supercells

By

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The purpose of this supplemental appendix is to make actual polarimetric radar data from tornadic storms available to the readers of our paper. While our schematics capture typical low-level features of classic supercells, individual cases often present rather different polarimetric features and structures. Nowcasters should be aware of the great variability occurring in such storms, and it is hoped this supplemental appendix will be useful to those seeking greater familiarity with low-level polarimetric features of classic supercells.

Figure 1: 8 May 2003 Southern Plains Supercell (KOUN)

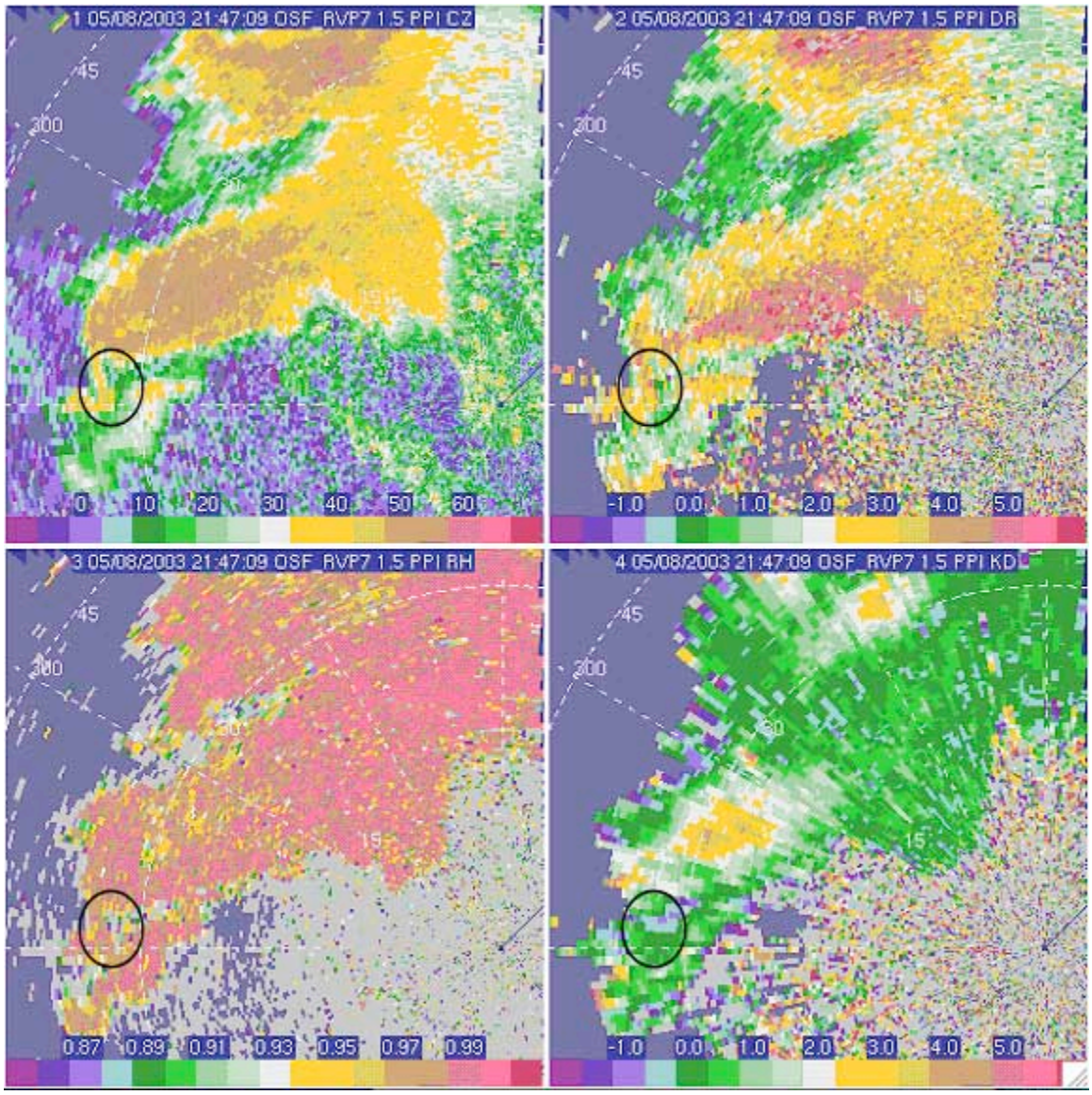

Figure 1a: Pre-tornado time polarimetric data for the 8 May 2003 Southern Plains supercell, which affected Moore and southwest Oklahoma City, Oklahoma. Tornadogenesis region was about 31 km west of KOUN, and is indicated by a dark circle. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

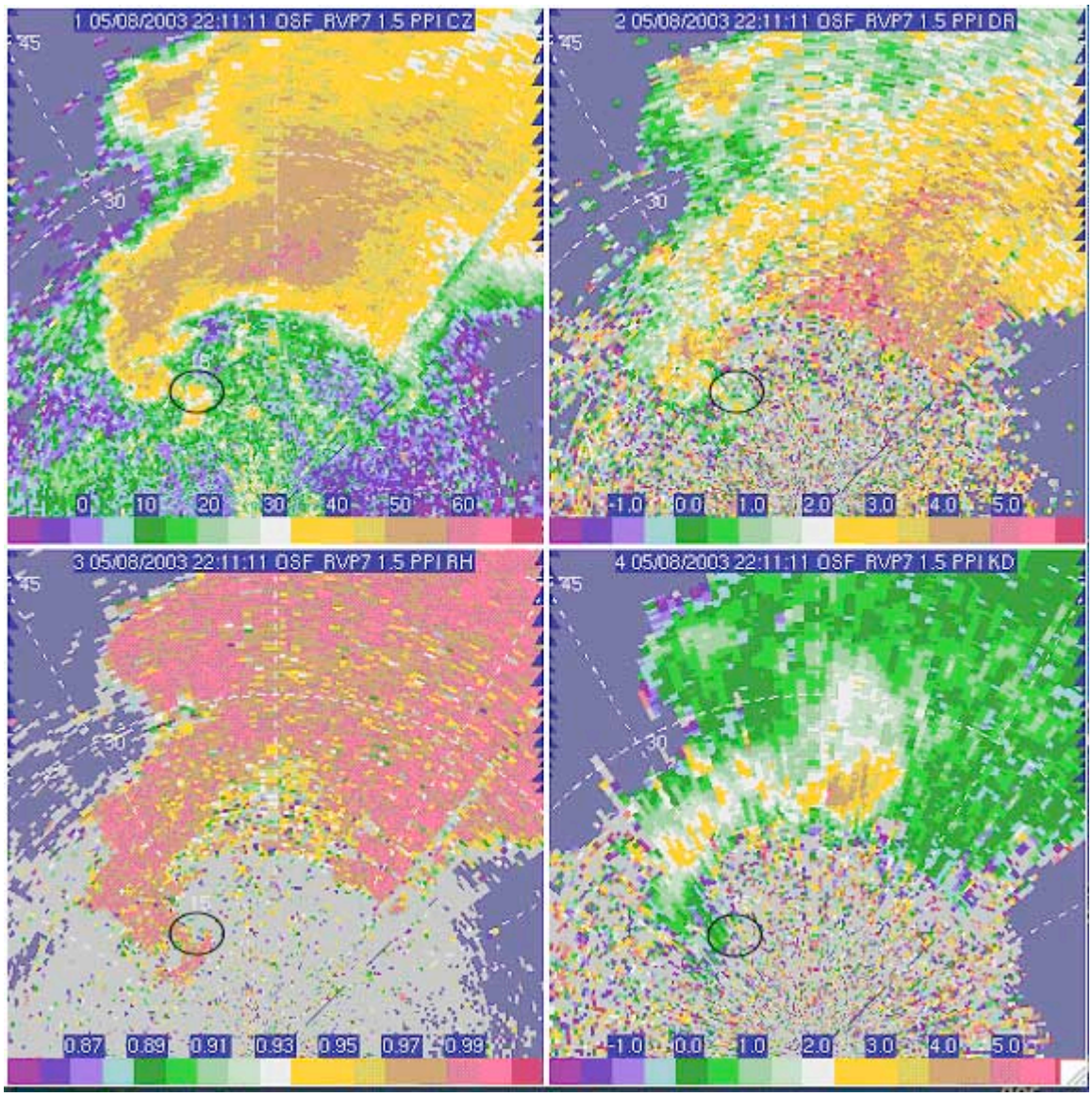

Figure 1b: Tornado time polarimetric data for the 8 May 2003 Southern Plains supercell, which affected Moore and southwest Oklahoma City, Oklahoma. A tornado developed one minute before this time and almost immediately did damage worthy of an F3 rating, and eventually did spotty F4 damage. Range to the tornado was about 9 km north-northwest of KOUN, and is indicated by a dark circle. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

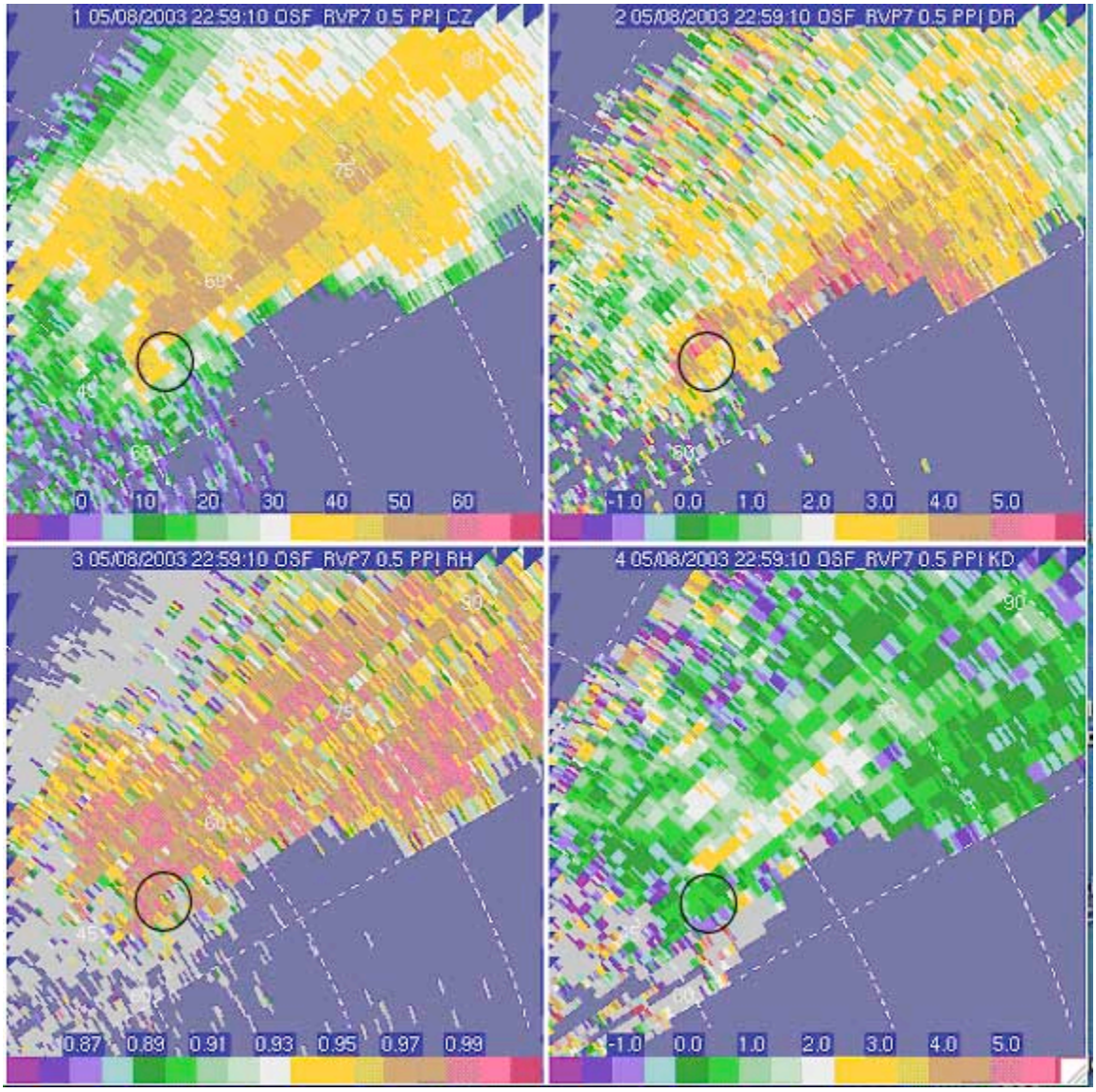

Figure 1c: Tornado demise time polarimetric data for the 8 May 2003 Southern Plains supercell, which affected Moore and southwest Oklahoma City, Oklahoma. Range to the dissipating tornado, which was rated F4, was about 50 km northeast of KOUN—this location is indicated by a dark circle. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

Figure 2: 10 May 2003 Southern Plains Supercell (KOUN)

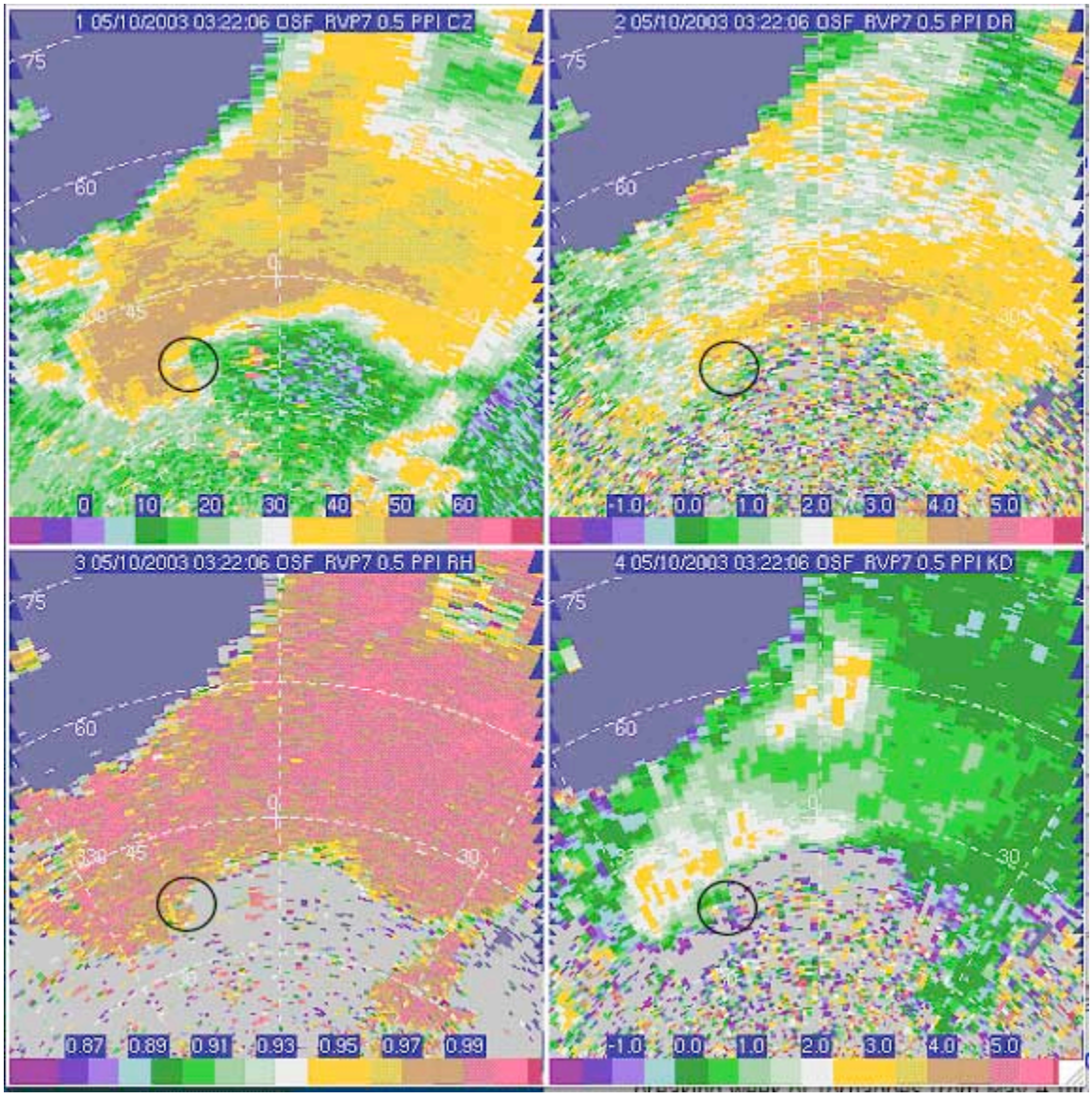

Figure 2a: Pre-tornado time polarimetric data for the 10 May 2003 Southern Plains supercell, which affected Edmond, Oklahoma. Tornadogenesis region was about 37 km northwest of KOUN, and is indicated by a dark circle. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

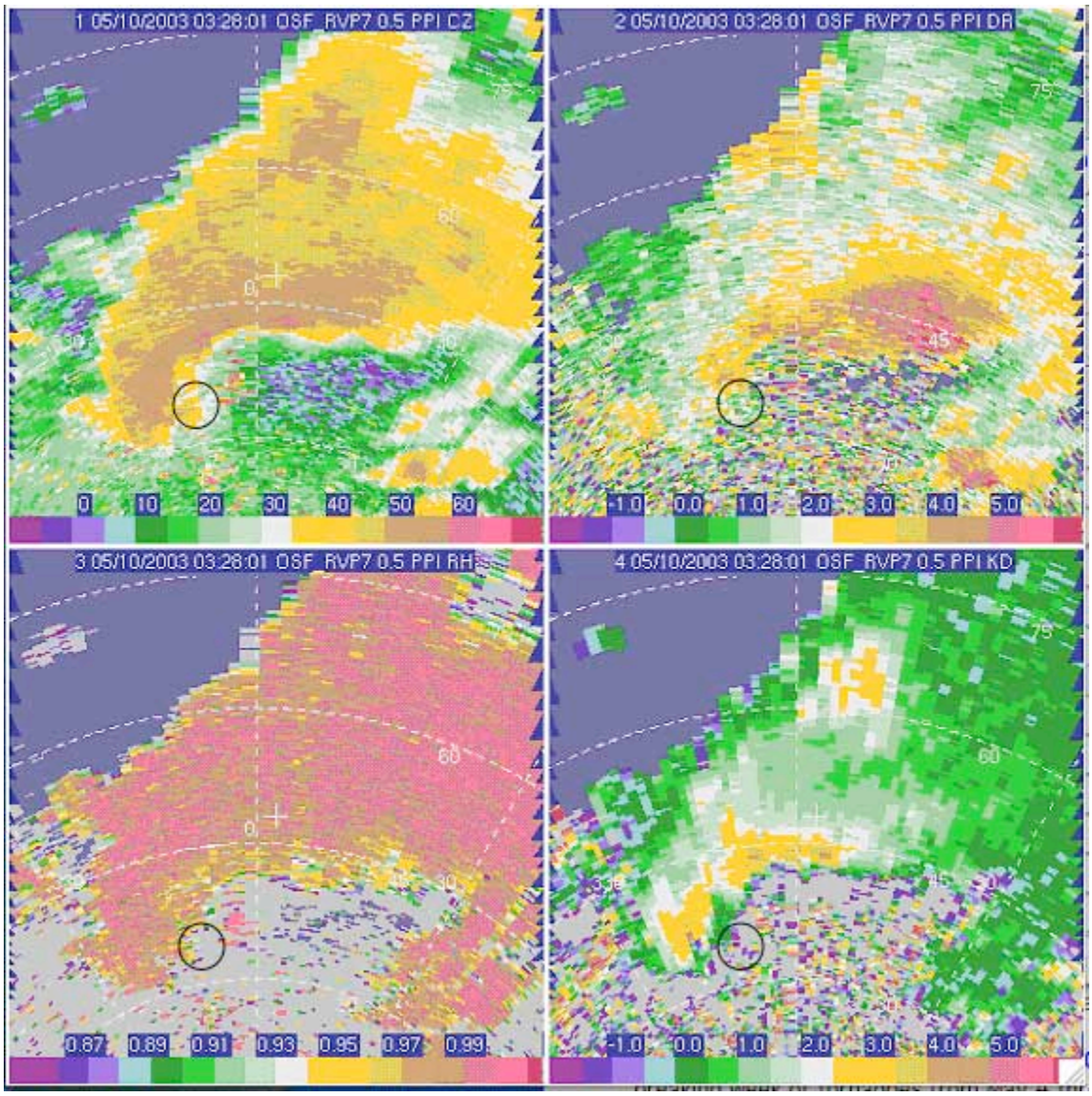

Figure 2b: Tornado time polarimetric data for the 10 May 2003 Southern Plains supercell, which affected Edmond, Oklahoma. The tornado quickly reached F3 intensity, and was located about 35 km north-northwest of KOUN—a dark circle indicates this location. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

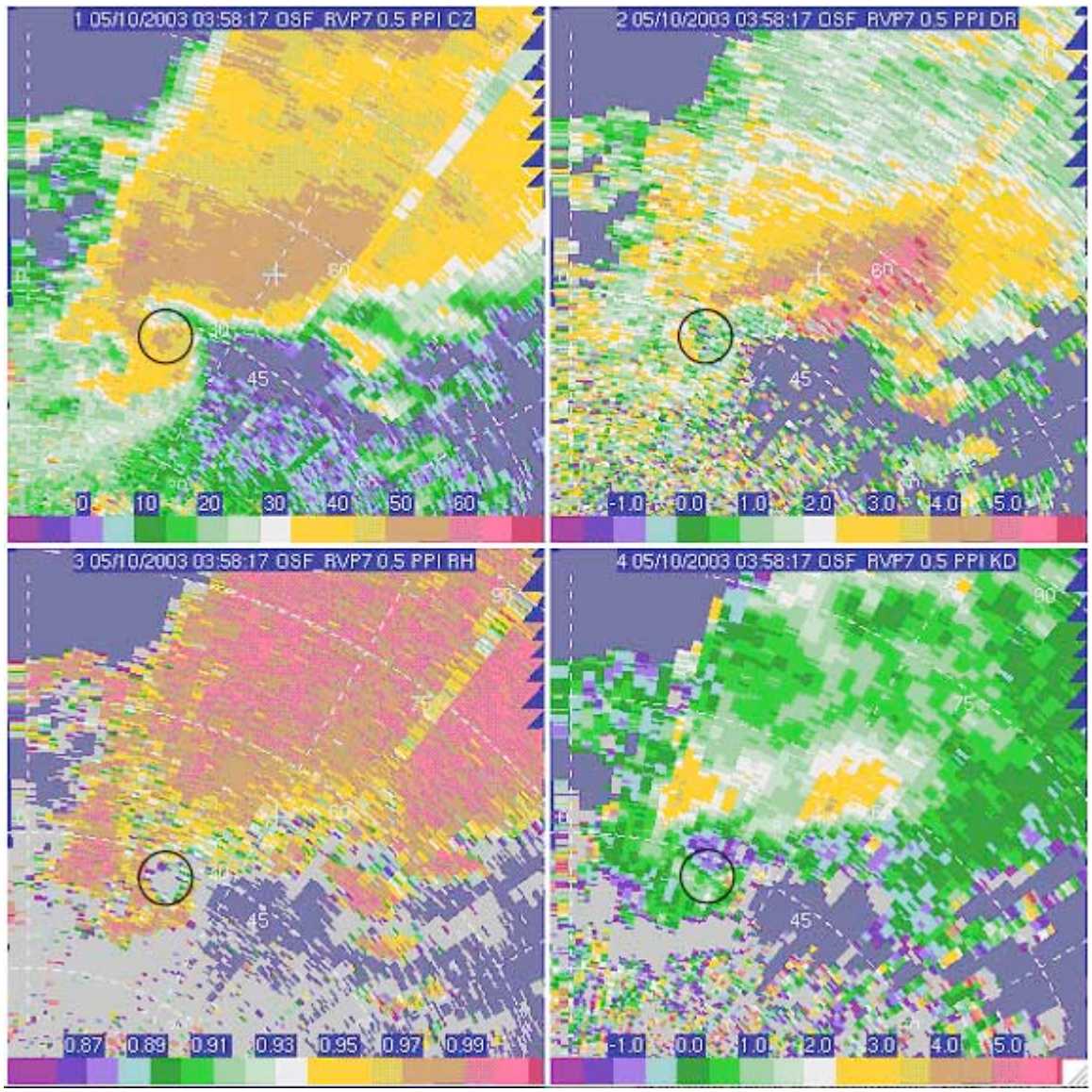

Figure 2c: Tornado demise time polarimetric data for the 10 May 2003 Southern Plains supercell, which affected Edmond, Oklahoma. The tornado was rated F3, and was located about 42 km north-northeast of KOUN—a dark circle indicates this location. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

Figure 3: 30 May 2004 Southern Plains Supercell (KOUN)

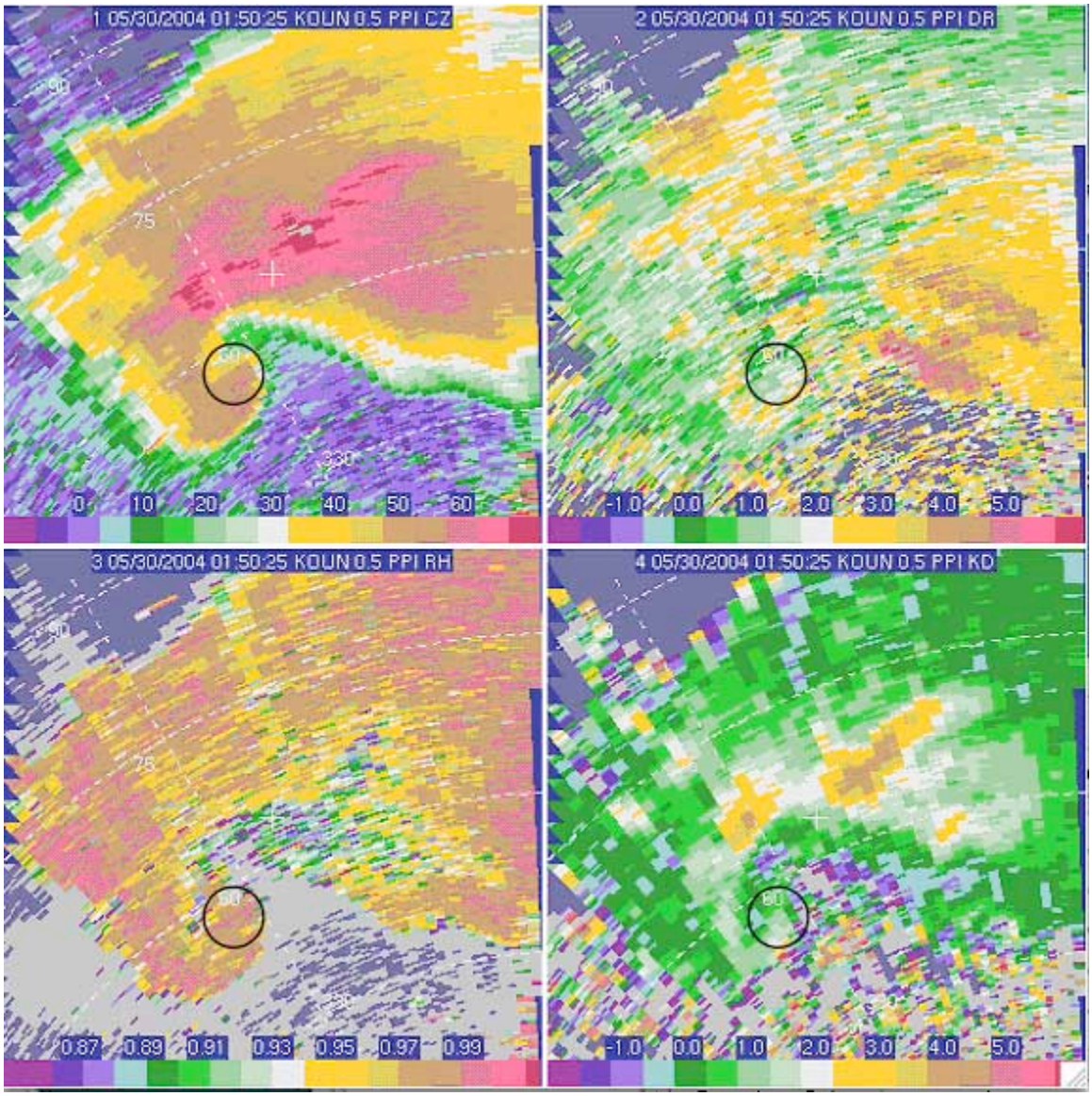

Figure 3a: Pre-tornado time polarimetric data for the 30 May 2004 Southern Plains supercell, which affected Edmond, Oklahoma. Tornadogenesis region was about 57 km northwest of KOUN, and is indicated by a dark circle. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

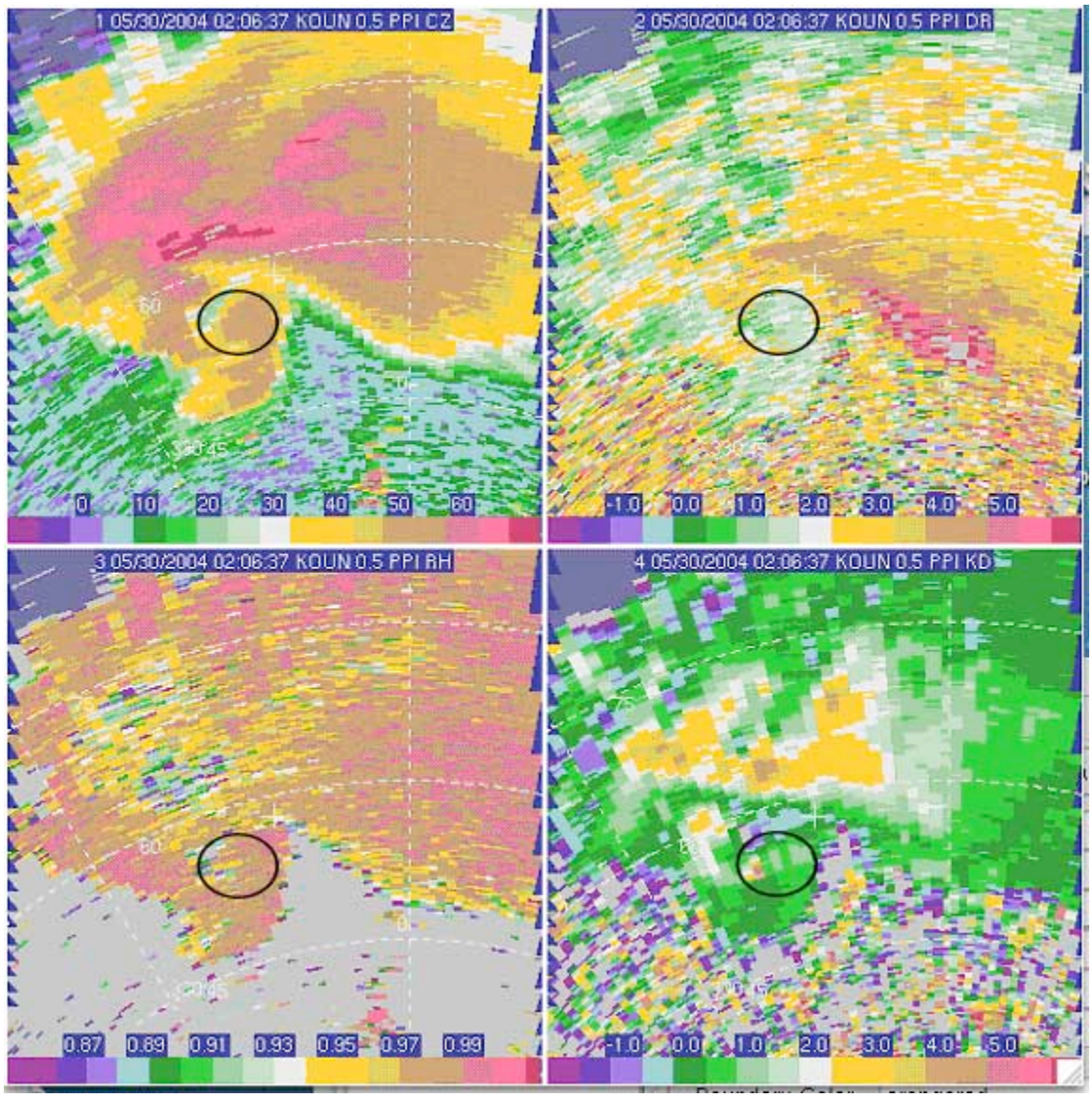

Figure 3b: Tornado time polarimetric data for the 30 May 2004 Southern Plains supercell, which affected Edmond, Oklahoma. Tornado location was about 57 km north-northwest of KOUN, and is indicated by a dark circle. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

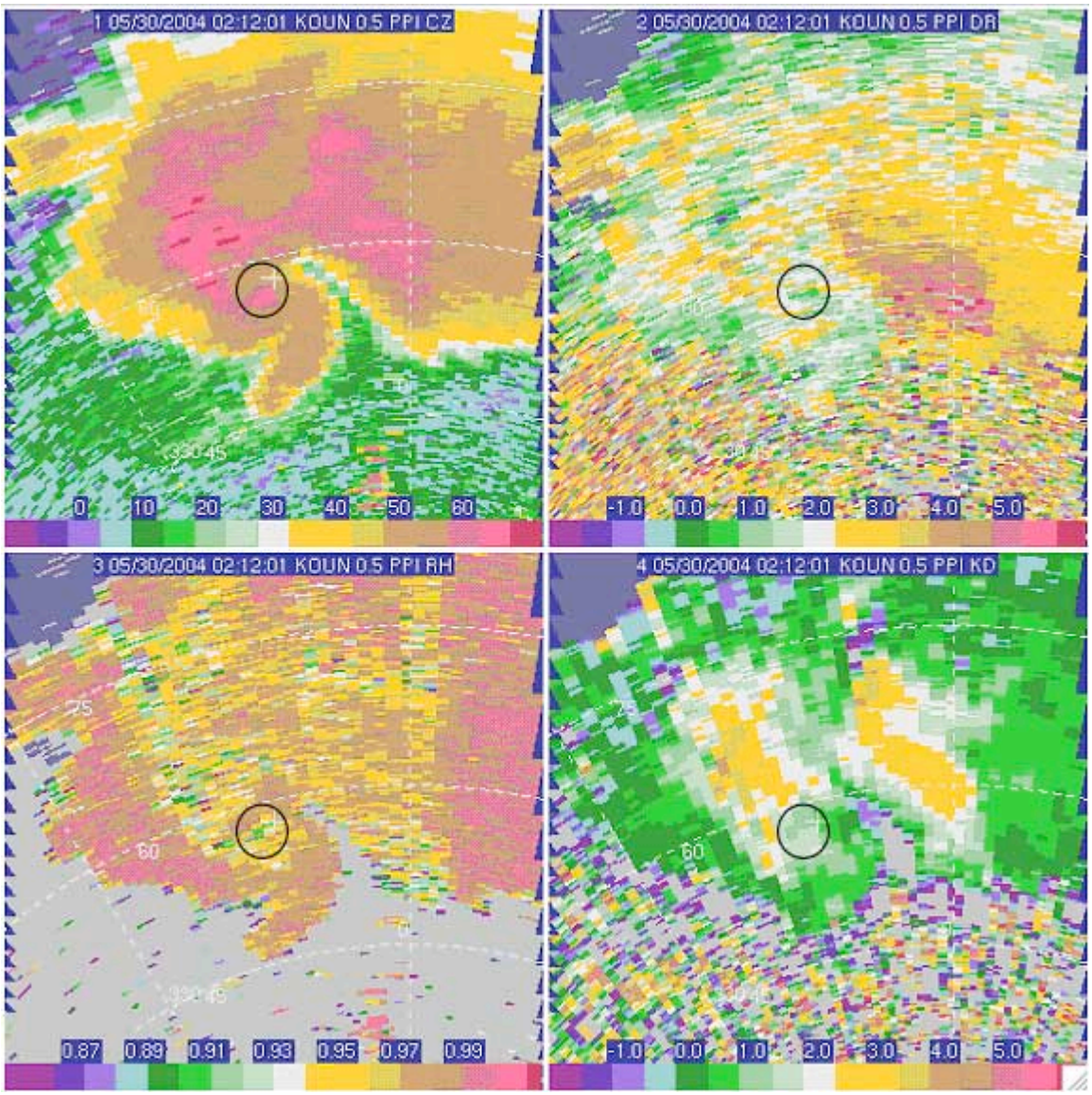

Figure 3c: Tornado demise time polarimetric data for the 30 May 2004 Southern Plains supercell, which affected Edmond, Oklahoma. Tornado dissipation was occurring about 58 km north-northwest of KOUN; a dark circle indicates this location. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

Figure 4: 24 May 2004 Southern Plains Supercell (KOUN)

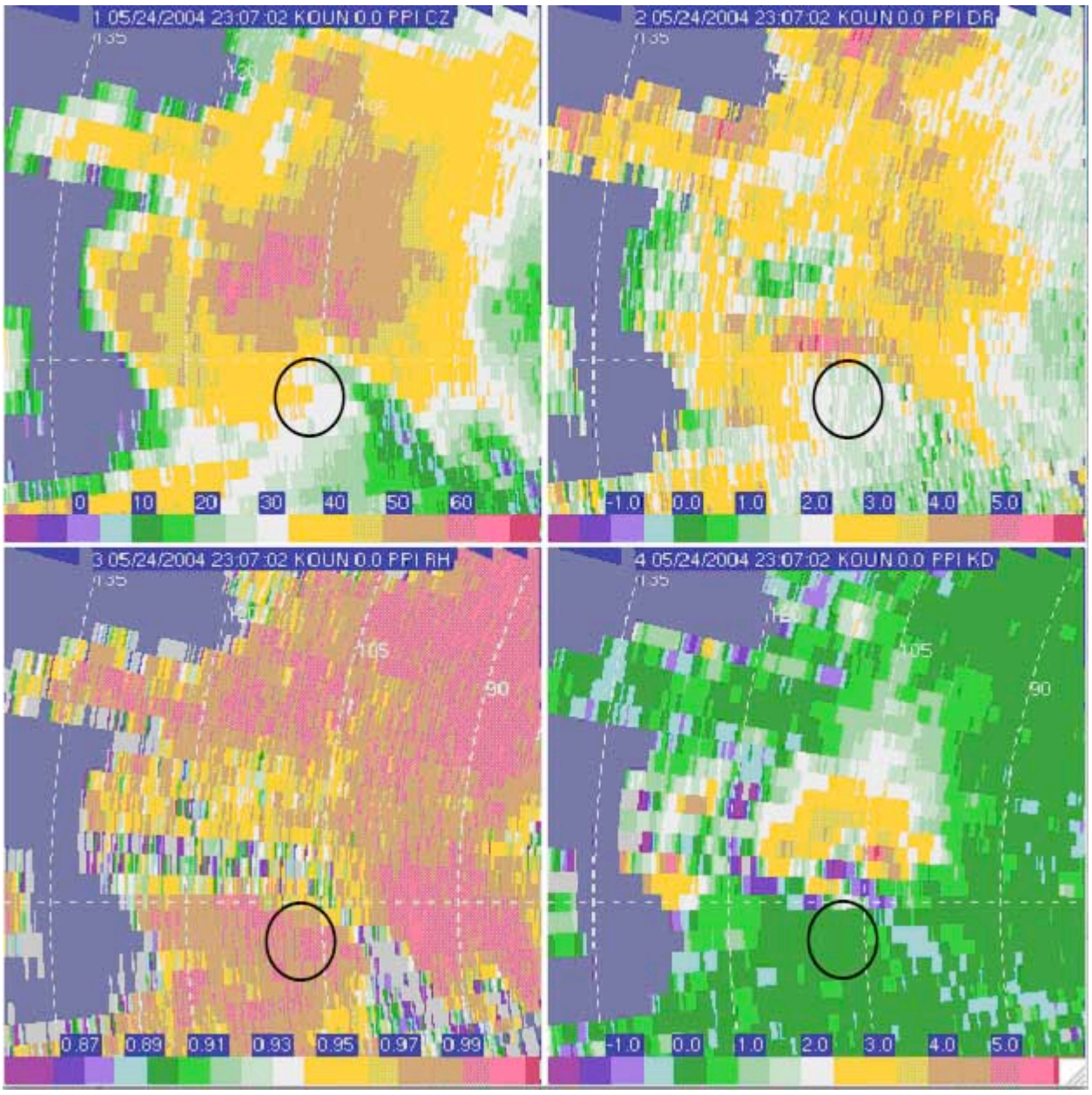

Figure 4a: Pre-tornado time polarimetric data for the 24 May 2004 Southern Plains supercell, which affected the region near Binger, Oklahoma. Tornadogenesis region was about 110 km west of KOUN, and is indicated by a dark circle. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

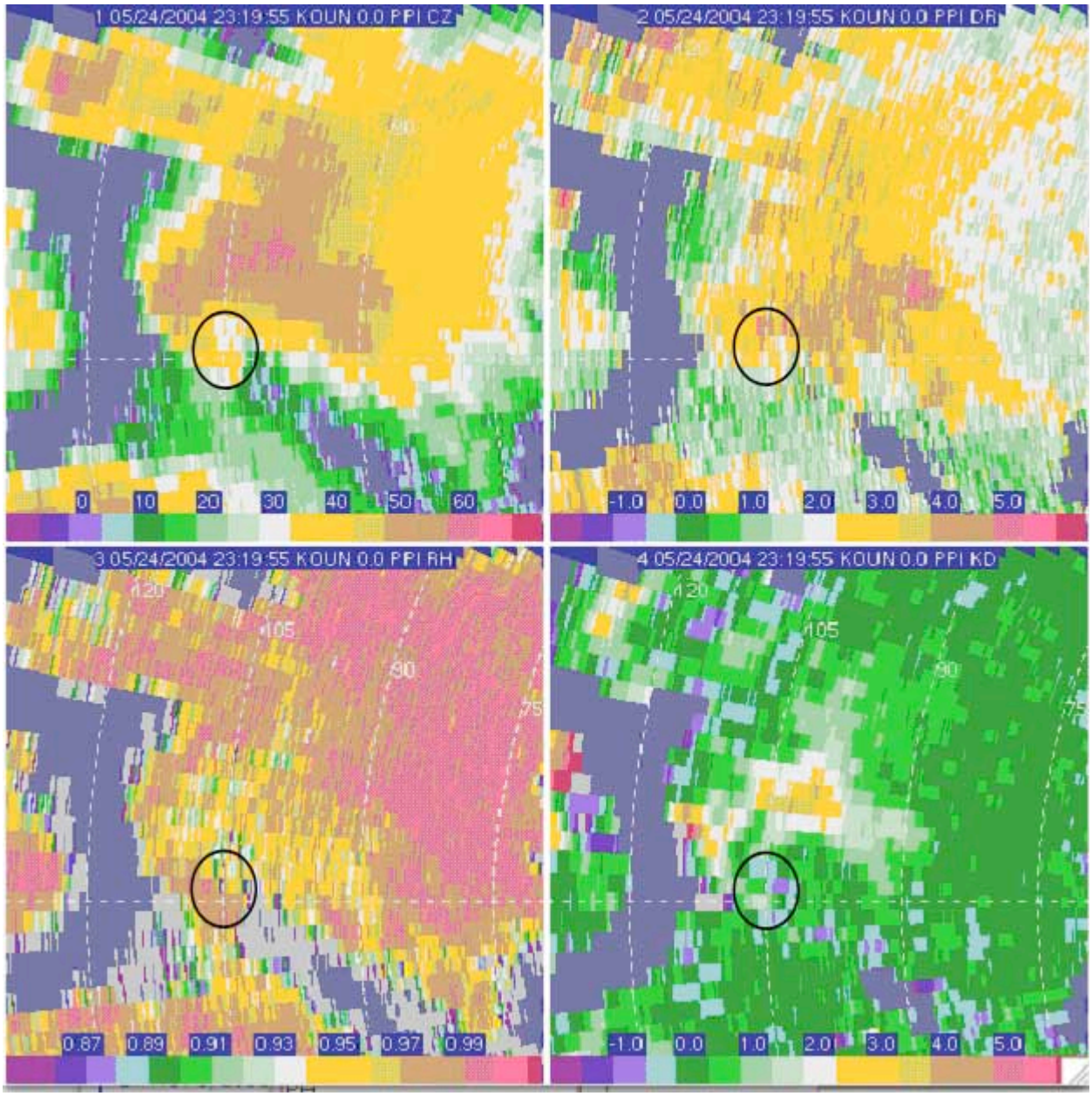

Figure 4b: Tornado time polarimetric data for the 24 May 2004 Southern Plains supercell, which affected the region near Binger, Oklahoma. Tornado location was about 100 km west of KOUN, and is indicated by a dark circle. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

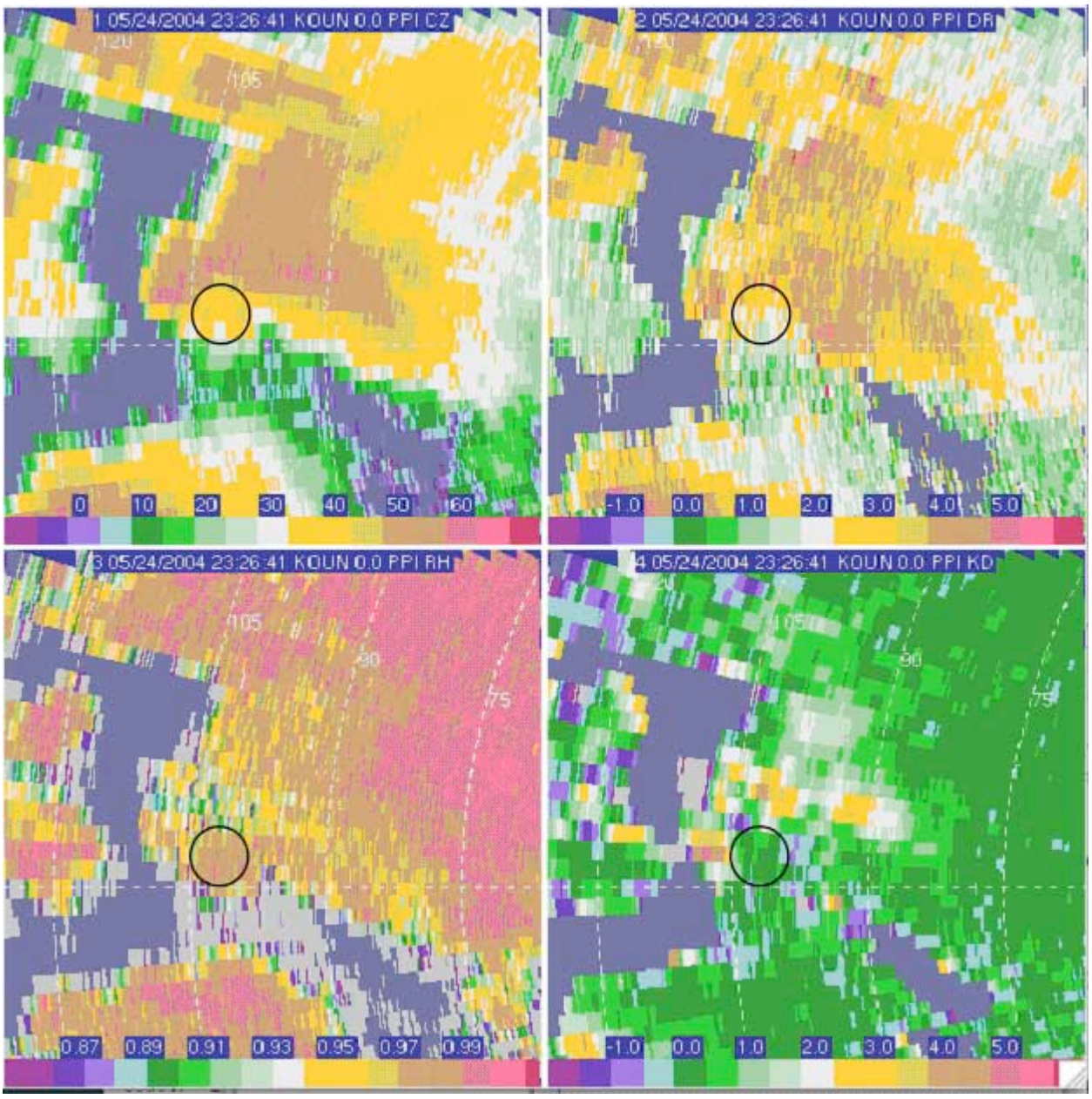

Figure 4c: Tornado demise time polarimetric data for the 24 May 2004 Southern Plains supercell, which affected the region near Binger, Oklahoma. Tornado dissipation was occurring about 100 km west of KOUN; a dark circle indicates this location. Fields shown, clockwise from upper left, are reflectivity (Z_{HH}), differential reflectivity (Z_{DR}), specific differential phase (K_{DP}), and correlation coefficient (ρ_{hv}).

Figure 5: 14 June 1998 Southern Plains Supercell (Cimarron)

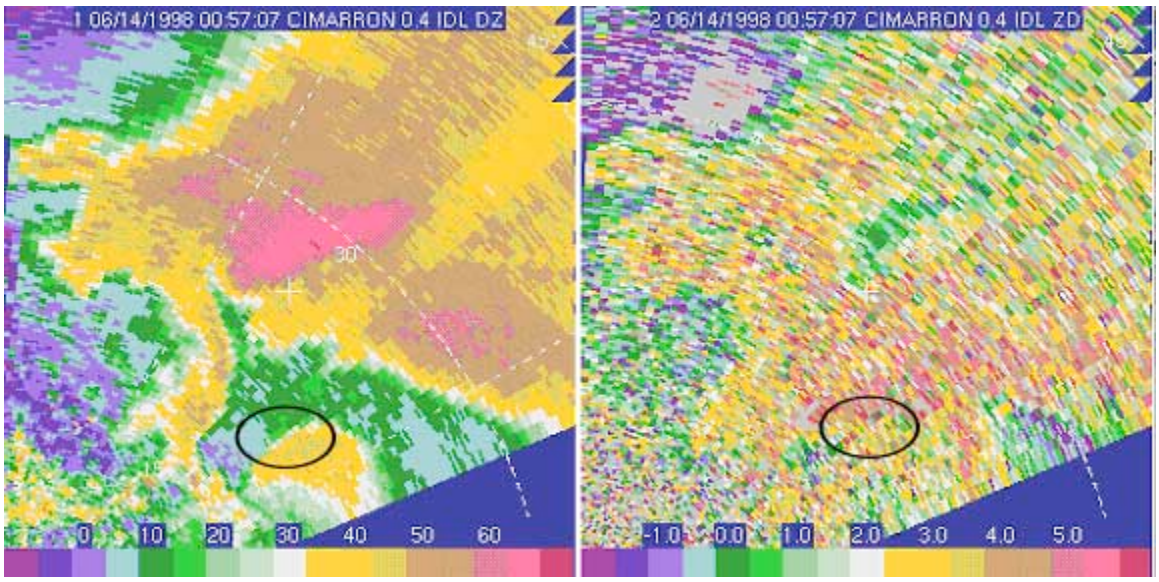

Figure 5a: Pre-tornado time polarimetric data for the 14 June 1998 Southern Plains supercell. Tornadogenesis region was about 22 km northeast of the Cimarron radar, and is indicated by a dark circle. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

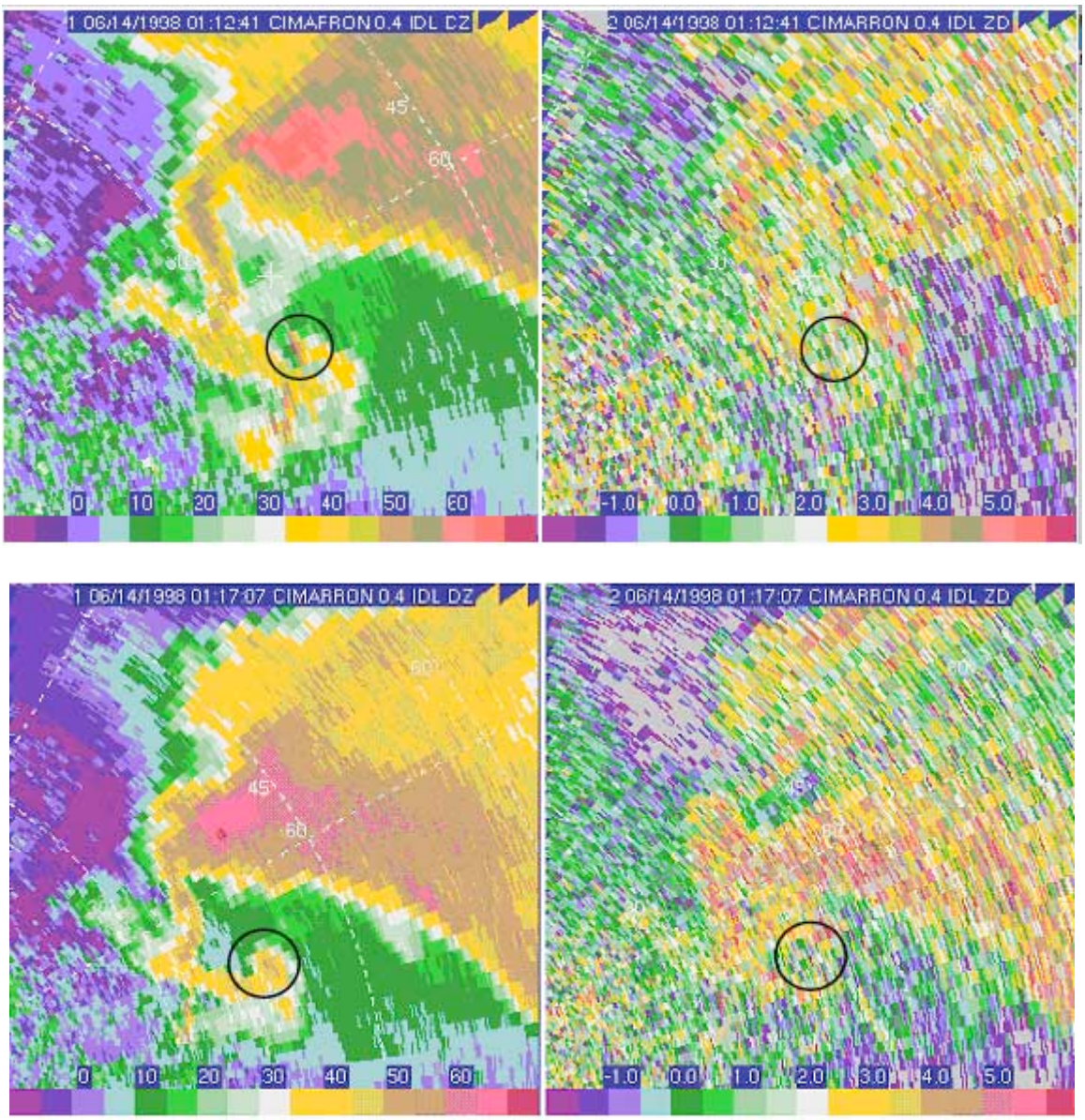

Figure 5b: Tornado time polarimetric data for the 14 June 1998 Southern Plains supercell. Tornado location was about 35 to 40 km east-northeast of the Cimarron radar; this tornado was rated F2. A dark circle indicates its location. Fields shown, from left to right, are reflectivity factor (Z_{HH}), and differential reflectivity (Z_{DR}). The top is early in the tornado life and the bottom is later in the tornado life.

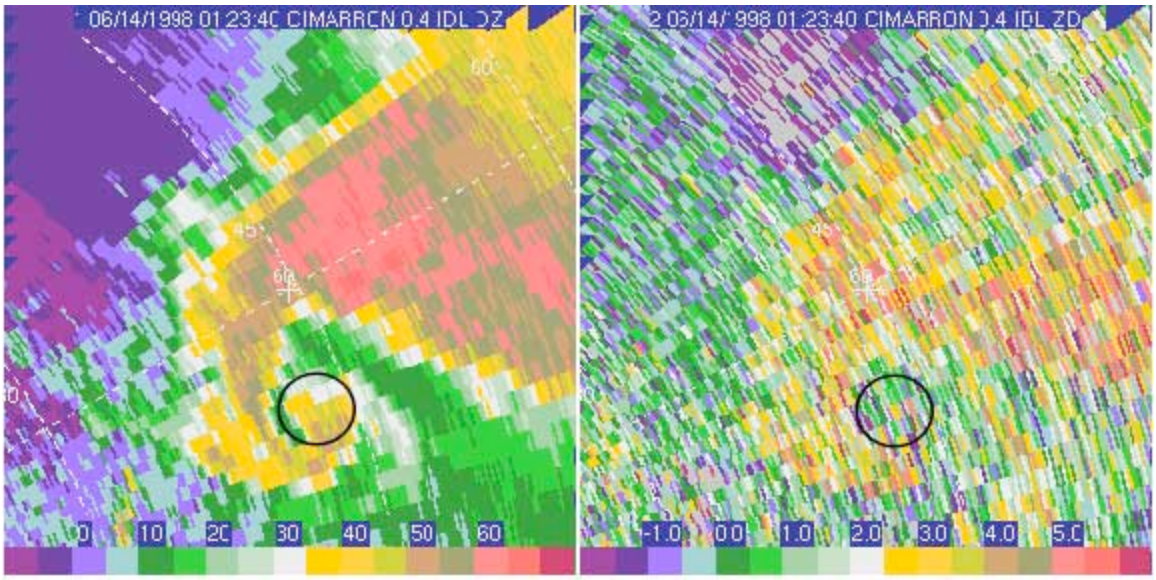

Figure 5c: Tornado demise time polarimetric data for the 14 June 1998 Southern Plains supercell. Tornado location was about 43 km east-northeast of the Cimarron radar, and is indicated by a dark circle. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

Figure 6: 05 October 1998 Southern Plains Supercell (Cimarron)

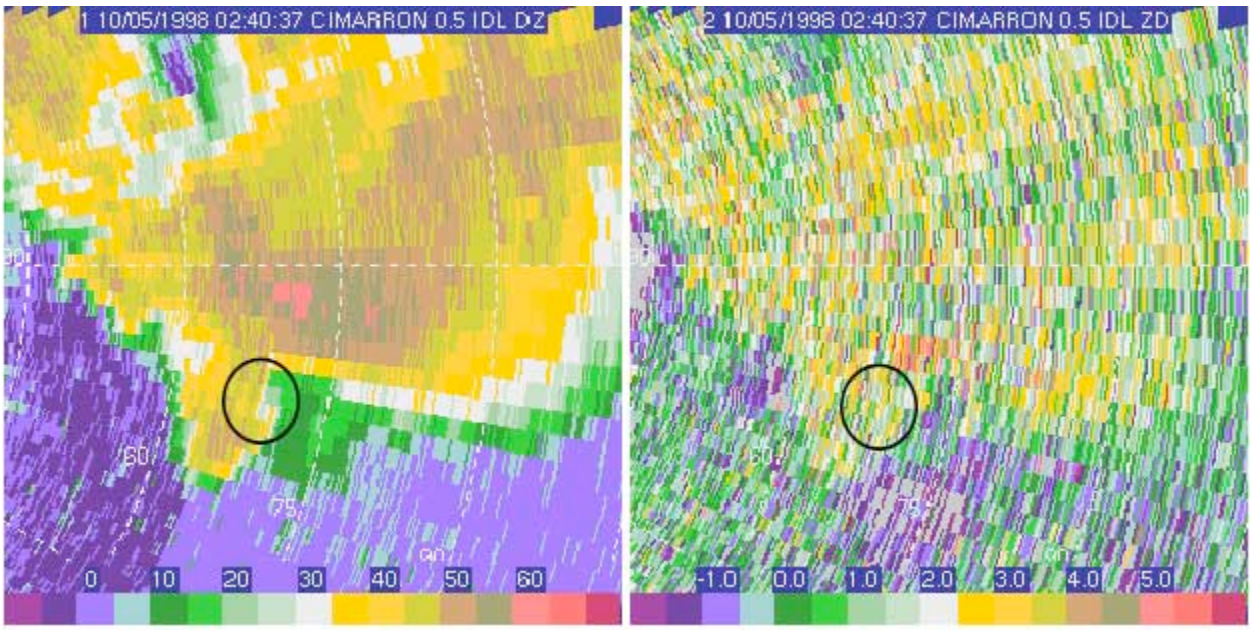

Figure 6a: Tornado time polarimetric data for the 05 October 1998 Southern Plains supercell. Tornadogenesis region was about 70 km east-southeast of the Cimarron radar, and is indicated by a dark circle. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

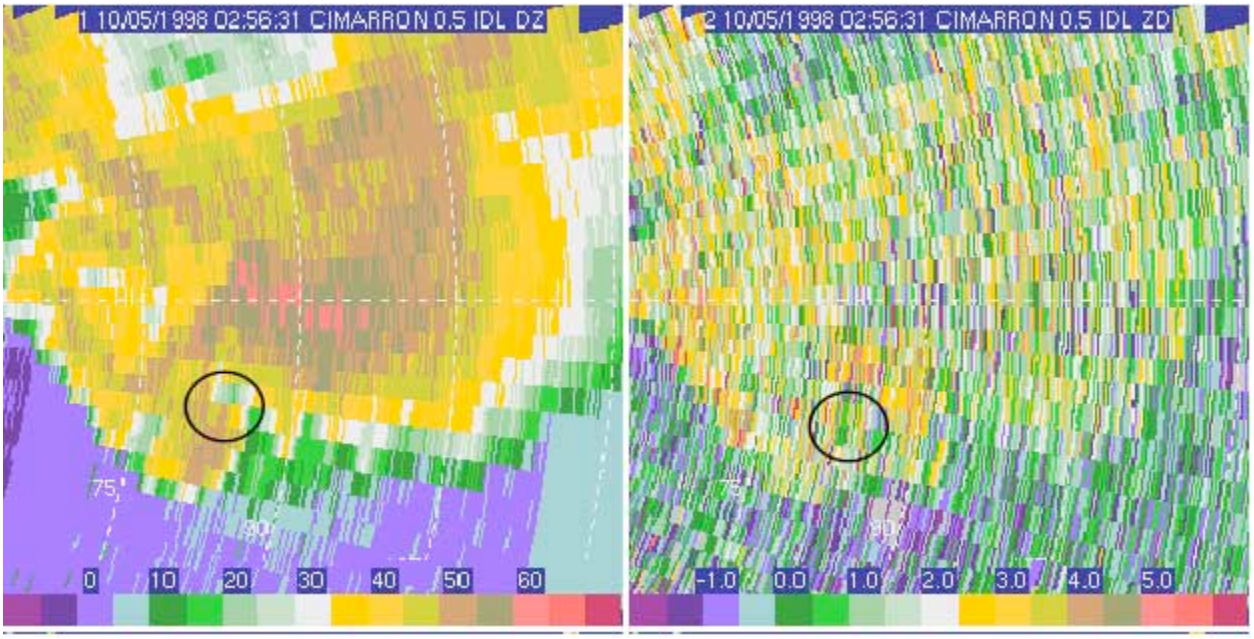

Figure 6b: Tornado time polarimetric data for the 05 October 1998 Southern Plains supercell. Tornadogenesis region was about 80 km east-southeast of the Cimarron radar, and is indicated by a dark circle. This tornado was rated F3. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

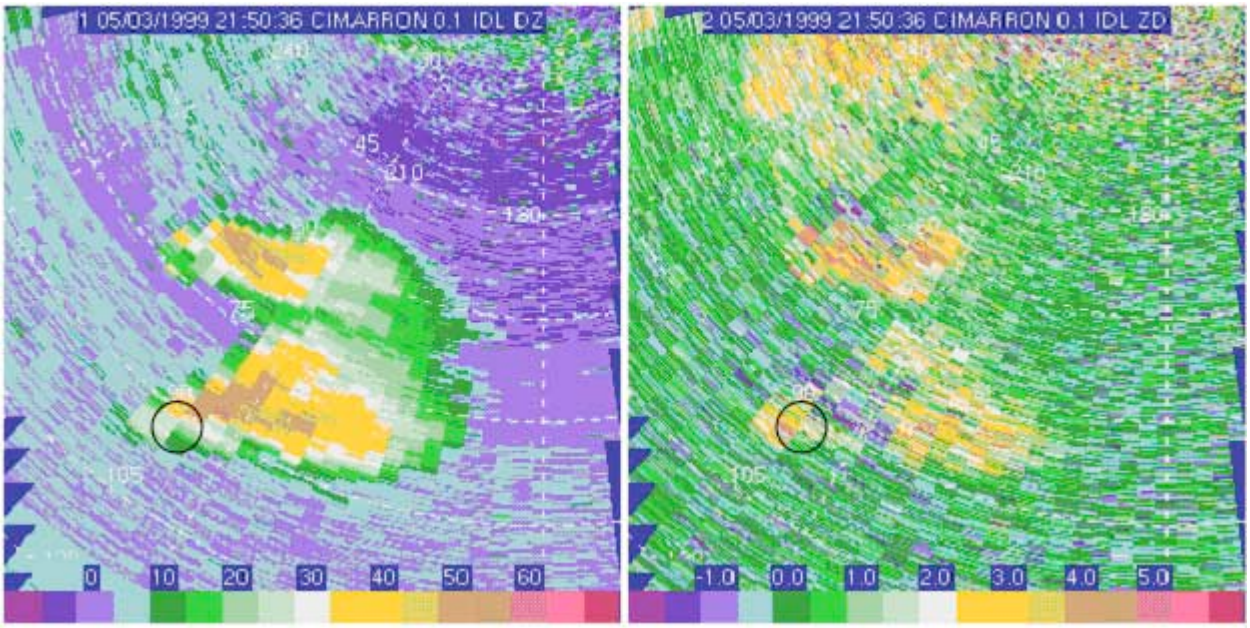

Figure 7a: Tornado time polarimetric data from storm A of the 03 May 1999 Southern Plains supercells (~21:50UTC). Tornadogenesis region was about 95 km south-southwest of the Cimarron radar, and is indicated by a dark circle. This tornado, one of many from this storm, was rated F1. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

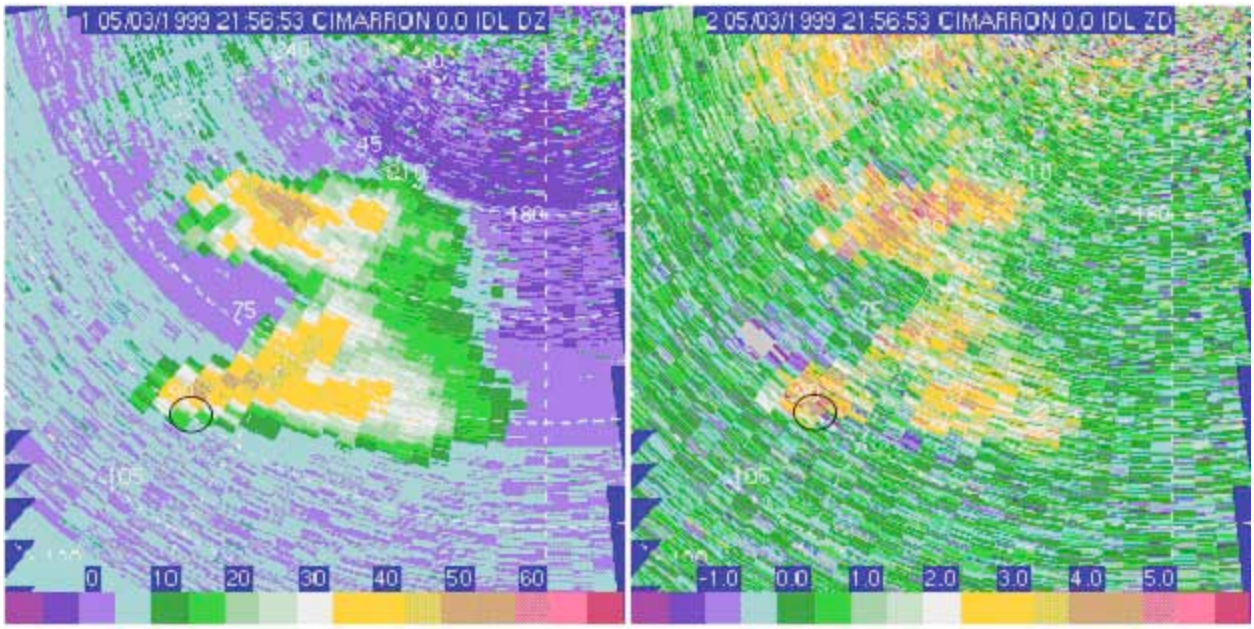

Figure 7b: Tornado demise time polarimetric data from storm A of the 03 May 1999 Southern Plains supercells (~21:56UTC). Location of tornado dissipation was about 90 km southwest of the Cimarron radar, and is indicated by a dark circle. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

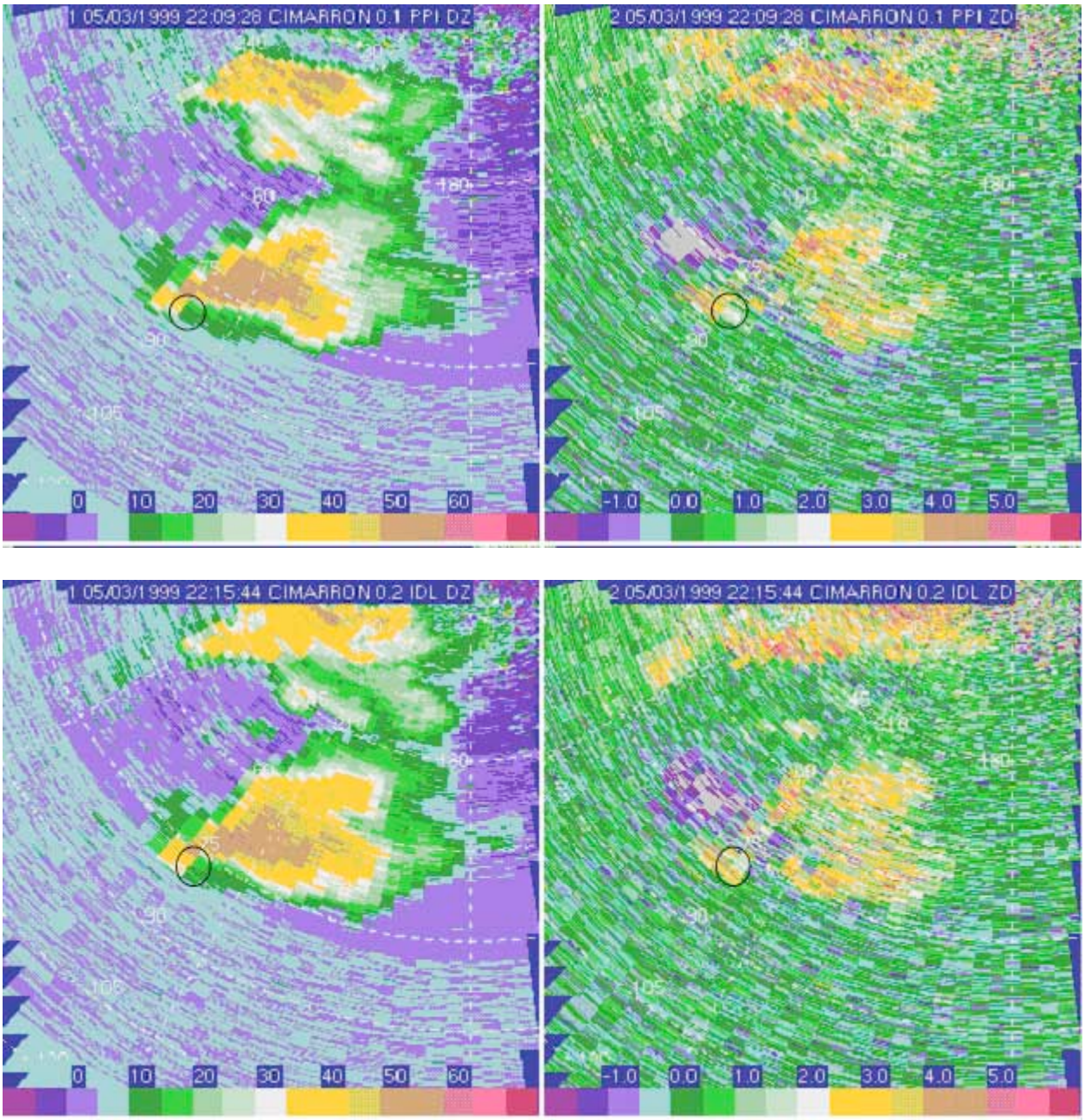

Figure 7c: Pre-tornado time polarimetric data for the third tornado from storm A of the 03 May 1999 Southern Plains supercells (~22:09 and ~21:15 UTC). Tornadogenesis region was about 80-85 km south-southwest of the Cimarron radar, and is indicated by a dark circle. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

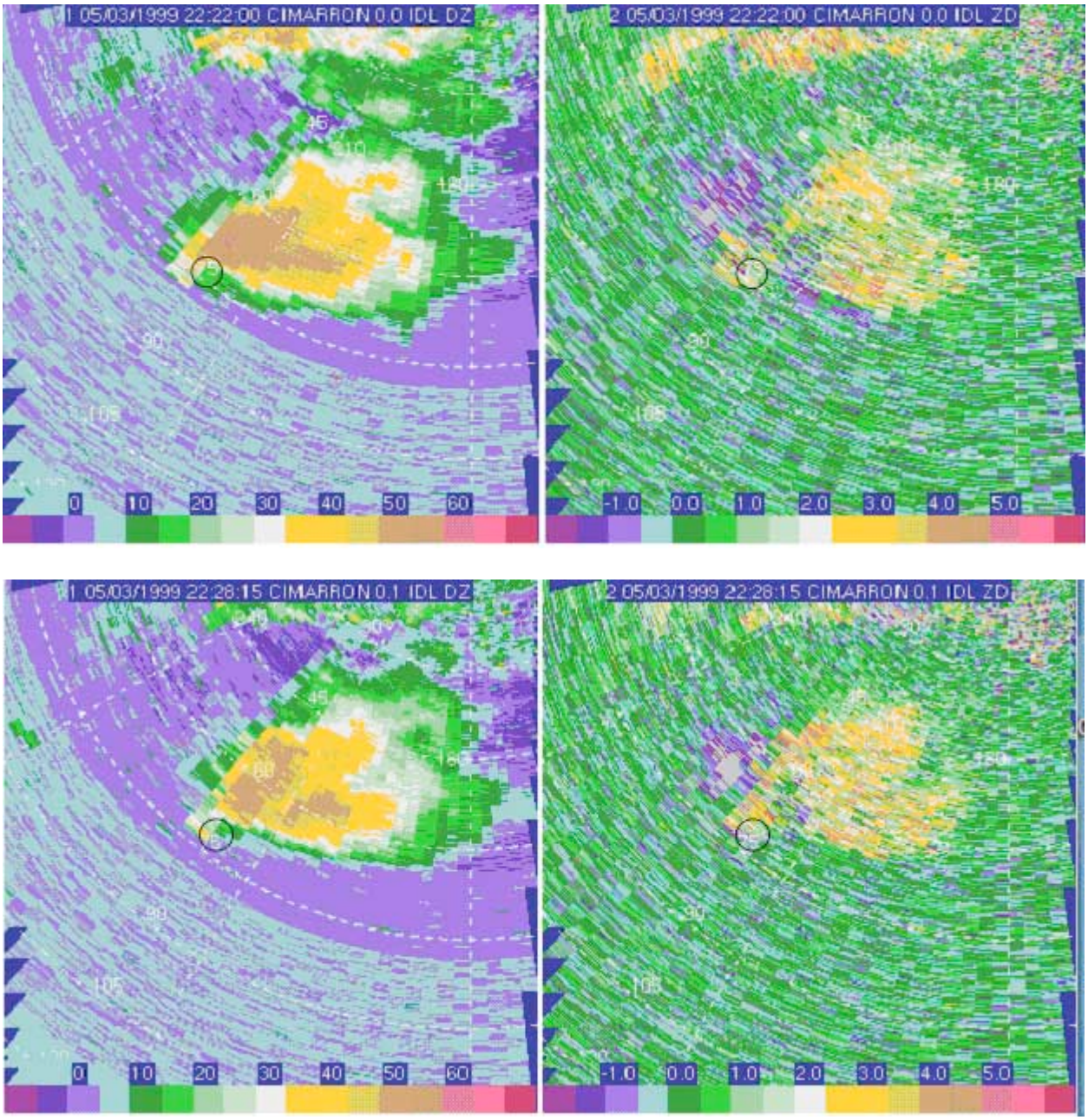

Figure 7d: Tornado time polarimetric data for the third tornado from storm A of the 03 May 1999 Southern Plains supercells (~22:22 and ~22:28 UTC). The F3 tornado was about 70-75 km south-southwest of the Cimarron radar; a dark circle indicates its location. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

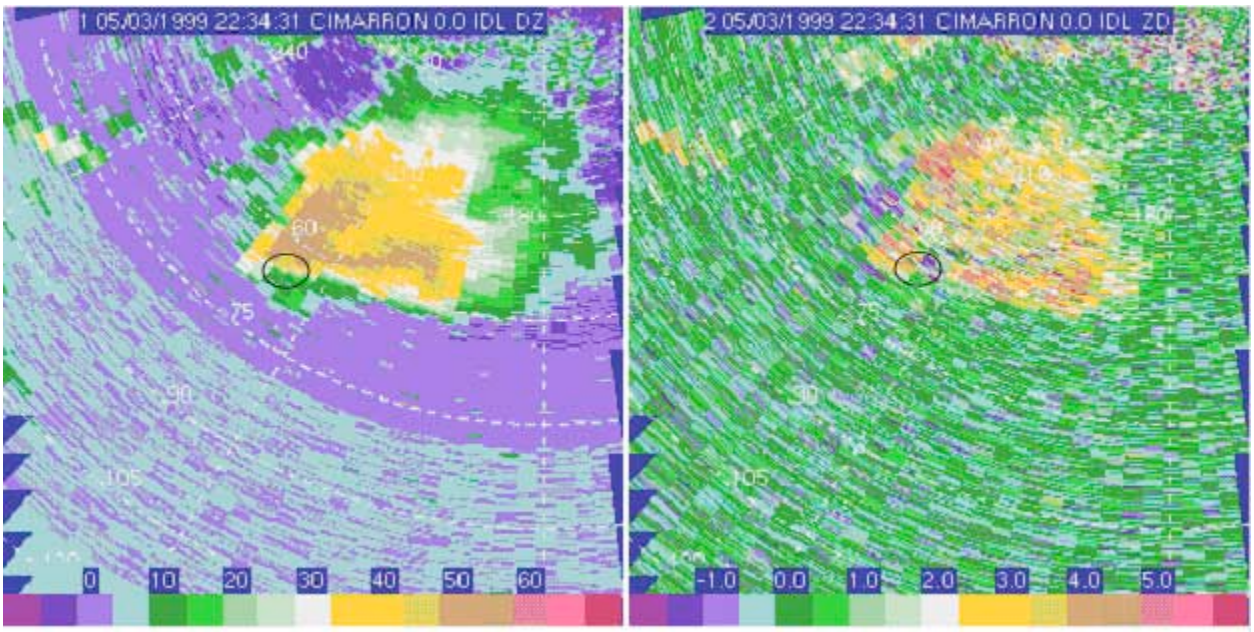

Figure 7e: Tornado demise time polarimetric data from storm A of the 03 May 1999 Southern Plains supercells (~22:34UTC). The tornado is dissipating about 65 km southwest of the Cimarron radar; a dark circle indicates this location. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

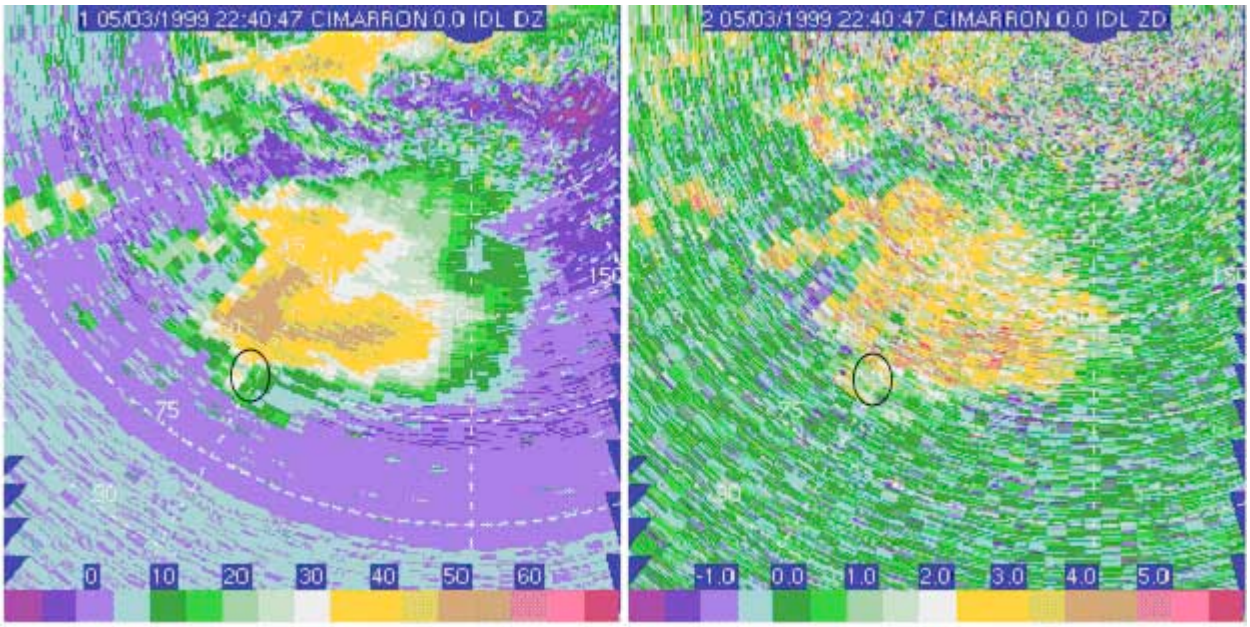

Figure 7f: Pre-tornado time polarimetric data for the sixth tornado from storm A of the 03 May 1999 Southern Plains supercells (~22:40 UTC). Tornadogenesis region was about 60-65 km south-southwest of the Cimarron radar, and is indicated by a dark circle. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

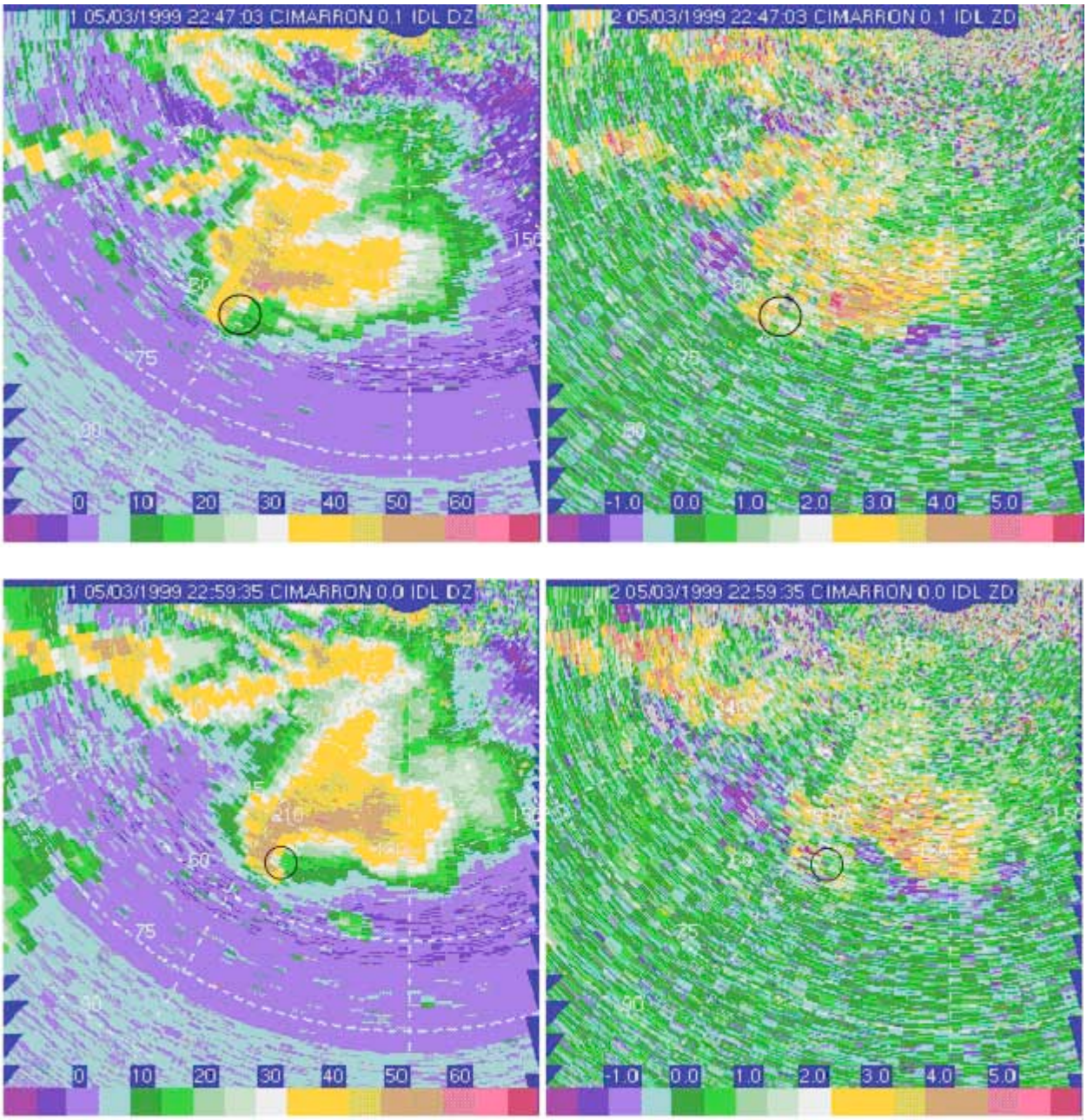

Figure 7g: Tornado time polarimetric data for the sixth tornado from storm A of the 03 May 1999 Southern Plains supercells (~22:47 and ~22:59 UTC). The F3 tornado was about 55-60 km south-southwest of the Cimarron radar; a dark circle indicates this location. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).

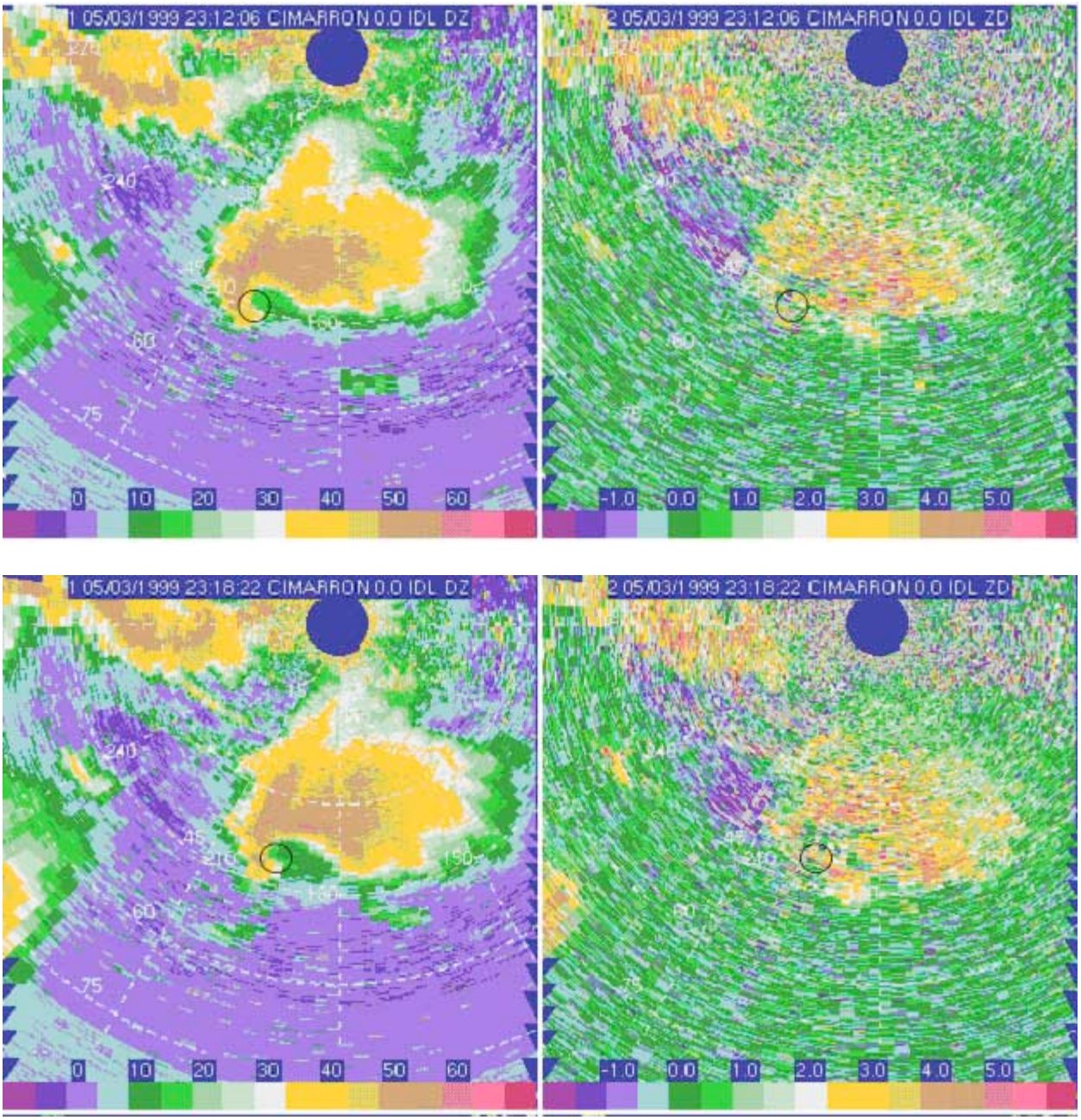

Figure 7h: Tornado time polarimetric data for the 8th tornado from storm A of the 03 May 1999 Southern Plains supercells (~23:12 and ~23:18 UTC). The F2 tornado was about 40-45 km south-southwest of the Cimarron radar; a dark circle indicates this location. Fields shown, from left to right, are reflectivity factor (Z_{HH}) and differential reflectivity (Z_{DR}).