

# IceCube Upgrade field effort VS IceCube

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Question: is there a simple metric to compare IceCube production drilling and installation effort to the same effort for IceCube Upgrade.

The following is a simple back on the envelope comparison, based on scaling of some characteristic numbers.

*Warning and disclaimer: This is just meant to be a sanity check, not an analysis. Don't read too much into it.*

# Drill season: IceCube and IceCube Upgrade

	Upgrade	IceCube	ratio	
Drilling	Drill volume/m <sup>3</sup> (measure of drill time)	2150	1560	<b>1.34</b>
	Equivalent number of strings	7	9.7	
	Drill population	28	30	1.07
	Scale factor of duration/hole			<b>1.43</b>
Installation	Modules per string (measure of deployment effort)	115	60	1.91
	Complexity of modules	1.2	1.0	1.3
	Deployment population	10	10	1.0
	Equivalent number of modules deployment effort			<b>2.4</b>

Scale factor time required for 7 strings:

Drilling:

- based on pure drill time and population: 1.43
- Installation: 2.4

Effort scale factor weighted by relative effort of drilling and installation: 1.71

Note: non-drilling time between holes is here scaled the same way (1.4) as the actual drill time. This is a realistic, probably conservative assumption, When comparing to IC full production drilling. Eg, shorter moves make things easier for Upgrade.

# Drill season: IceCube and IceCube Upgrade

**Scale factor for time required per string deployed:**

**Drilling:**

- based on pure drill time and population: 1.43

**Installation:**

- Based on # of modules per string and complexity: 2.4

**Overall scale factor** for effort weighted by relative population of drilling and installation: 1.69

Time required for drilling and installation based on scaling model:

**7 Upgrade strings = 11.8 IceCube strings**

IceCube would drill 20 holes from start of December to about January 28.

Upgrade has schedule to drill 7 holes from 12/14 to 1/21. Scales well with may be a week to spare in Upgrade.