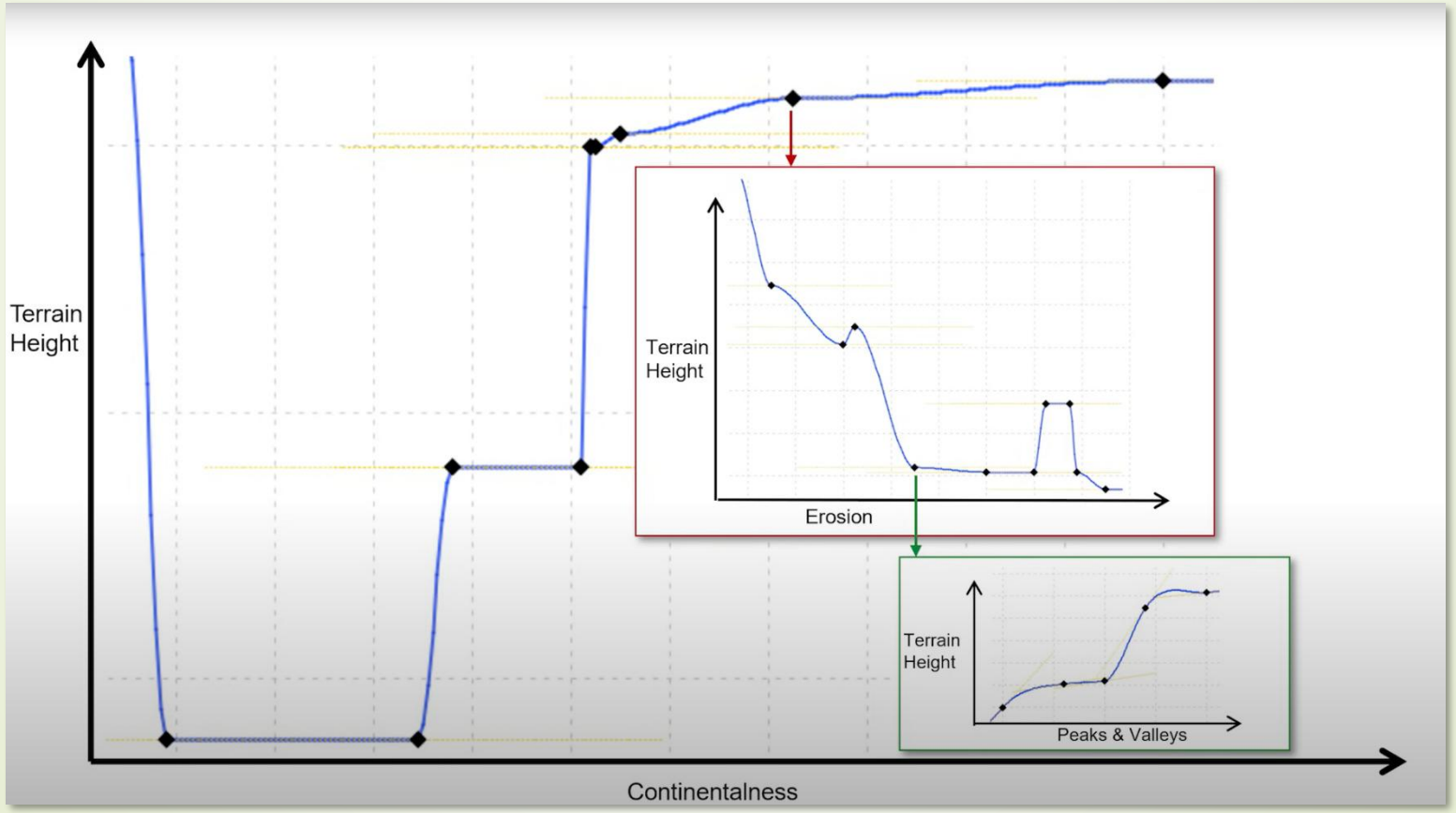
Curves

1D curves which we will use to map noise layers to height offsets and scales

Minecraft Splines

- Called splines, they are really piece-wise curves.
- Their system is quite complex so we will try to approximate it but using several piece-wise curves and summing the contributions.



Curves

- **Curve1D**
- Base class with one pure virtual function.

```
float Curve1D::Evaluate(float t)
```

- **LinearCurve1D**
  - Derived from Curve1D.
  - Has a start and end value.
  - Evaluate interpolates between start and end according to t.
- **PiecewiseCurve1D**
  - Derived from Curve1D.
  - Holds a collection of subcurves, each with a start time t.
  - Evaluate finds the subcurve that contains the t in its range and tells it to evaluate.
  - This lets you make piece-wise curves out of any type of curve you want.
- Assume min and max t and output values are (-1, 1) for now.

Linear Curves

- To evaluate a linear curve and calculate v (the output):

```
if t < start
  v = 0
if t >= end
  v = 1
else
  v = interpolate(start, end, t)
```

Piecewise-Curves

- To evaluate a piece-wise curve and calculate v (the output):

```
find curve c where key[i].t < t < key[i + 1].t
v = c.evaluate(fraction_within(key[i].t, key[i + 1].t, t))
```

Piecewise-Curves

Piece-wise curve with key-value pairs (t, v) and in the range (0, 1)

(0.25, 0.5)

(0.75, 0.5)

(1.0, 1.0)