Radar Coordination and Missions in VORTEX2

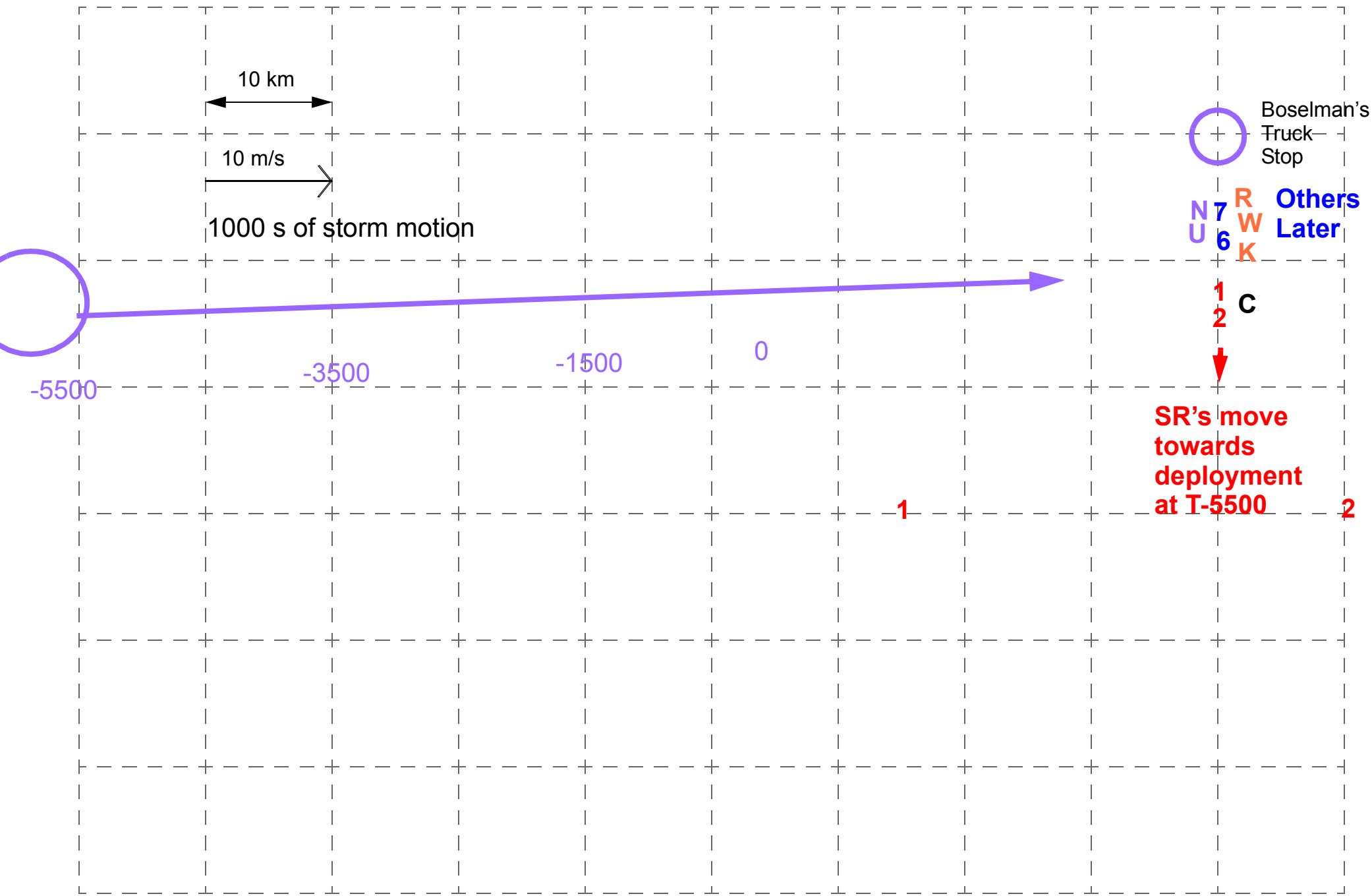
Three study scales: Storm, Mesocyclone, Tornado

Ten radars: SR1, SR2, DOW6, DOW7, NOXP, UMASSX, Rapid-Scan DOW, TTA-K, CIRPAS, UMASSW

Three generic operations modes for mesocyclone scale:

1. Continuous dual-Doppler
2. Continuous dual-Polarization
3. Fast moving / difficult storms

Storm is moving 10 m/s (20 mph)(30 km/h)
Idealized W-E road parallel motion.



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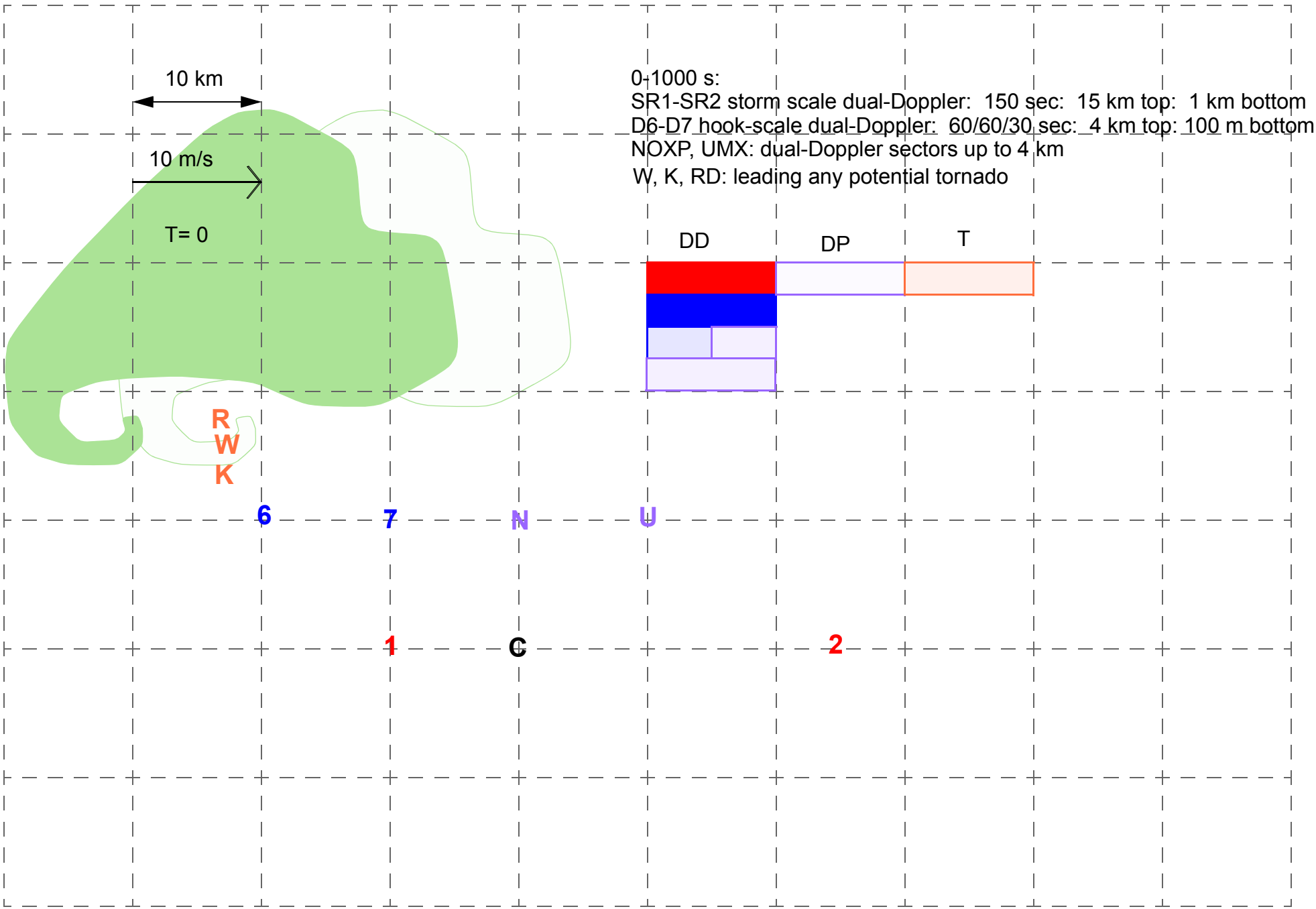
Continuous Dual-Doppler Slow



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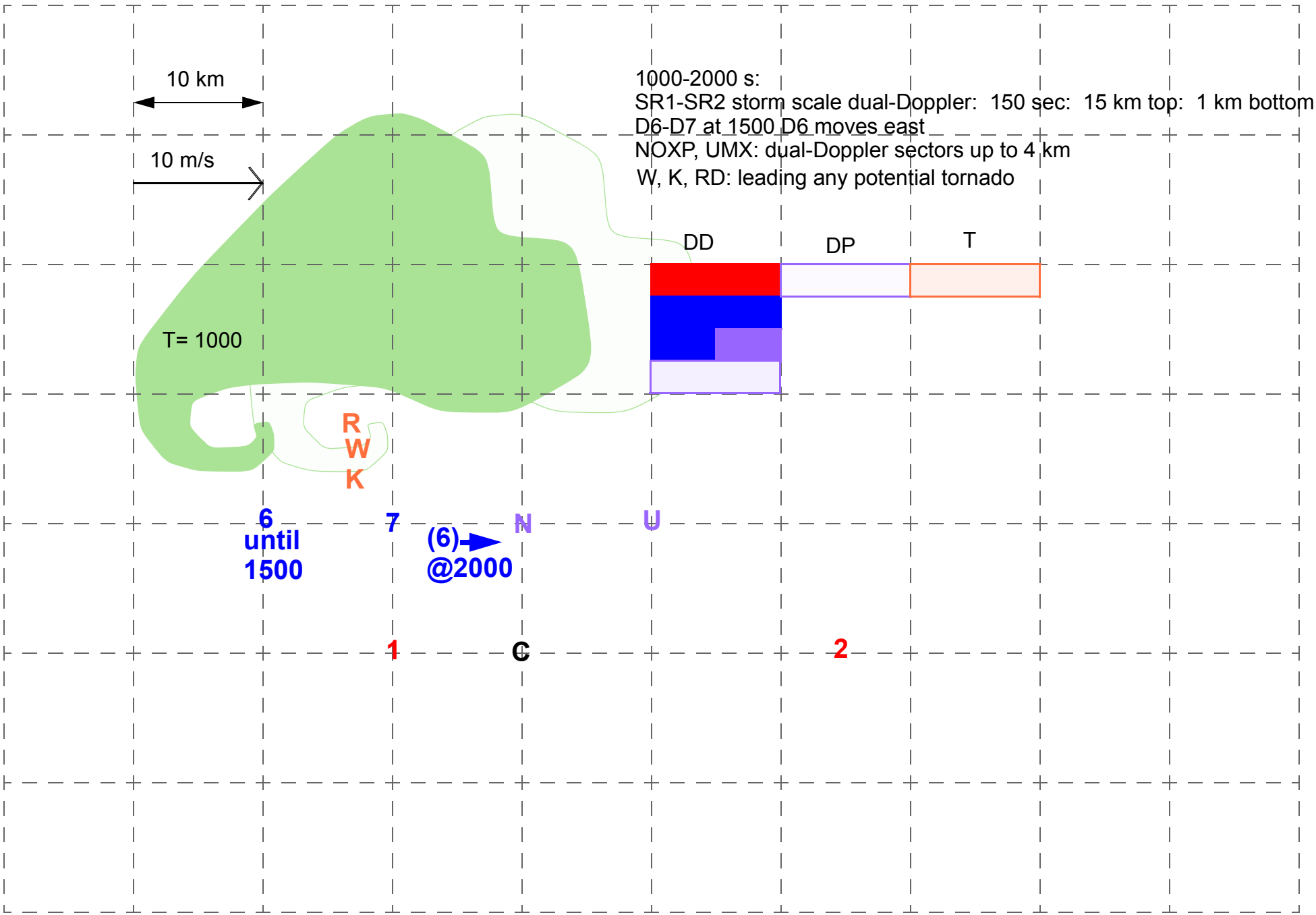

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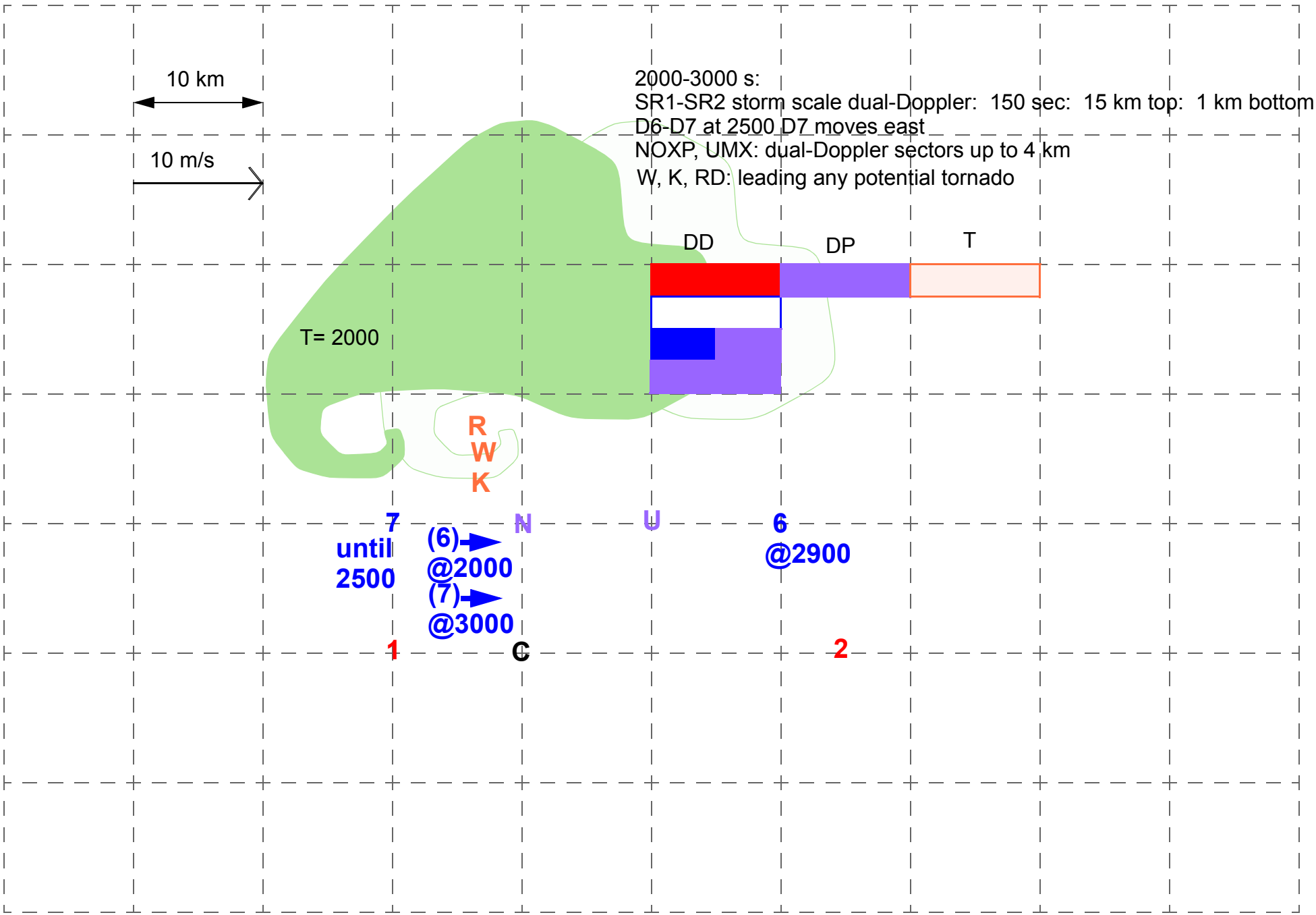

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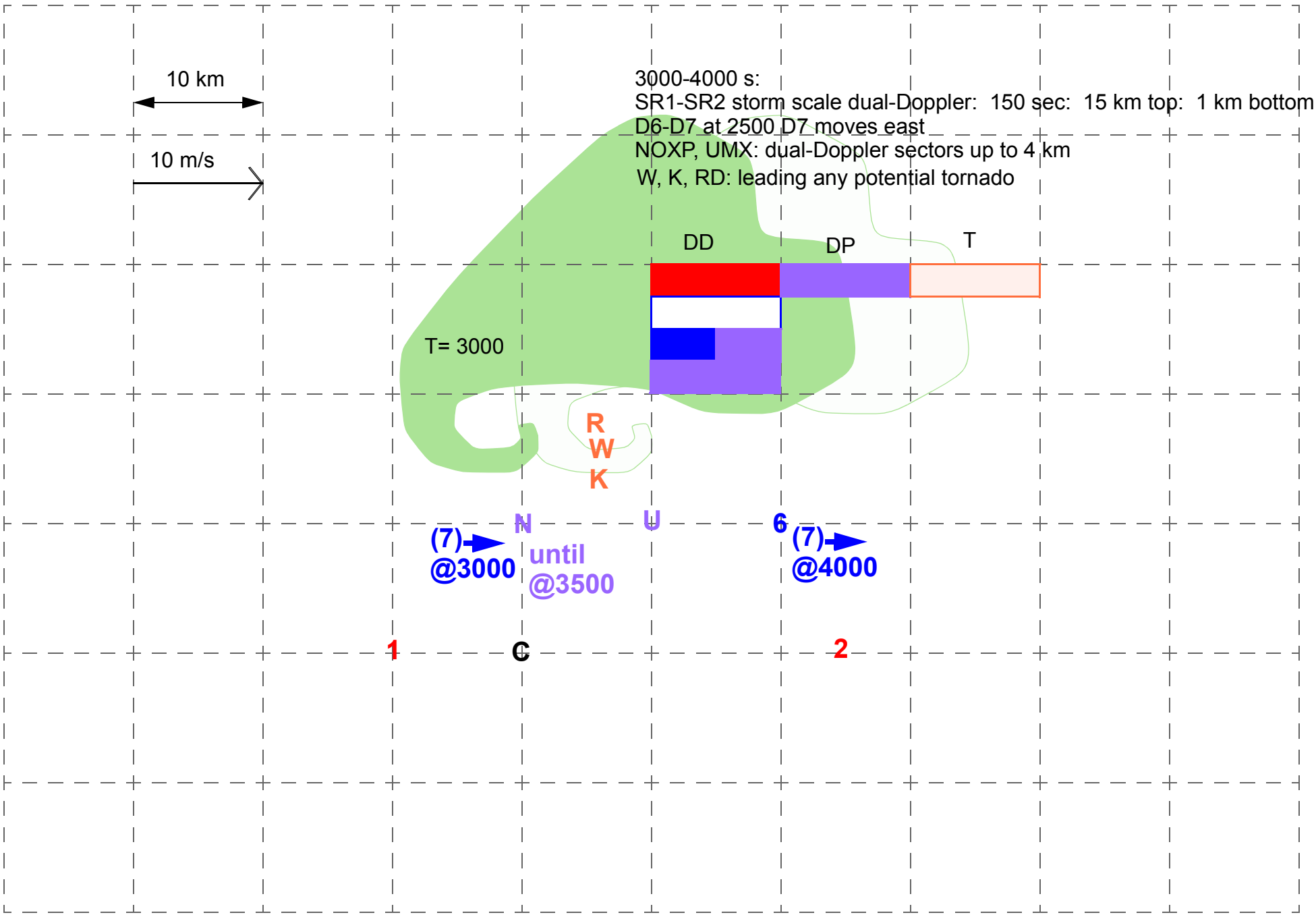

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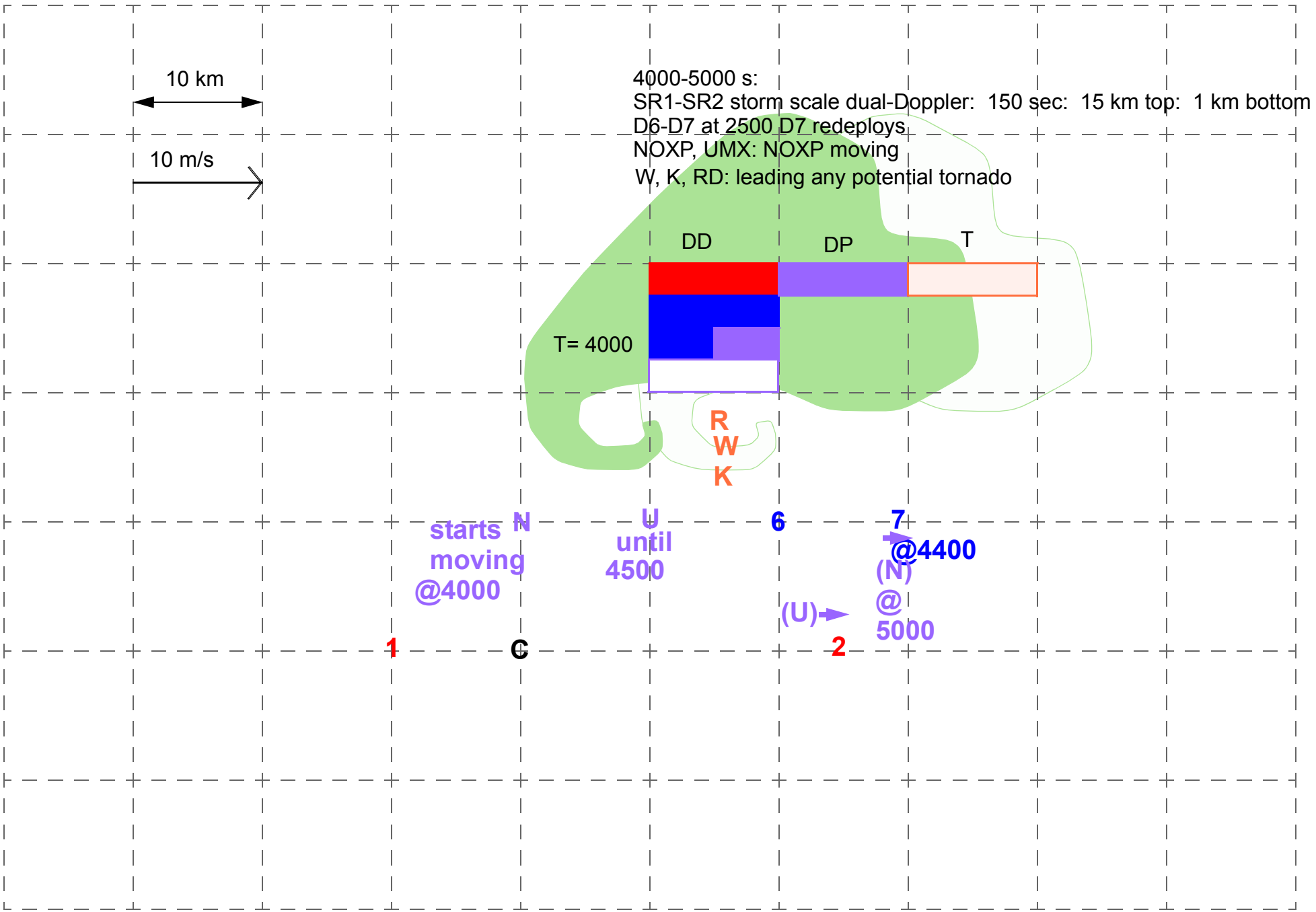

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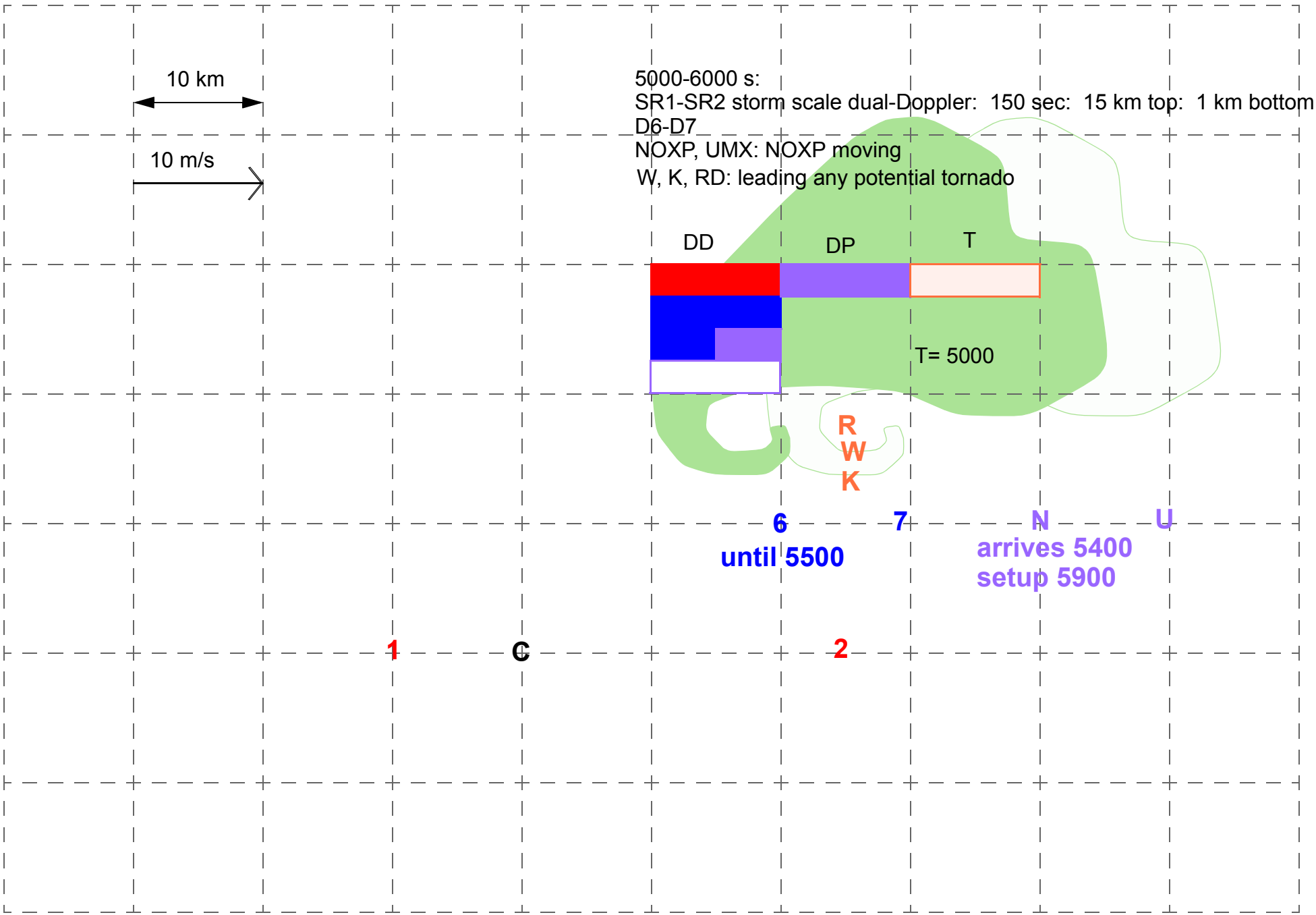

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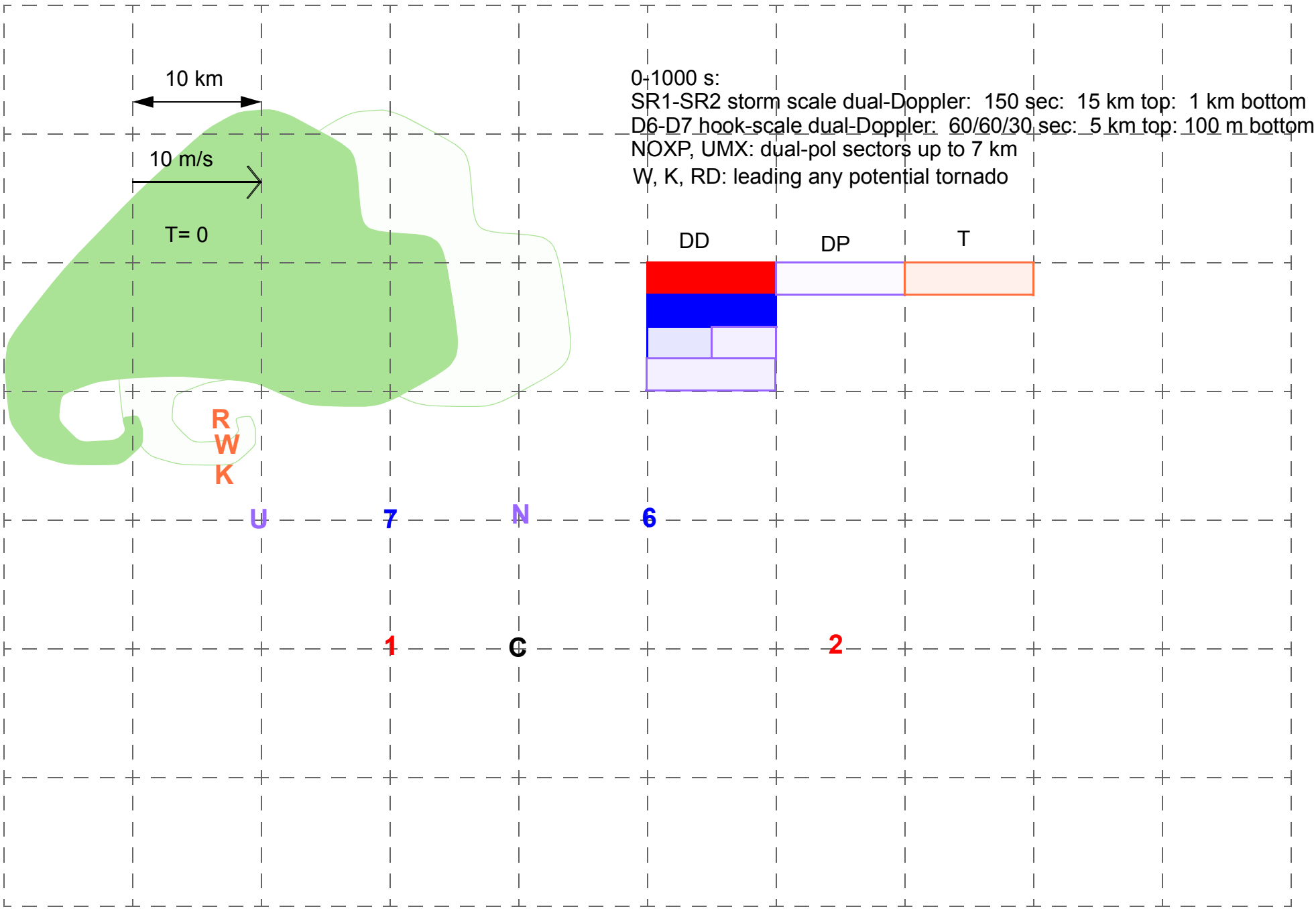
Continuous Dual-Pol Slow



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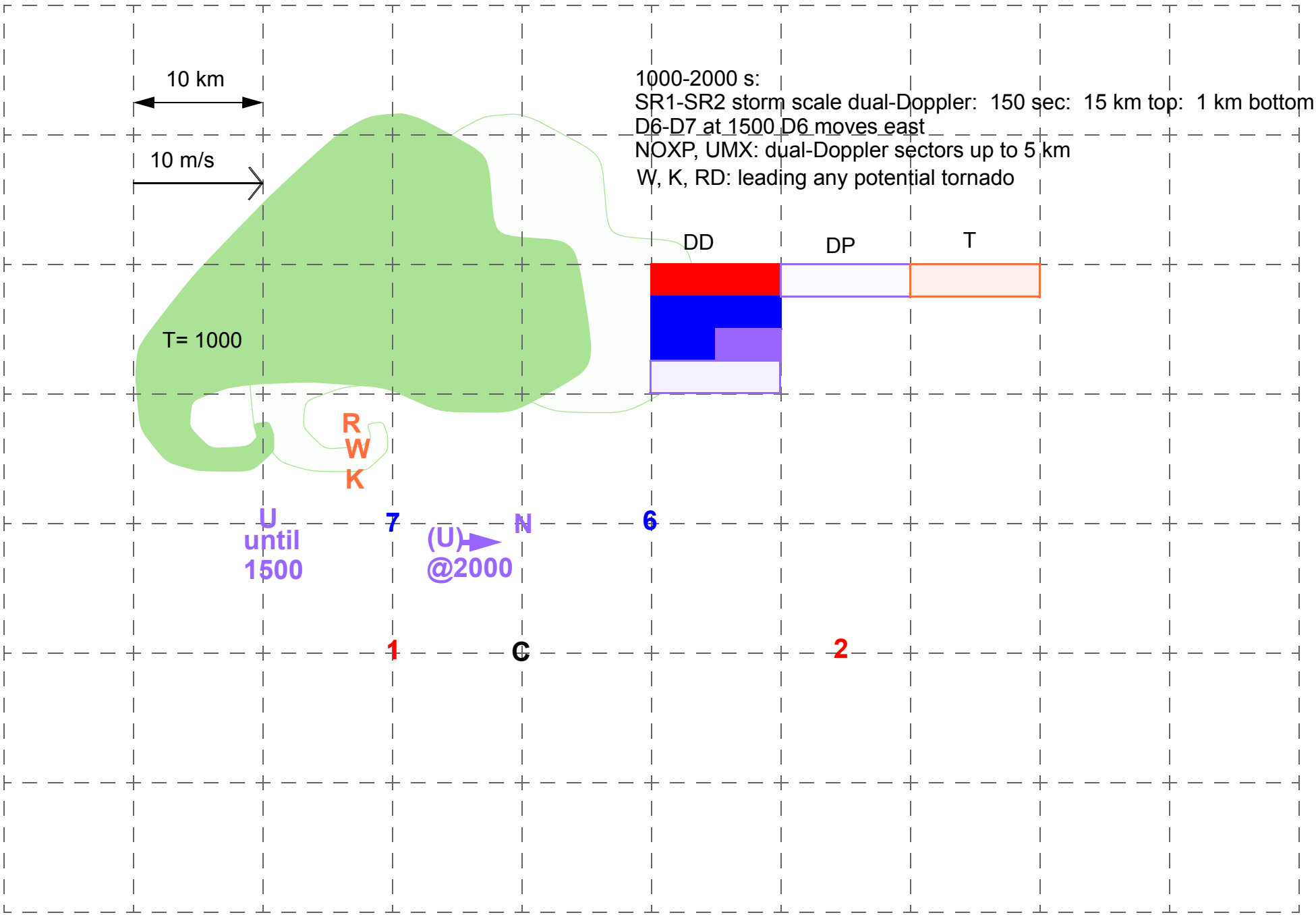

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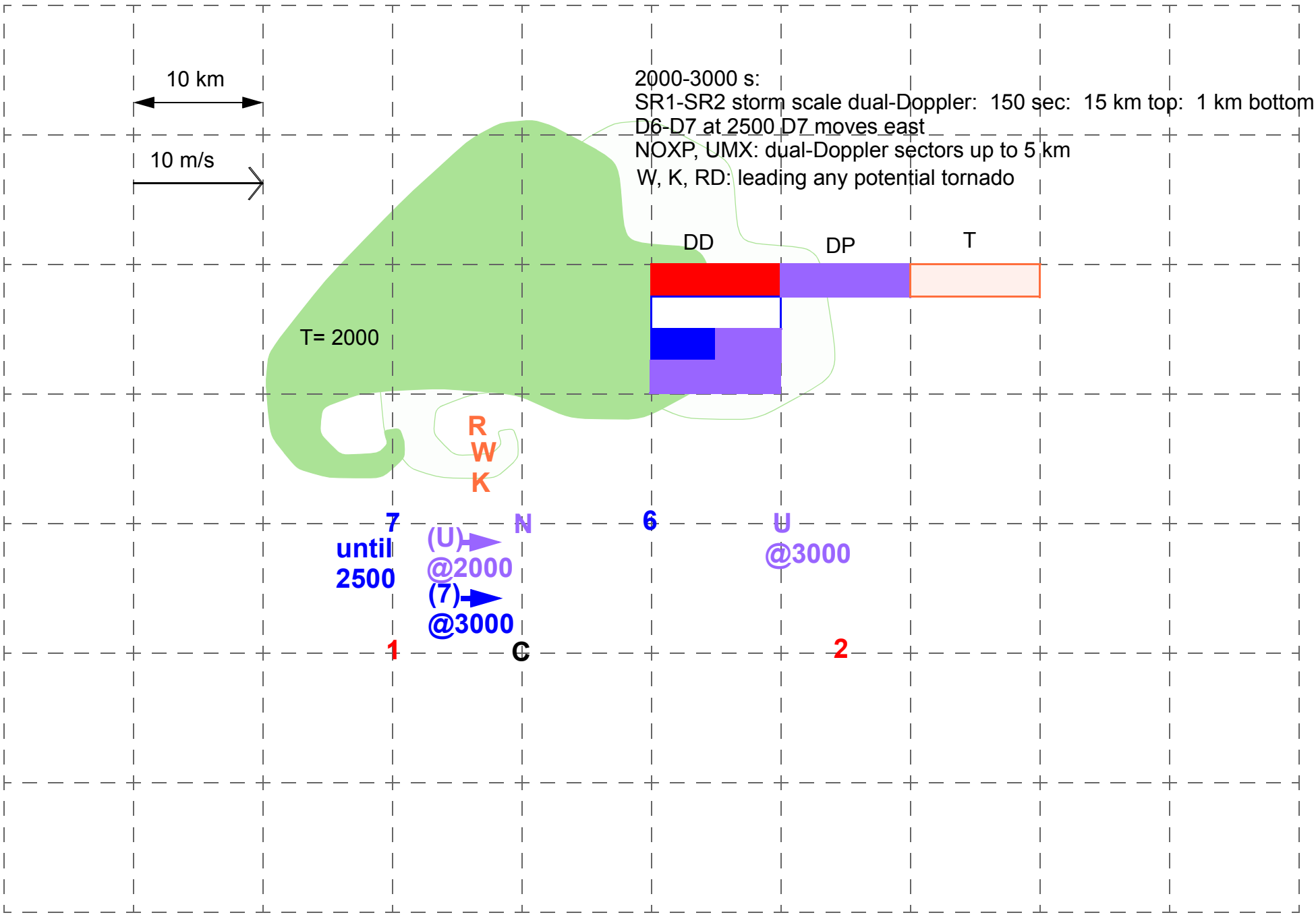

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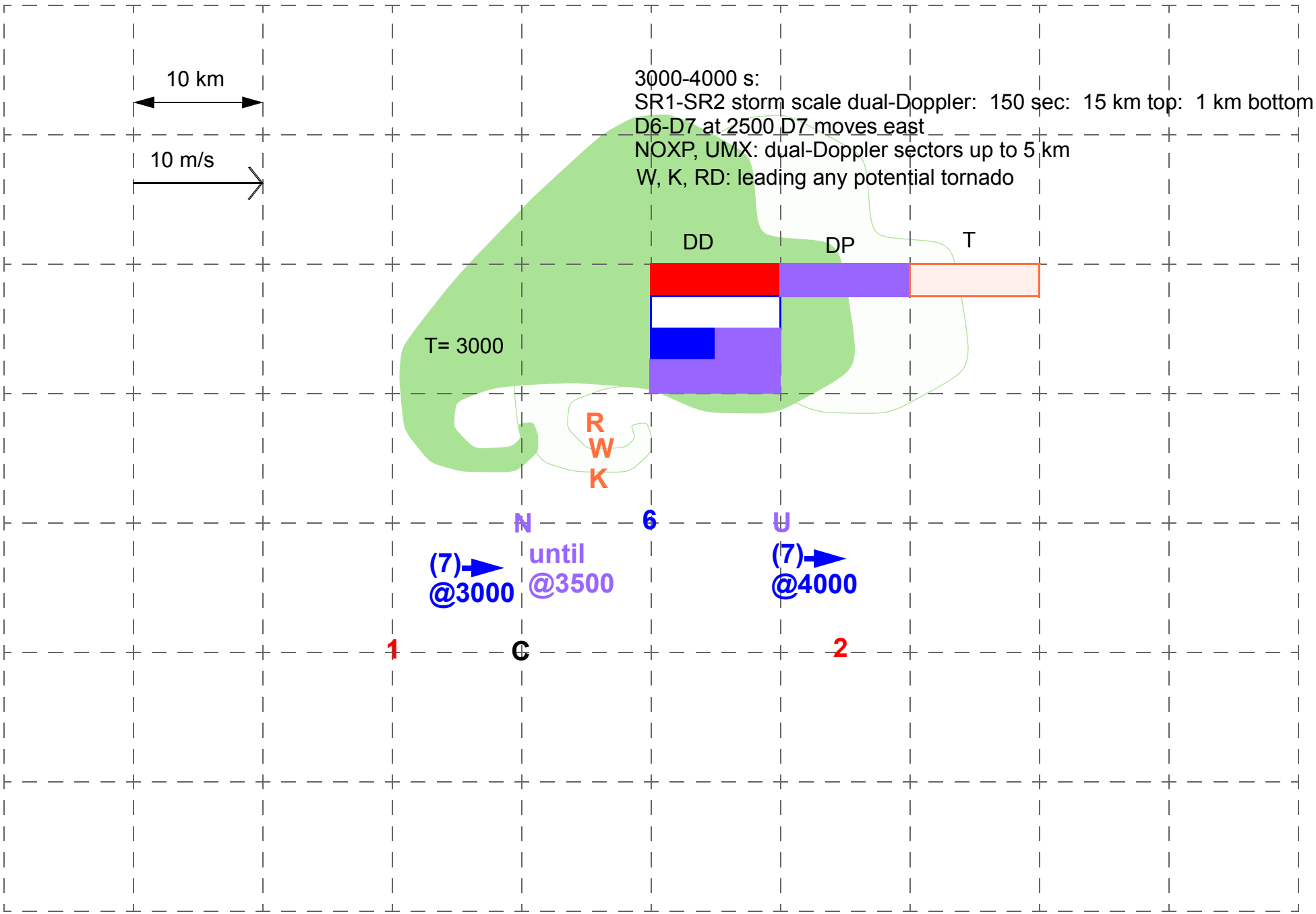
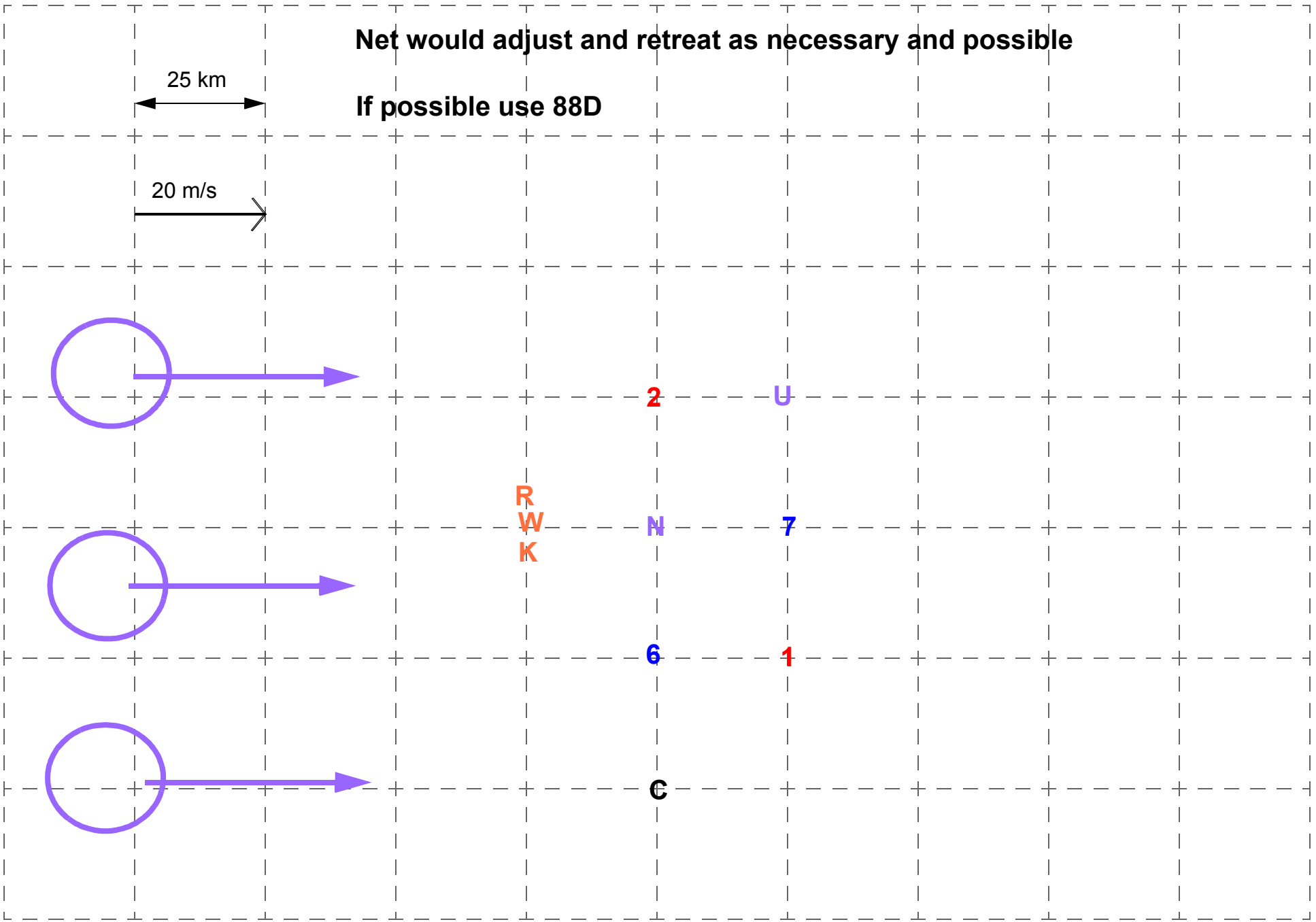


Fast Storm Mode: Set up a 25 km grid/net

Fast is > 13-15 m/s, depending on roads, angle of motion, etc.

Net would adjust and retreat as necessary and possible

If possible use 88D



Notes and Special Cases

Central OK Operations
Normal operations for slow storms
Consider anchoring to PAR for fast storms

Operations in Coordination with UAS
Normal operations. Bias towards UAS COA region if possible

Non Tornadic Weather
Consider operations on non-tornado days for CI
Consider post tornado operations in bow, squall, etc.

Intercomparisons
Target same non-tornadic storm with same scans, colocated, W,K,X,C intercomparison

Operations in CI on tornadic days
Consider early deployment for CI, keeping slower radars far to the east

Switching to tornado scans from DP or DD modes
If DD possible betweeen X-X or X-K in tornado: yes
If tornado crossing town: yes
If surface array is deployed in tornado: maybe
If only single Doppler and no surface array: no

HP Storms

Cyclic Storms
Consider expanding mesocyclone radar baselines
Continuous Dual-Doppler mode prefered

Mergers

Tornado

Probe

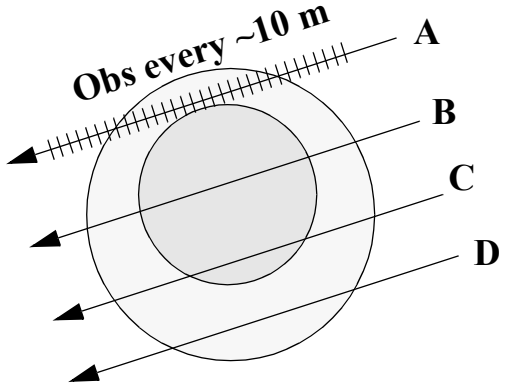
Probe

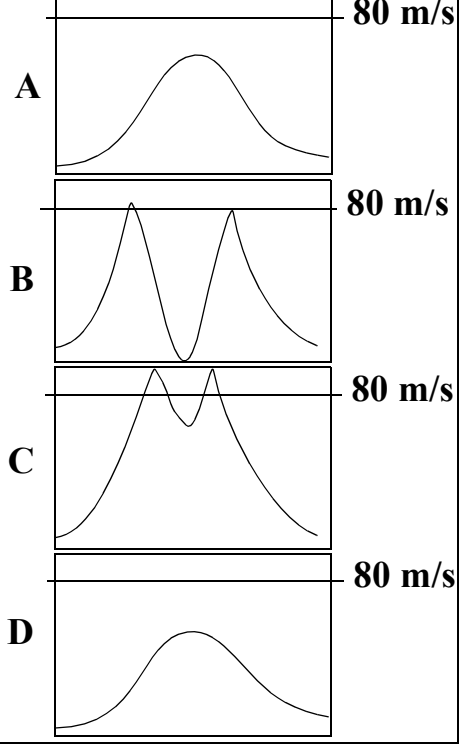
Probe

Rapid-DOW or TTA-K
or UMASS-W

In Situ Tornado Pods
RMY, Gill, T/RH

Tornado Pods





Different trajectories through tornado give radicaly different time histories of wind speed. (and, of course, direction)

Effective 2D gridspacing for winds is 50 m x 10 m, similar to radar.

Fence #1

20 pods distributed over 1000 m reduces probability of miss

Fence

50 m spacing

400 m

200 m

Forecast track at deployment time

Actual Track

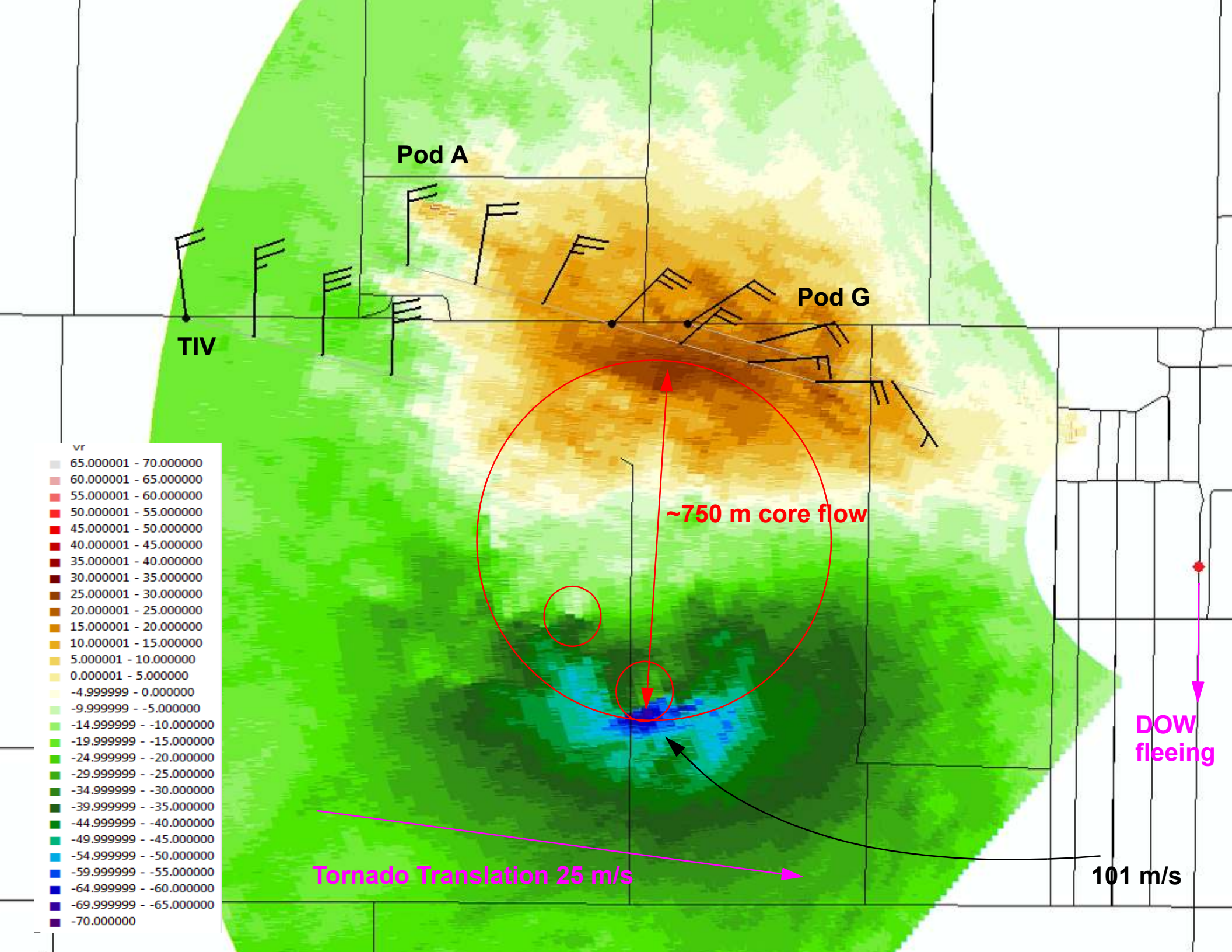
Core Flow Region

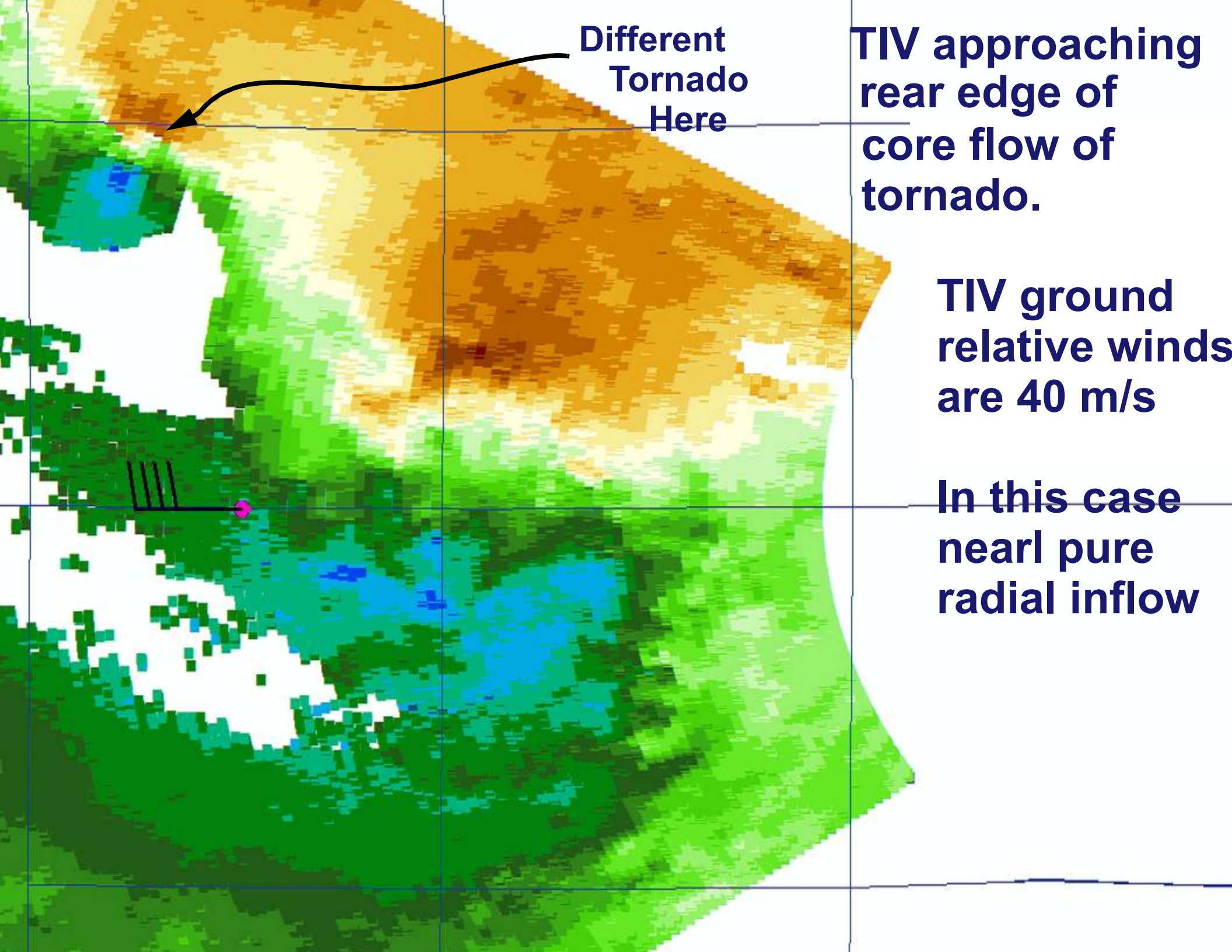
1.6-4.8 km

1 km distance at deployment time

= 100 s before transit @ 10 m/s

Array of 12 (more?) pods spaced at ~50 m will be much more likely to obtain quasi-2D sampling of tornado and nearby environment


Pod A
Pod G
TIV
~750 m core flow
DOW fleeing
Tornado Translation 25 m/s
101 m/s
Vr
65.000001 - 70.000000
60.000001 - 65.000000
55.000001 - 60.000000
50.000001 - 55.000000
45.000001 - 50.000000
40.000001 - 45.000000
35.000001 - 40.000000
30.000001 - 35.000000
25.000001 - 30.000000
20.000001 - 25.000000
15.000001 - 20.000000
10.000001 - 15.000000
5.000001 - 10.000000
0.000001 - 5.000000
-4.999999 - 0.000000
-9.999999 - -5.000000
-14.999999 - -10.000000
-19.999999 - -15.000000
-24.999999 - -20.000000
-29.999999 - -25.000000
-34.999999 - -30.000000
-39.999999 - -35.000000
-44.999999 - -40.000000
-49.999999 - -45.000000
-54.999999 - -50.000000
-59.999999 - -55.000000
-64.999999 - -60.000000
-69.999999 - -65.000000
-70.000000


Different
Tornado
Here
TIV approaching rear edge of core flow of tornado.
TIV ground relative winds are 40 m/s
In this case nearl pure radial inflow