

Examining the Effects on Wildfire Spread: NetLogo Code

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;;Team 1016 Monte del Sol Charter School
;;Shayla Anthony, Hebert Soto, Max Montoya, Nefi Guevara
;;Sponsor Teacher: Rhonda Crespo
breed [flames fire]
breed [winds wind] ;different types of breeds
breed [trees tree]
flames-own [temperature] ;energy is measured in temperature

to setup
  clear-all
  reset-ticks
  ask patches
  [ set pcolor 51

    if pycor < max-pxcor - highSlope ;this codes for the higher altitude
  [
    set pcolor 53 ]

  if pycor < max-pxcor - Slope ;this codes for the altitude

  [set pcolor green]
]

create-flames Fire_Pop ;this creates fire
[ set heading 0
  set size 2
  set color orange
```

```
setxy min-pxcor min-pycor
set temperature random 500
]
```

```
create-winds wind_pop ;this creates wind
[
set heading 90
set color white
setxy min-pycor random-pxcor
]
```

```
create-trees trees_pop ; this creates trees
[setxy random-pxcor random-pycor
set shape "tree"
set size 3
set color 32]
end
```

```
to go
fire_move
wind_move ;procedures
trees_burn
```

```
if not any? flames ;if there is no more fire, the model stops
[stop]
```

```
end
```

to wind_move ;this codes for how the wind will move

ask winds

[

right random 90

left random 90

forward wind_speed

]

end

to fire_move ;this codes for how the fire will move and spread

ask flames

[

forward 1

right random 90

left random 90

set temperature temperature - 2 ;as the fire moves, it loses energy

if pcolor = green ;grasslands

[set pcolor 31

set temperature temperature + 5 - humidity] ;how humidity and slope affect the fire

if pcolor = 53 ;altitude/slope

[set pcolor 30.5

set temperature temperature + 7 - humidity] ;humidity reduces the temperature of the fire

if pcolor = 51 ;higher altitude/high slope

[set pcolor black

set temperature temperature + 9 - humidity] ;the higher the slope, the more energy the fire gets

if temperature >= 250 ;once the fire reaches a certain temperature, it will sprout a new fire, spreading more

```
[hatch 1
  forward 1
  set temperature temperature / 2]
```

if temperature <= 0 ;once the fire is out of energy, it dies
[die]

if any? winds-here ;how the wind will affect the fire
[set heading 90
 forward 1
 set temperature temperature + 10]

if any? trees-here ;how vegetation affects the fire
[set temperature temperature + 5]
]
tick

end

to trees_burn ;when the fire touches a tree, it burns and dies
ask trees
[if any? flames-here
 [die]]

end