**3 Clusters**

3 2 1

25 33 41

> # First cluster

[1] "B1\_2" "B1\_3" "B1\_4" "B1\_8" "B2\_1" "B3\_4"

[7] "B3\_5" "B4\_8" "IL1\_3" "IL2\_5" "M1\_1" "M1\_10"

[13] "M1\_2" "M1\_4" "M1\_6" "M1\_7" "M1\_8" "M2\_10"

[19] "M2\_5" "M2\_6" "M2\_7" "M2\_8" "M2\_9" "M3\_7"

[25] "M4\_5"

> # Second Cluster

[1] "B1\_10" "B1\_5" "B1\_6" "B1\_9" "B2\_10"

[6] "B2\_2" "B2\_4" "B2\_5" "B2\_6" "B2\_8"

[11] "B2\_9" "B3\_2" "B3\_3" "B3\_8" "B3\_9"

[16] "B4\_4" "B4\_6" "B4\_7" "IL1\_1" "IL1\_10"

[21] "IL1\_8" "IL1\_9" "IL2\_2" "IL2\_3" "IL3\_2"

[26] "IL3\_4" "IL3\_6" "IL4\_3" "M1\_5" "M3\_1"

[31] "M3\_5" "M4\_4" "M4\_9"

> # Third Cluster

[1] "B1\_1" "B1\_7" "B2\_7" "B3\_1" "B3\_10"

[6] "B3\_6" "B3\_7" "B4\_1" "B4\_10" "B4\_2"

[11] "B4\_3" "B4\_9" "IL1\_4" "IL1\_5" "IL2\_1"

[16] "IL2\_10" "IL2\_4" "IL2\_7" "IL2\_8" "IL2\_9"

[21] "IL3\_1" "IL3\_10" "IL3\_3" "IL3\_7" "IL3\_9"

[26] "IL4\_10" "IL4\_2" "IL4\_4" "IL4\_5" "IL4\_7"

[31] "IL4\_8" "IL4\_9" "M2\_1" "M2\_3" "M3\_2"

[36] "M3\_3" "M3\_8" "M4\_2" "M4\_3" "M4\_6"

[41] "M4\_7"

**4 Clusters**

2 1 4 3

9 25 27 38

> # First cluster

[1] "B1\_8" "B4\_8" "M1\_1" "M1\_10" "M1\_7" "M1\_8"

[7] "M2\_10" "M2\_6" "M2\_7"

> # Second Cluster

[1] "B1\_10" "B1\_5" "B1\_9" "B2\_10" "B2\_2"

[6] "B2\_4" "B2\_5" "B2\_8" "B2\_9" "B3\_2"

[11] "B3\_6" "B3\_8" "B4\_3" "B4\_4" "B4\_6"

[16] "B4\_7" "IL1\_1" "IL1\_10" "IL1\_9" "IL2\_3"

[21] "IL3\_4" "IL3\_6" "IL4\_3" "M3\_5" "M4\_9"

> # Third Cluster

[1] "B1\_2" "B1\_3" "B1\_4" "B1\_6" "B1\_7" "B2\_1"

[7] "B2\_6" "B3\_3" "B3\_4" "B3\_5" "B3\_9" "IL1\_3"

[13] "IL1\_8" "IL2\_2" "IL2\_5" "IL3\_2" "M1\_2" "M1\_4"

[19] "M1\_5" "M1\_6" "M2\_5" "M2\_8" "M2\_9" "M3\_1"

[25] "M3\_7" "M4\_4" "M4\_5"

> # Fourth Cluster

[1] "B1\_1" "B2\_7" "B3\_1" "B3\_10" "B3\_7"

[6] "B4\_1" "B4\_10" "B4\_2" "B4\_9" "IL1\_4"

[11] "IL1\_5" "IL2\_1" "IL2\_10" "IL2\_4" "IL2\_7"

[16] "IL2\_8" "IL2\_9" "IL3\_1" "IL3\_10" "IL3\_3"

[21] "IL3\_7" "IL3\_9" "IL4\_10" "IL4\_2" "IL4\_4"

[26] "IL4\_5" "IL4\_7" "IL4\_8" "IL4\_9" "M2\_1"

[31] "M2\_3" "M3\_2" "M3\_3" "M3\_8" "M4\_2"

[36] "M4\_3" "M4\_6" "M4\_7"

**5 Clusters**

3 2 5 1 4

1 9 16 29 44

> # First cluster

[1] "IL4\_8"

> # Second Cluster

[1] "B1\_8" "B4\_8" "M1\_1" "M1\_10" "M1\_7" "M1\_8"

[7] "M2\_10" "M2\_6" "M2\_7"

> # Third Cluster

[1] "B1\_10" "B1\_9" "B2\_10" "B2\_2" "B2\_5" "B2\_9"

[7] "B3\_2" "B3\_8" "B4\_3" "B4\_4" "IL1\_1" "IL1\_9"

[13] "IL3\_6" "IL4\_3" "M3\_5" "M4\_9"

> # Fourth Cluster

[1] "B1\_2" "B1\_3" "B1\_4" "B1\_6" "B2\_1"

[6] "B2\_4" "B2\_6" "B2\_8" "B3\_3" "B3\_4"

[11] "B3\_5" "B3\_9" "B4\_7" "IL1\_10" "IL1\_3"

[16] "IL1\_8" "IL2\_2" "IL2\_5" "IL3\_2" "M1\_2"

[21] "M1\_4" "M1\_6" "M2\_5" "M2\_8" "M2\_9"

[26] "M3\_1" "M3\_7" "M4\_4" "M4\_5"

> # Fifth Cluster

[1] "B1\_1" "B1\_5" "B1\_7" "B2\_7" "B3\_1"

[6] "B3\_10" "B3\_6" "B3\_7" "B4\_1" "B4\_10"

[11] "B4\_2" "B4\_6" "B4\_9" "IL1\_4" "IL1\_5"

[16] "IL2\_1" "IL2\_10" "IL2\_3" "IL2\_4" "IL2\_7"

[21] "IL2\_8" "IL2\_9" "IL3\_1" "IL3\_10" "IL3\_3"

[26] "IL3\_4" "IL3\_7" "IL3\_9" "IL4\_10" "IL4\_2"

[31] "IL4\_4" "IL4\_5" "IL4\_7" "IL4\_9" "M1\_5"

[36] "M2\_1" "M2\_3" "M3\_2" "M3\_3" "M3\_8"

[41] "M4\_2" "M4\_3" "M4\_6" "M4\_7"

**USGS Clusters**

**3Clusters**

1 3 2

10 38 88

> # First cluster

[1] "1" "10" "12" "14" "15" "17"

[7] "18" "33" "39" "IL4\_8"

> # Second Cluster

[1] "11" "43" "B1\_1" "B1\_2" "B1\_3"

[6] "B1\_4" "B1\_8" "B2\_1" "B2\_8" "B3\_3"

[11] "B3\_4" "B3\_5" "B3\_9" "B4\_7" "B4\_8"

[16] "IL1\_10" "IL1\_3" "IL1\_8" "IL2\_2" "IL2\_4"

[21] "IL2\_5" "M1\_1" "M1\_10" "M1\_2" "M1\_4"

[26] "M1\_6" "M1\_7" "M1\_8" "M2\_10" "M2\_5"

[31] "M2\_6" "M2\_7" "M2\_8" "M2\_9" "M3\_1"

[36] "M3\_7" "M4\_4" "M4\_5"

> # Third Cluster

[1] "2" "16" "19" "20" "21"

[6] "23" "24" "32" "38" "40"

[11] "42" "44" "47" "48" "50"

[16] "57" "59" "60" "61" "67"

[21] "68" "73" "77" "80" "82"

[26] "90" "B1\_10" "B1\_5" "B1\_6" "B1\_7"

[31] "B1\_9" "B2\_10" "B2\_2" "B2\_4" "B2\_5"

[36] "B2\_6" "B2\_7" "B2\_9" "B3\_1" "B3\_10"

[41] "B3\_2" "B3\_6" "B3\_7" "B3\_8" "B4\_1"

[46] "B4\_10" "B4\_2" "B4\_3" "B4\_4" "B4\_6"

[51] "B4\_9" "IL1\_1" "IL1\_4" "IL1\_5" "IL1\_9"

[56] "IL2\_1" "IL2\_10" "IL2\_3" "IL2\_7" "IL2\_8"

[61] "IL2\_9" "IL3\_1" "IL3\_10" "IL3\_2" "IL3\_3"

[66] "IL3\_4" "IL3\_6" "IL3\_7" "IL3\_9" "IL4\_10"

[71] "IL4\_2" "IL4\_3" "IL4\_4" "IL4\_5" "IL4\_7"

[76] "IL4\_9" "M1\_5" "M2\_1" "M2\_3" "M3\_2"

[81] "M3\_3" "M3\_5" "M3\_8" "M4\_2" "M4\_3"

[86] "M4\_6" "M4\_7" "M4\_9"

**4 Clusters**

1 2 3 4

6 13 35 82

> # First cluster

[1] "1" "12" "15" "17" "18" "33"

> # Second Cluster

[1] "2" "10" "14" "16" "20" "39"

[7] "44" "50" "61" "67" "77" "IL1\_9"

[13] "IL4\_8"

> # Third Cluster

[1] "11" "43" "B1\_1" "B1\_2" "B1\_3" "B1\_4"

[7] "B1\_8" "B2\_1" "B2\_8" "B3\_3" "B3\_4" "B3\_5"

[13] "B3\_9" "B4\_8" "IL1\_3" "IL1\_8" "IL2\_2" "IL2\_4"

[19] "IL2\_5" "M1\_1" "M1\_10" "M1\_2" "M1\_4" "M1\_6"

[25] "M1\_7" "M1\_8" "M2\_10" "M2\_5" "M2\_6" "M2\_7"

[31] "M2\_8" "M2\_9" "M3\_1" "M3\_7" "M4\_5"

> # Fourth Cluster

[1] "19" "21" "23" "24" "32"

[6] "38" "40" "42" "47" "48"

[11] "57" "59" "60" "68" "73"

[16] "80" "82" "90" "B1\_10" "B1\_5"

[21] "B1\_6" "B1\_7" "B1\_9" "B2\_10" "B2\_2"

[26] "B2\_4" "B2\_5" "B2\_6" "B2\_7" "B2\_9"

[31] "B3\_1" "B3\_10" "B3\_2" "B3\_6" "B3\_7"

[36] "B3\_8" "B4\_1" "B4\_10" "B4\_2" "B4\_3"

[41] "B4\_4" "B4\_6" "B4\_7" "B4\_9" "IL1\_1"

[46] "IL1\_10" "IL1\_4" "IL1\_5" "IL2\_1" "IL2\_10"

[51] "IL2\_3" "IL2\_7" "IL2\_8" "IL2\_9" "IL3\_1"

[56] "IL3\_10" "IL3\_2" "IL3\_3" "IL3\_4" "IL3\_6"

[61] "IL3\_7" "IL3\_9" "IL4\_10" "IL4\_2" "IL4\_3"

[66] "IL4\_4" "IL4\_5" "IL4\_7" "IL4\_9" "M1\_5"

[71] "M2\_1" "M2\_3" "M3\_2" "M3\_3" "M3\_5"

[76] "M3\_8" "M4\_2" "M4\_3" "M4\_4" "M4\_6"

[81] "M4\_7" "M4\_9"

**5 Clusters**

1 5 3 2 4

6 11 15 49 55

> # First cluster

[1] "1" "12" "15" "17" "18" "33"

> # Second Cluster

[1] "2" "10" "14" "20" "39" "44"

[7] "50" "61" "77" "IL1\_9" "IL4\_8"

> # Third Cluster

[1] "11" "B1\_8" "B3\_5" "B4\_8" "M1\_1" "M1\_10"

[7] "M1\_4" "M1\_7" "M1\_8" "M2\_10" "M2\_6" "M2\_7"

[13] "M2\_8" "M3\_7" "M4\_5"

> # Fourth Cluster

[1] "32" "43" "59" "60" "67"

[6] "68" "90" "B1\_1" "B1\_2" "B1\_3"

[11] "B1\_4" "B1\_5" "B1\_6" "B1\_7" "B1\_9"

[16] "B2\_1" "B2\_4" "B2\_6" "B2\_8" "B3\_3"

[21] "B3\_4" "B3\_8" "B3\_9" "B4\_6" "B4\_7"

[26] "IL1\_10" "IL1\_3" "IL1\_8" "IL2\_2" "IL2\_3"

[31] "IL2\_4" "IL2\_5" "IL2\_8" "IL2\_9" "IL3\_10"

[36] "IL3\_2" "IL3\_6" "IL3\_7" "IL4\_10" "IL4\_2"

[41] "M1\_2" "M1\_5" "M1\_6" "M2\_5" "M2\_9"

[46] "M3\_1" "M3\_5" "M4\_4" "M4\_9"

> # Fifth Cluster

[1] "16" "19" "21" "23" "24"

[6] "38" "40" "42" "47" "48"

[11] "57" "73" "80" "82" "B1\_10"

[16] "B2\_10" "B2\_2" "B2\_5" "B2\_7" "B2\_9"

[21] "B3\_1" "B3\_10" "B3\_2" "B3\_6" "B3\_7"

[26] "B4\_1" "B4\_10" "B4\_2" "B4\_3" "B4\_4"

[31] "B4\_9" "IL1\_1" "IL1\_4" "IL1\_5" "IL2\_1"

[36] "IL2\_10" "IL2\_7" "IL3\_1" "IL3\_3" "IL3\_4"

[41] "IL3\_9" "IL4\_3" "IL4\_4" "IL4\_5" "IL4\_7"

[46] "IL4\_9" "M2\_1" "M2\_3" "M3\_2" "M3\_3"

[51] "M3\_8" "M4\_2" "M4\_3" "M4\_6" "M4\_7"

**6 Clusters**

6 2 3 1 4 5

3 12 15 28 32 46

> # First cluster

[1] "1" "12" "17"

> # Second Cluster

[1] "2" "10" "14" "15" "18" "20"

[7] "33" "39" "50" "61" "IL1\_9" "IL4\_8"

> # Third Cluster

[1] "11" "B1\_8" "B3\_5" "B4\_8" "M1\_1" "M1\_10"

[7] "M1\_4" "M1\_7" "M1\_8" "M2\_10" "M2\_6" "M2\_7"

[13] "M2\_8" "M3\_7" "M4\_5"

> # Fourth Cluster

[1] "19" "21" "23" "24" "38" "48"

[7] "57" "59" "73" "80" "90" "B1\_10"

[13] "B1\_9" "B2\_10" "B2\_2" "B2\_5" "B2\_9" "B3\_2"

[19] "B3\_6" "B3\_8" "B4\_4" "IL1\_1" "IL3\_1" "IL3\_3"

[25] "IL3\_6" "IL4\_3" "IL4\_9" "M3\_5"

> # Fifth Cluster

[1] "32" "60" "68" "B1\_1" "B1\_2"

[6] "B1\_3" "B1\_4" "B1\_5" "B1\_6" "B2\_1"

[11] "B2\_4" "B2\_6" "B2\_8" "B3\_3" "B3\_4"

[16] "B3\_9" "B4\_6" "B4\_7" "IL1\_10" "IL1\_3"

[21] "IL1\_8" "IL2\_2" "IL2\_4" "IL2\_5" "IL3\_2"

[26] "M1\_2" "M1\_5" "M1\_6" "M2\_5" "M2\_9"

[31] "M3\_1" "M4\_4"

> # Sixth Cluster

[1] "16" "40" "42" "43" "44"

[6] "47" "67" "77" "82" "B1\_7"

[11] "B2\_7" "B3\_1" "B3\_10" "B3\_7" "B4\_1"

[16] "B4\_10" "B4\_2" "B4\_3" "B4\_9" "IL1\_4"

[21] "IL1\_5" "IL2\_1" "IL2\_10" "IL2\_3" "IL2\_7"

[26] "IL2\_8" "IL2\_9" "IL3\_10" "IL3\_4" "IL3\_7"

[31] "IL3\_9" "IL4\_10" "IL4\_2" "IL4\_4" "IL4\_5"

[36] "IL4\_7" "M2\_1" "M2\_3" "M3\_2" "M3\_3"

[41] "M3\_8" "M4\_2" "M4\_3" "M4\_6" "M4\_7"

[46] "M4\_9"