地理信息系统与遥感应用

第六讲　空间分析专题三

南方科技大学 · 环境科学与工程学院

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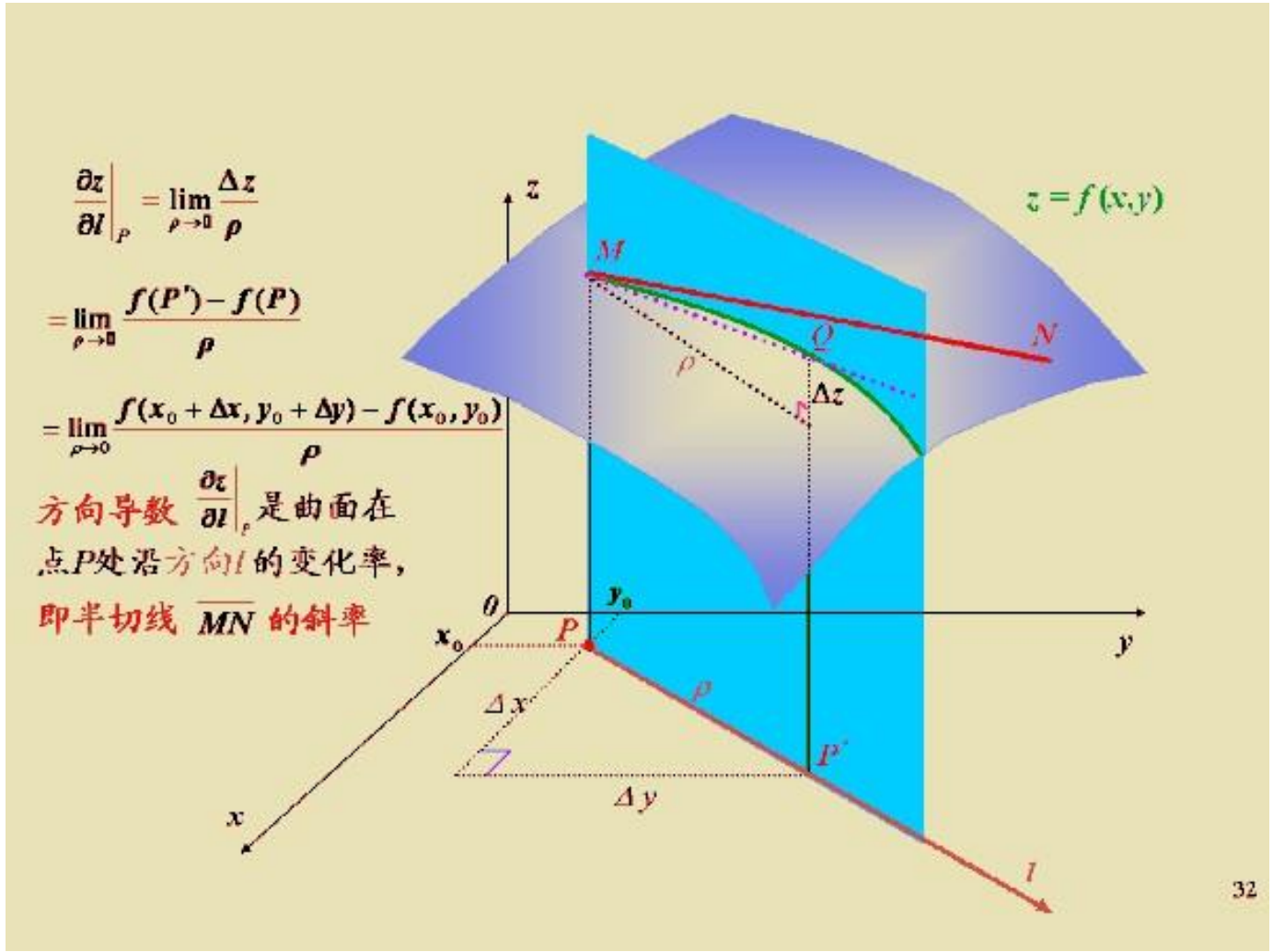
Slope



$$\frac{\partial f}{\partial x} i + \frac{\partial f}{\partial y} j,$$

a	b	c
d	e	f
g	h	i

$$slope\_radians = ATAN\left(\sqrt{([dz/dx]^2 + [dz/dy]^2)}\right)$$

$$slope\_degrees = ATAN\left(\sqrt{([dz/dx]2 + [dz/dy]2)}\right) * 57.29578$$

$$dz/dx = ((c + 2f + i) - (a + 2d + g) / (8 * x\_cellsize)$$

$$dz/dy = ((g + 2h + i) - (a + 2b + c)) / (8 * y\_cellsize)$$

50	45	50
30	30	30
8	10	10

$$dz/dx = ((c + 2f + i) - (a + 2d + g) / (8 * x\_cellsize)$$
$$= ((50 + 60 + 10) - (50 + 60 + 8)) / (8 * 5) = (120 - 118) / 40 = 0.05$$

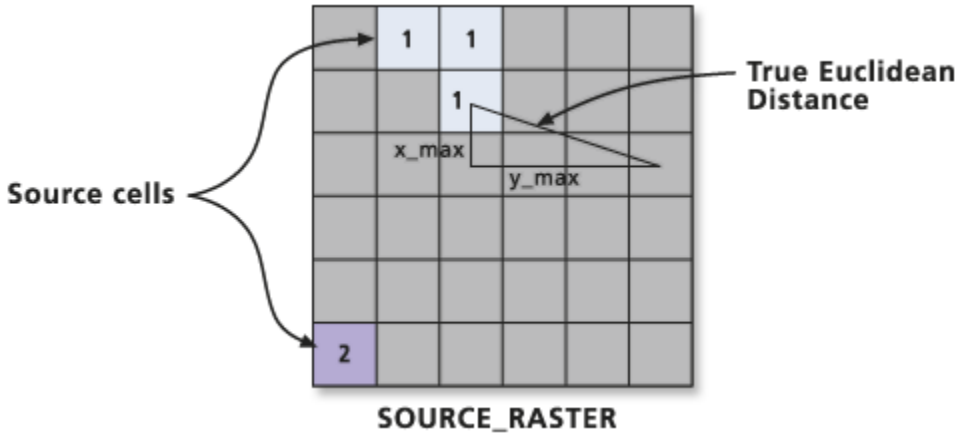
$$dz/dy = ((g + 2h + i) - (a + 2b + c)) / (8 * y\_cellsize) =$$
$$((8 + 20 + 10) - (50 + 90 + 50)) / (8 * 5) = (38 - 190) / 40 = -3.8$$

59	56	59
71	75	70
60	63	57

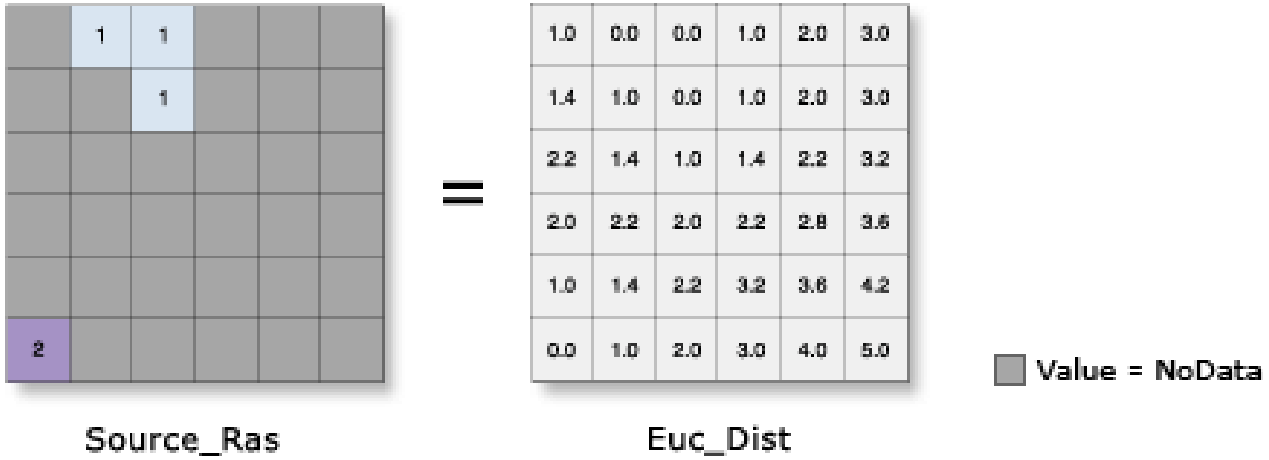
$$rise\_run = \sqrt{([dz/dx]2 + [dz/dy]2)} = \sqrt{((0.05)2 + (-3.8)2)} = \sqrt{(0.0025 + 14.44)} = 3.80032$$

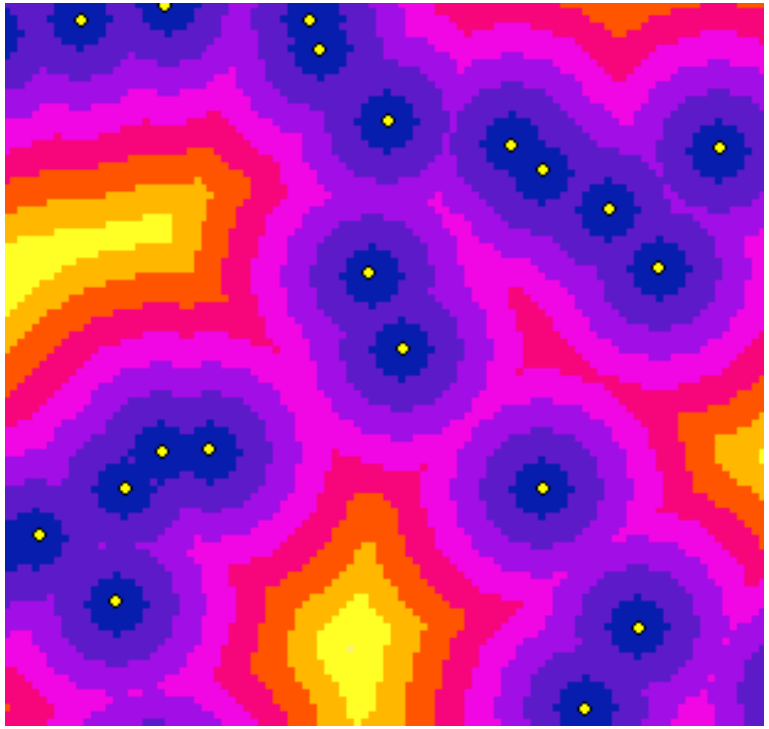
$$slope\_degrees = ATAN\,(rise\_run) * 57.29578 = ATAN\,(3.80032) * 57.29578 = 1.31349 * 57.29578 = 75.25762$$

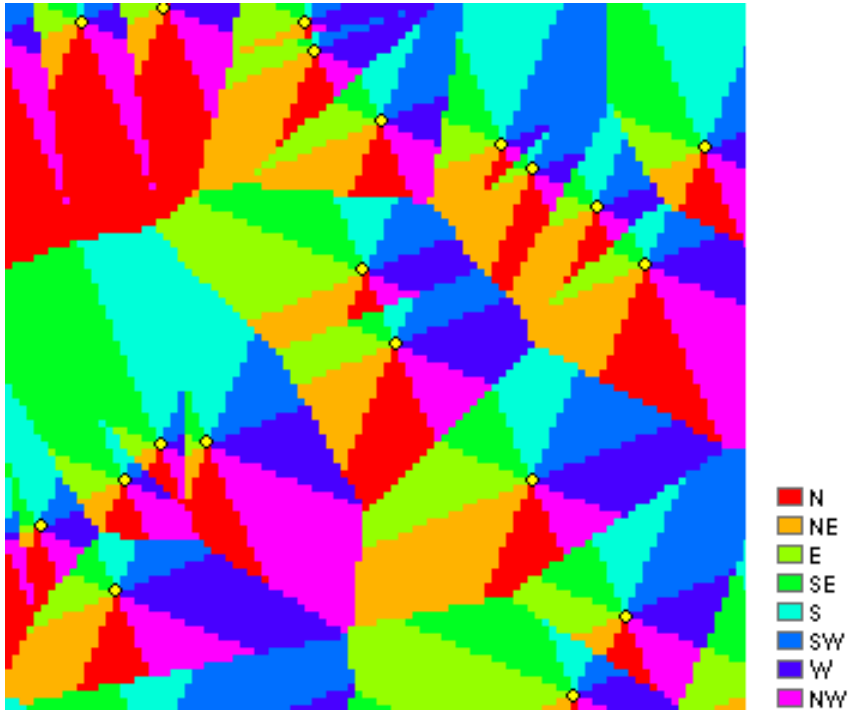
Euclidean Distance

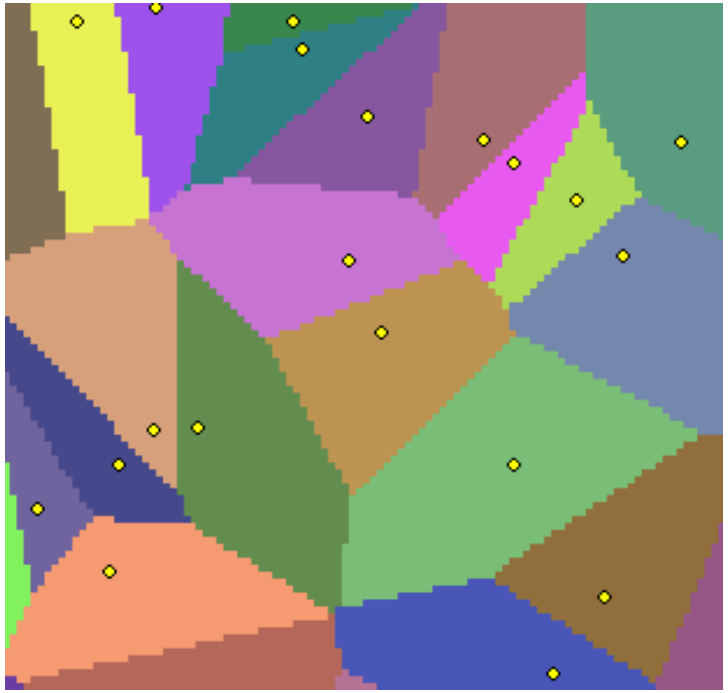


- Euclidean Distance gives the distance from each cell in the raster to the closest source.
  - ✓ Example of usage: What is the distance to the closest town?
- Euclidean Direction gives the direction from each cell to the closest source
  - ✓ Example of usage: What is the direction to the closest town?
- Euclidean Allocation identifies the cells that are to be allocated to a source based on closest proximity.
  - ✓ Example of usage: What is the closest town?

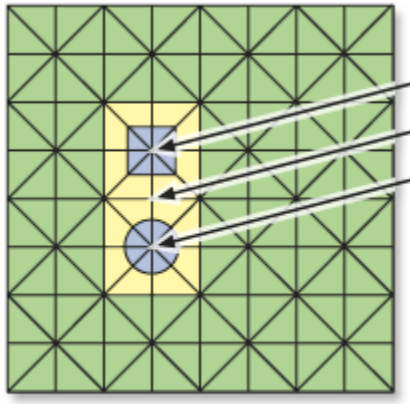





N
NE
E
SE
S
SW
W
NW



Cost Distance



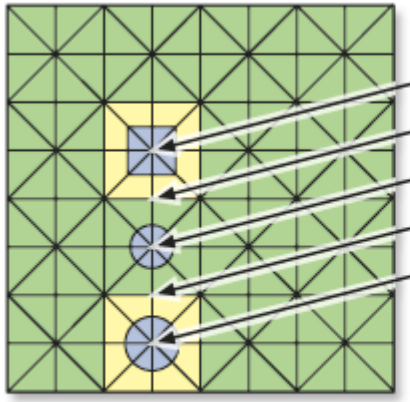
Starting point (cost 1)

a1

End point (cost 2)

$$a1 = \frac{\text{cost 1} + \text{cost 2}}{2}$$

Horizontal and vertical node calculations



Starting point (cost 1)

a1

Mid point (cost 2)

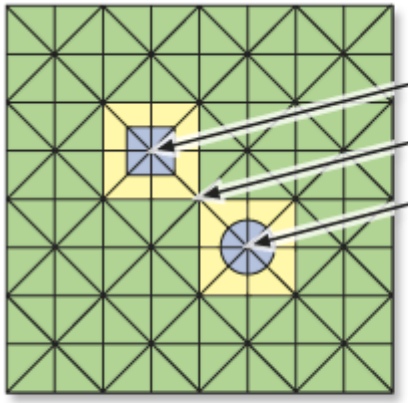
a2

End point (cost 3)

$$a2 = \frac{\text{cost 2} + \text{cost 3}}{2}$$

$$accum\_cost = a1 + a2$$

Accumulative cost node calculations



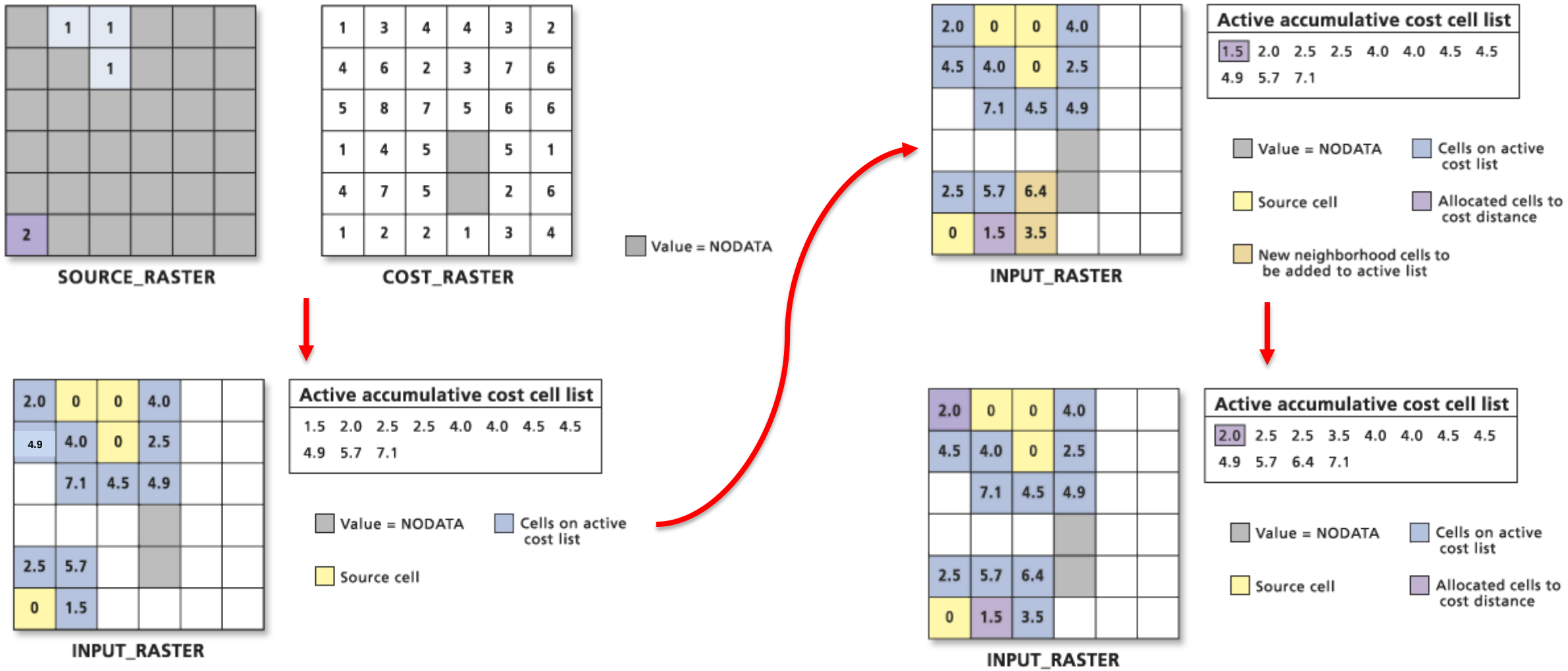
Starting point (cost 1)

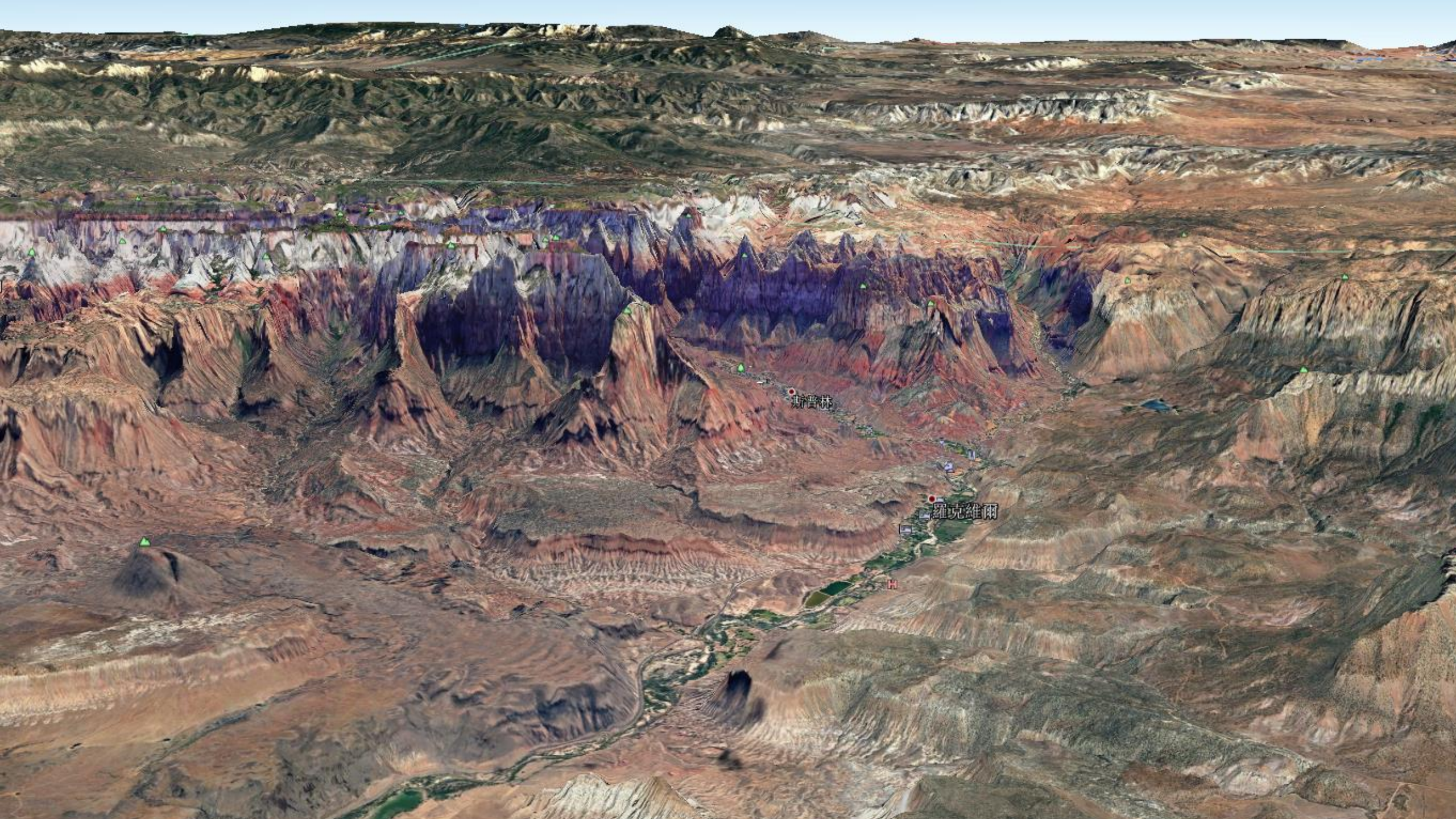
a1

End point (cost 2)

$$a1 = 1.4142 \frac{(\text{cost 1} + \text{cost 2})}{2}$$

Horizontal and vertical node calculations


SOURCE_RASTER
COST_RASTER
Value = NODATA
INPUT_RASTER
Active accumulative cost cell list
1.5 2.0 2.5 2.5 4.0 4.0 4.5 4.5
4.9 5.7 7.1
Value = NODATA
Cells on active cost list
Source cell
Allocated cells to cost distance
New neighborhood cells to be added to active list
INPUT_RASTER
Active accumulative cost cell list
2.0 2.5 2.5 3.5 4.0 4.0 4.5 4.5
4.9 5.7 6.4 7.1
Value = NODATA
Cells on active cost list
Source cell
Allocated cells to cost distance
INPUT_RASTER
Active accumulative cost cell list
1.5 2.0 2.5 2.5 4.0 4.0 4.5 4.5
4.9 5.7 7.1
Value = NODATA
Cells on active cost list
Source cell


許普林
羅克維爾