Breakpoints for farm field runoff

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The piecewise models we use here allow a seaparate slope and intercept on either side of the breakpoint. The breakpoint chosen is the one that minimizes the residual standard error, with the condition that there must be at least four data points on both sides of the breakpoint. The p-values cited in this paper are based on an F test of the improvement in model fit between the piecewise model (with four parameters: a slope and an intercept for each line segment) and a linear model (with two parameters: one slope and one intercept covering the entire range of data).

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Soil moisture breakpoints by farm:
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DF1: 36; p < 0.0001
DF1a: 36; p = 0.0725
DF1b: 36; p < 0.0001
DF2: 38; p = 0.0138
DF2a: 38; p = 0.0104
DF2b: 40; p = 1e-04
DF2c: 38; p = 0.0156
DF3: 36; p < 0.0001
```

Now get the I30 breakpoints:

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I30 breakpoints by farm:
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DF1: 2.3; p=p = 0.0237
DF1a: 2.3; p=p = 6e-04
DF1b: 2.3; p=p = 0.2438
DF2: 2.7; p=p = 0.0192
DF2a: 2.3; p=p = 0.0779
DF2b: 2.1; p=p = 0.0206
DF2c: 3.4; p=p = 0.0577
DF3: 1.7; p=p = 0.0537
```

Now split the data into two bins based on the soil moisure breakpoint (above vs. below the breakpoint) and find the I30 breakpoint in each bin:

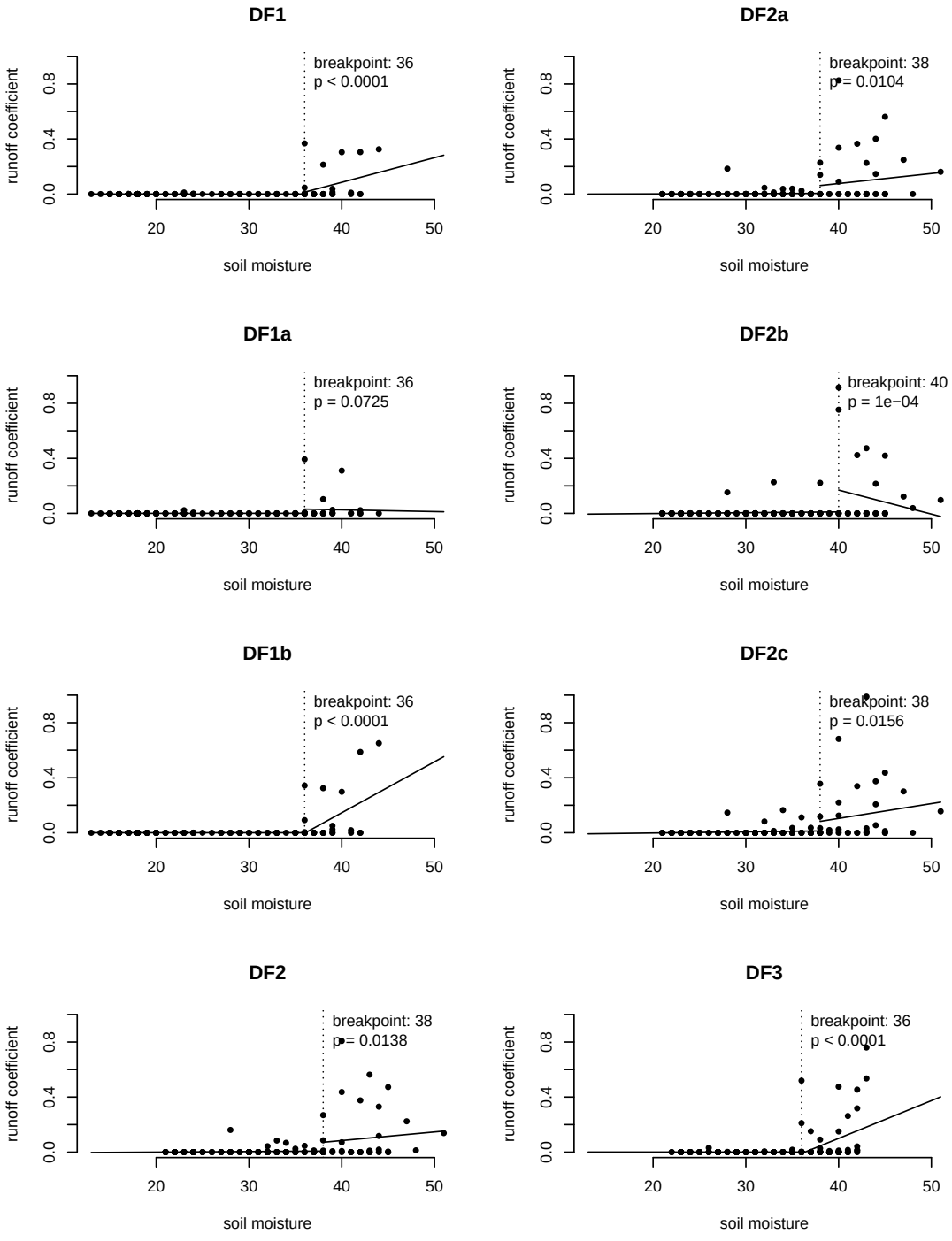

Figure 1: caption.

```
Intensity breakpoints at DF1 when binned by soil moisture:
0 <= SM < 36: 1.3; p=p = 0.0202
36 <= SM < Inf: 0.6; p=p = 0.4873

Intensity breakpoints at DF2 when binned by soil moisture:
0 <= SM < 38: 1.6; p=p = 2e-04
38 <= SM < Inf: 2.1; p=p = 0.1527

Intensity breakpoints at DF3 when binned by soil moisture:
0 <= SM < 36: 1.6; p=p = 0.1492
36 <= SM < Inf: 1.6; p=p = 0.037
```

When we put the events in bins based on their antecedent soil moisture (SM: high or low), the following are the precipitation breakpoints (units are centimeters of rain):

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Precipitation breakpoints at DF1 when binned by soil moisture:
0 <= SM < 36: 2.61; p=p < 0.0001
36 <= SM < Inf: 1.91; p=p = 0.1923

Precipitation breakpoints at DF2 when binned by soil moisture:
0 <= SM < 38: 2.04; p=p < 0.0001
38 <= SM < Inf: 2.09; p=p = 0.0712

Precipitation breakpoints at DF3 when binned by soil moisture:
0 <= SM < 36: 1.85; p=p = 0.001
36 <= SM < Inf: 1.46; p=p = 0.2429
```

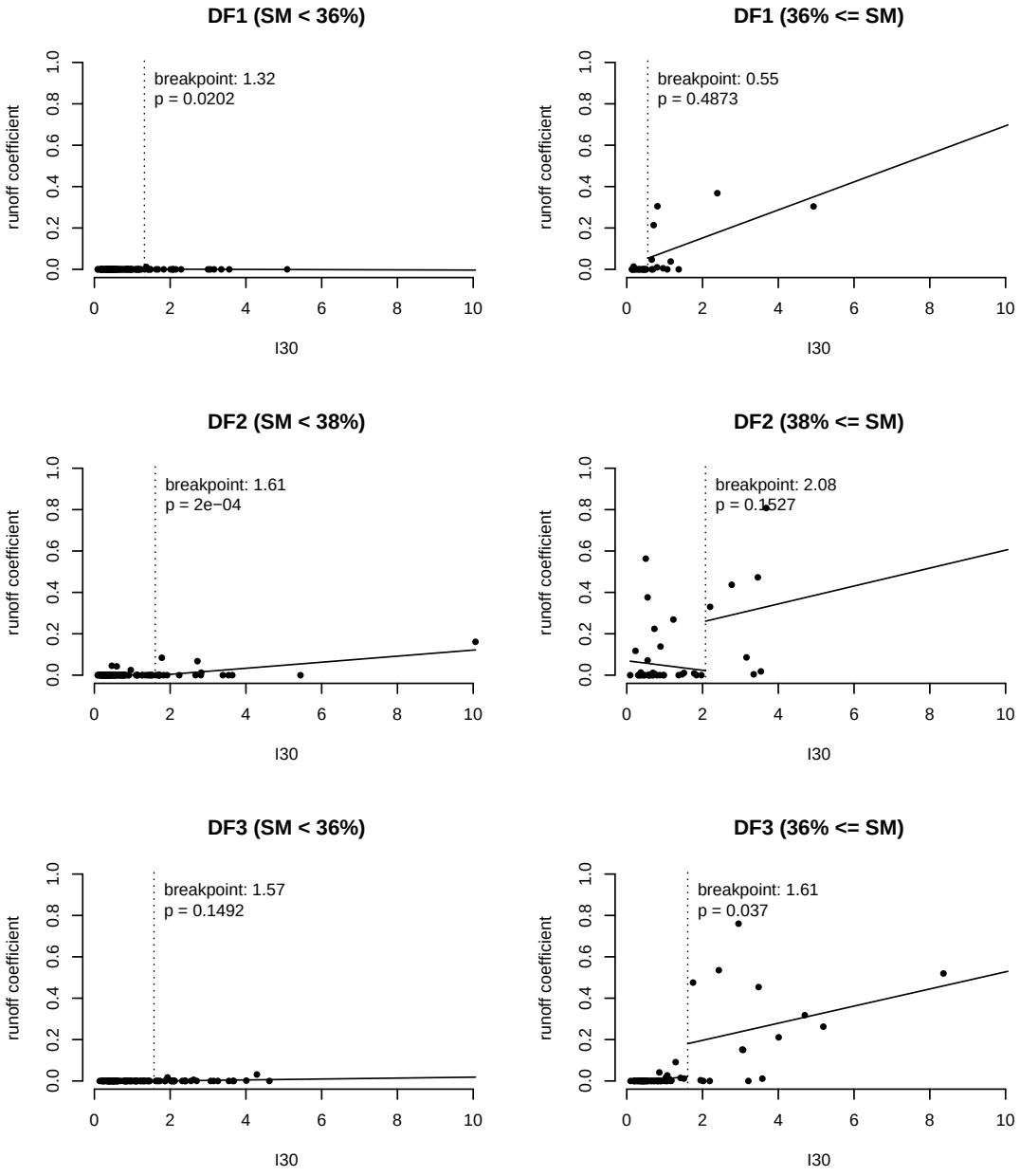

Figure 2: Top row: DF1, middle row: DF2, bottom row: DF3.

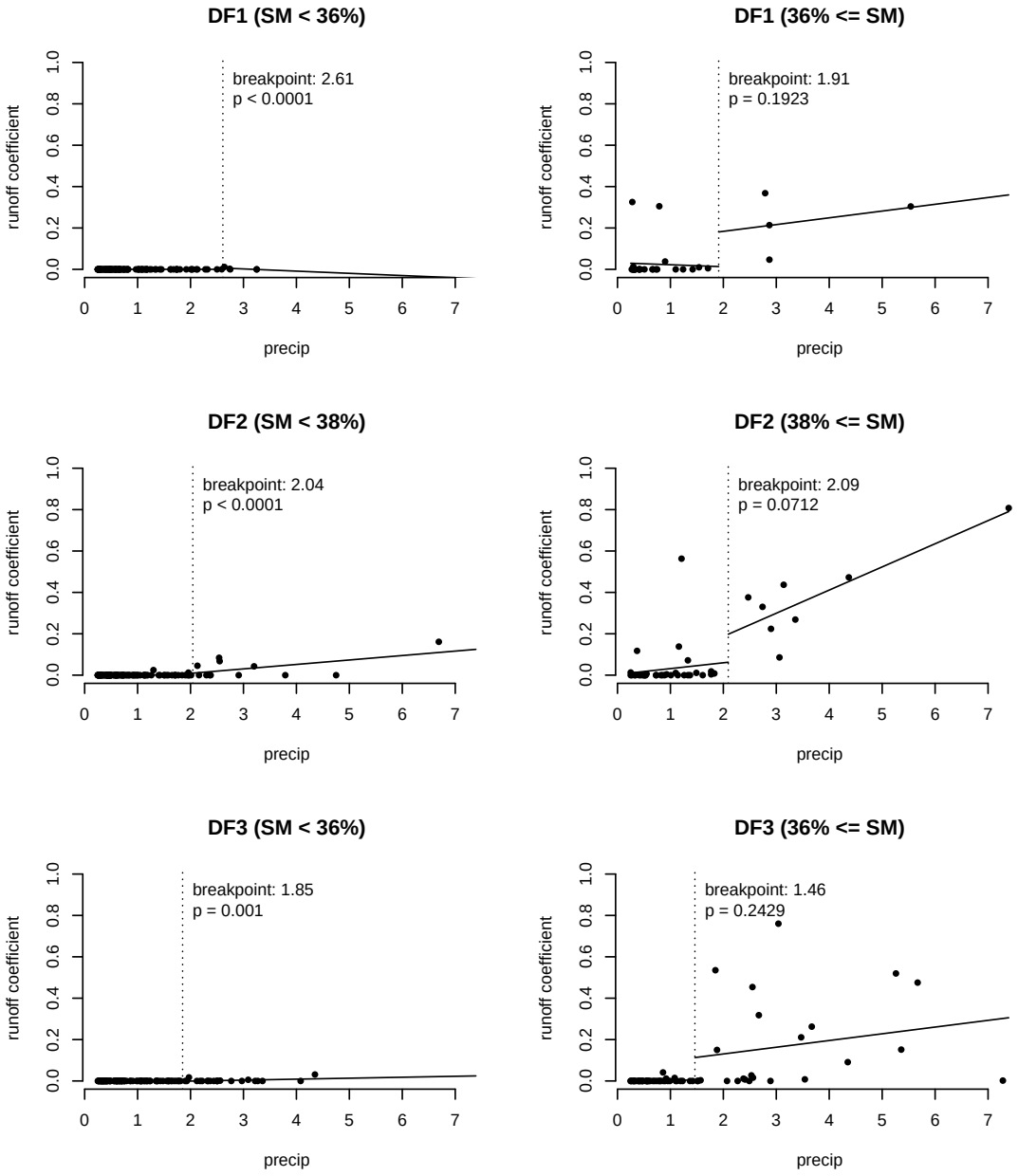

Figure 3: Top row: DF1, middle row: DF1, bottom row: DF1.