



**TOP500**  
**- 25 Years**  
**- 50 Editions**

SC17  
November 14  
2017

Erich  
Strohmaier  
Berkeley Lab

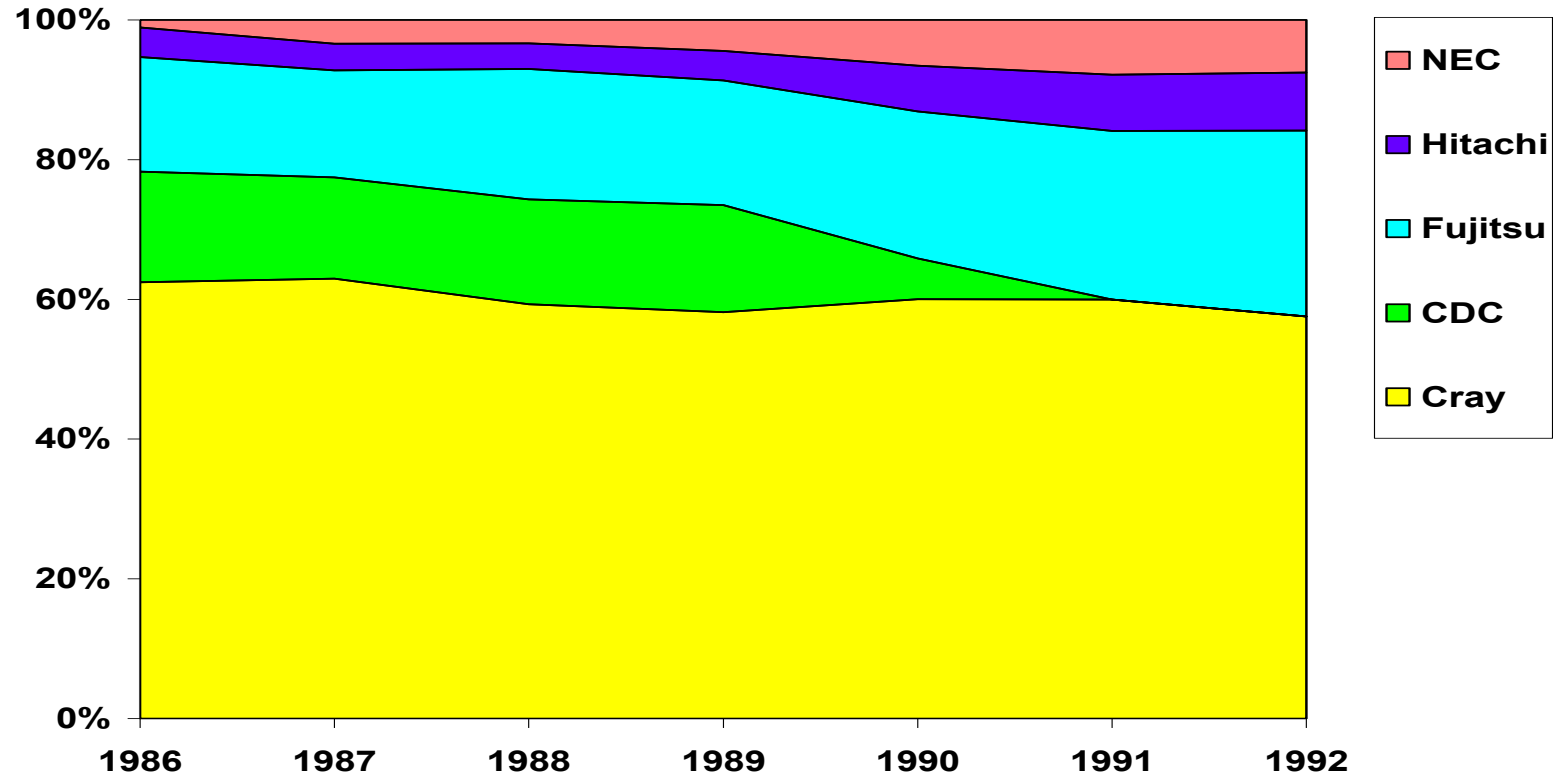
# TOP500 Roots – Early Surveys

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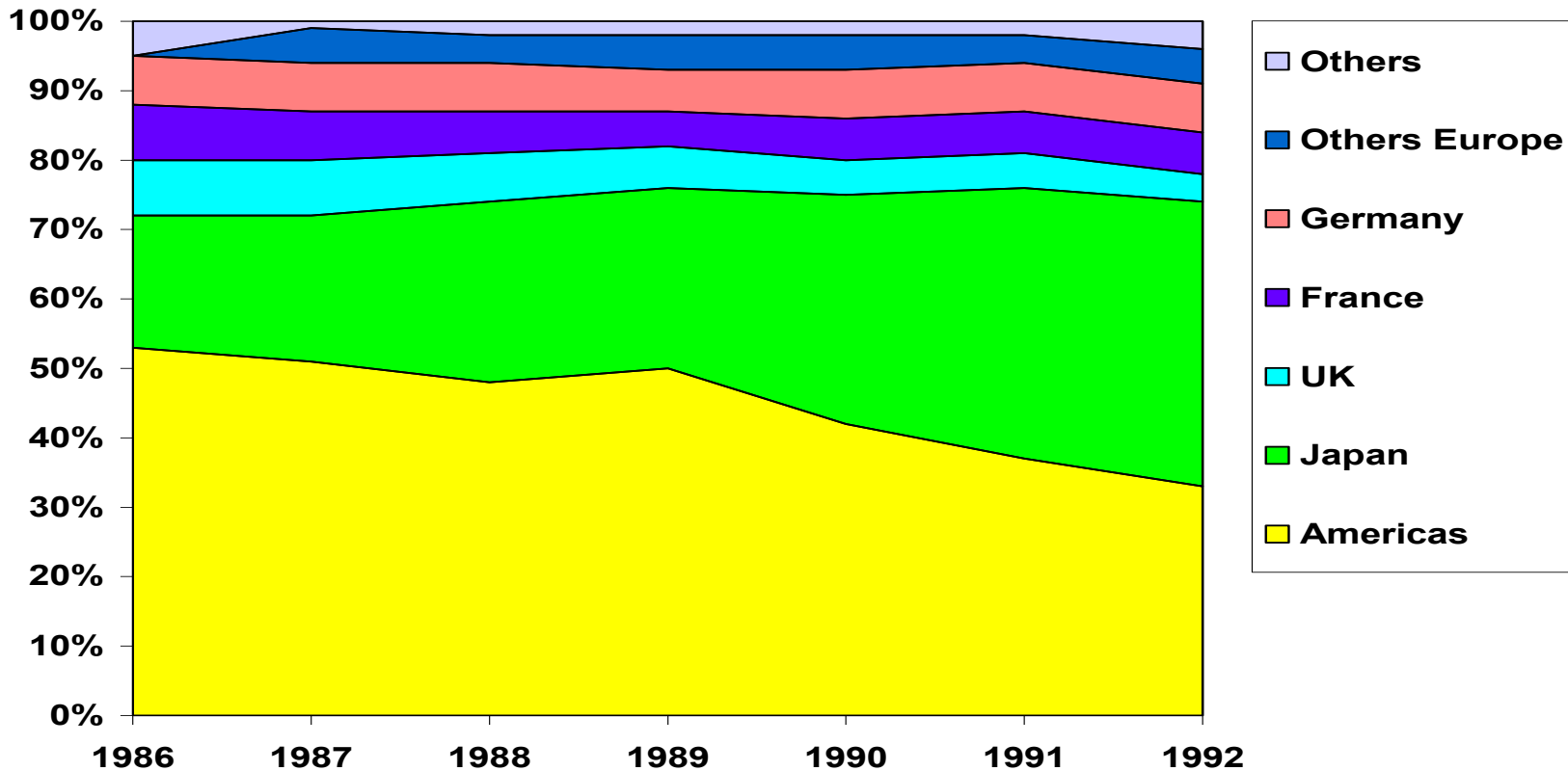
## Mannheimer Supercomputer Statistics

- Hans Meuer started the Mannheimer Supercomputer Seminar (precursor to ISC) in 1986
- He presented installation counts of Supercomputers (Vector-computers) to quantify the market size for this type of system
- Counting Vector-computer sales from only a few vendors of large systems was sufficient (Cray/CDC/Fujitsu/Hitachi/NEC)
- Worked reasonable well in the 1980s

# Mannheim Supercomputer Statistics



# Mannheim Supercomputer Statistics



# TOP500 Roots – End of 1980s

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- A lot of new vendors introduced new systems at various sizes – and wanted to be counted
- Entry level models were questionable to be counted
- Supercomputing market was no longer vertically separated from the ‘rest’ of the computing market
- Endless discussions what was a ‘*true*’ supercomputer
- A new definition for ‘Supercomputer’ was needed
- Preferable a definition which adapted itself over time
  - No static threshold
- And one which separated actual functional systems from concepts
- 2 Years of exploring different concepts

# TOP500 Roots – End of 1980s

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## Take the largest 500 installed!

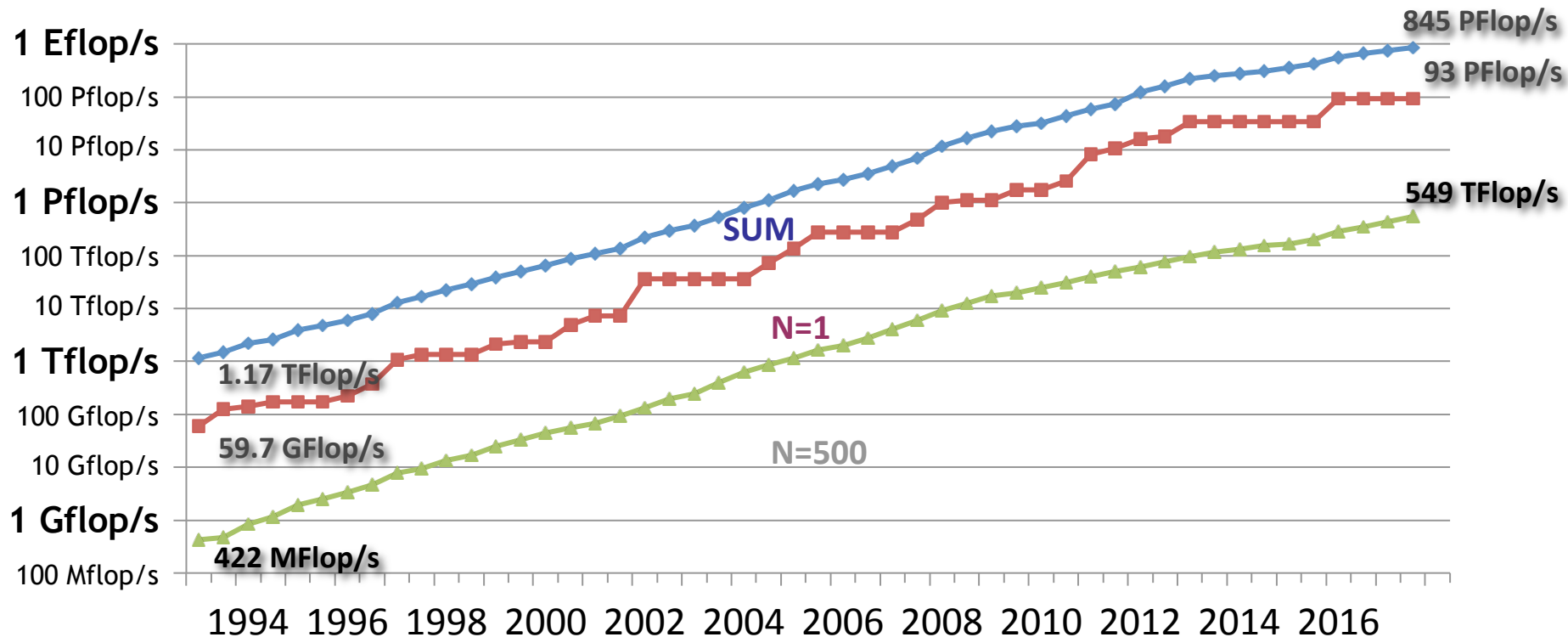
- Use Linpack as measure
  - Simplistic, but widely available and
  - You needed a functioning system to run it!
- Self-adapting over time
- And we knew, we had 500!

# TOP500

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- After first list we settled on publishing twice a year
  - ISC'xy in June in Germany
  - SCxy in November in the U.S.
- At the second list we realized that trends over time was the most interesting aspect of our data collection
- TOP500 is inventory based
  - Works well if turn-over is high
- All information available from the TOP500 web site at:  
[www.top500.org](http://www.top500.org)

# Performance Development



Hear more about this and the latest data at our BoF following at 5:15pm.



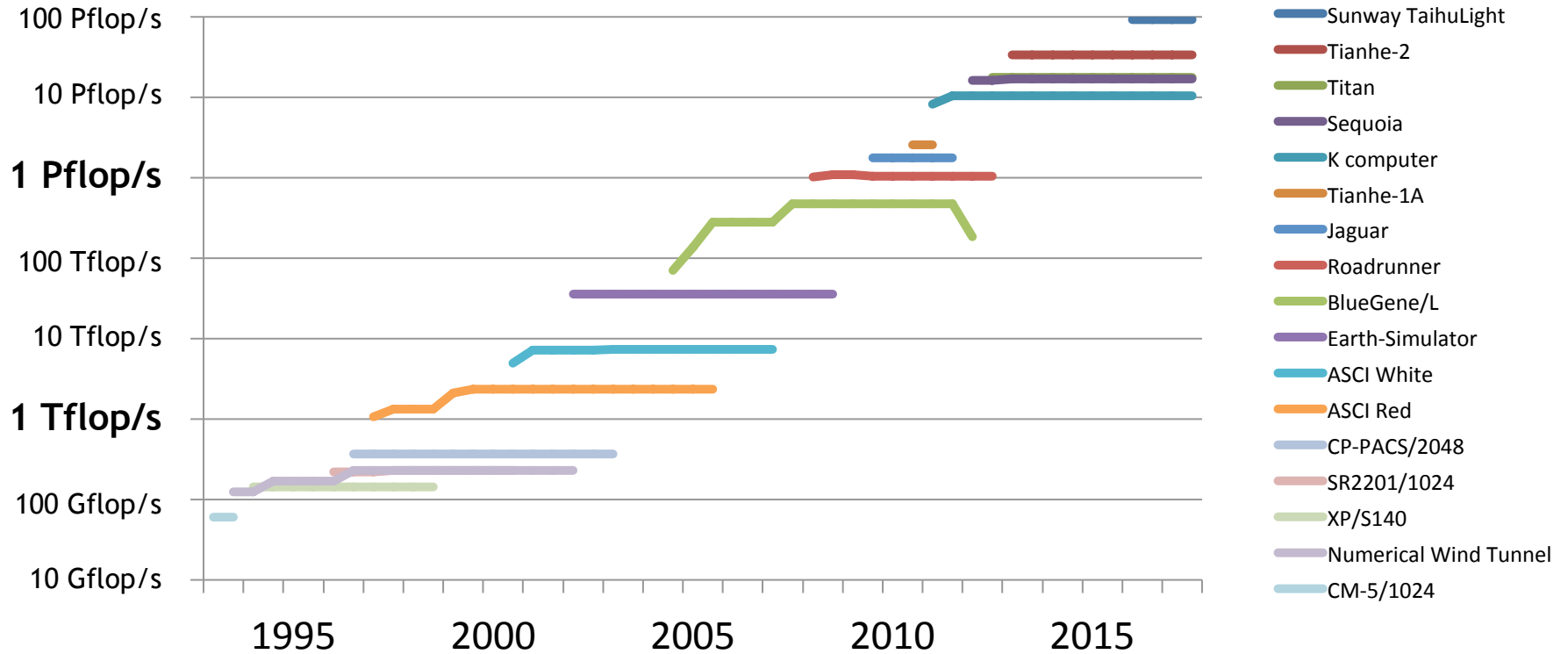
# 25 Years – 50 Editions

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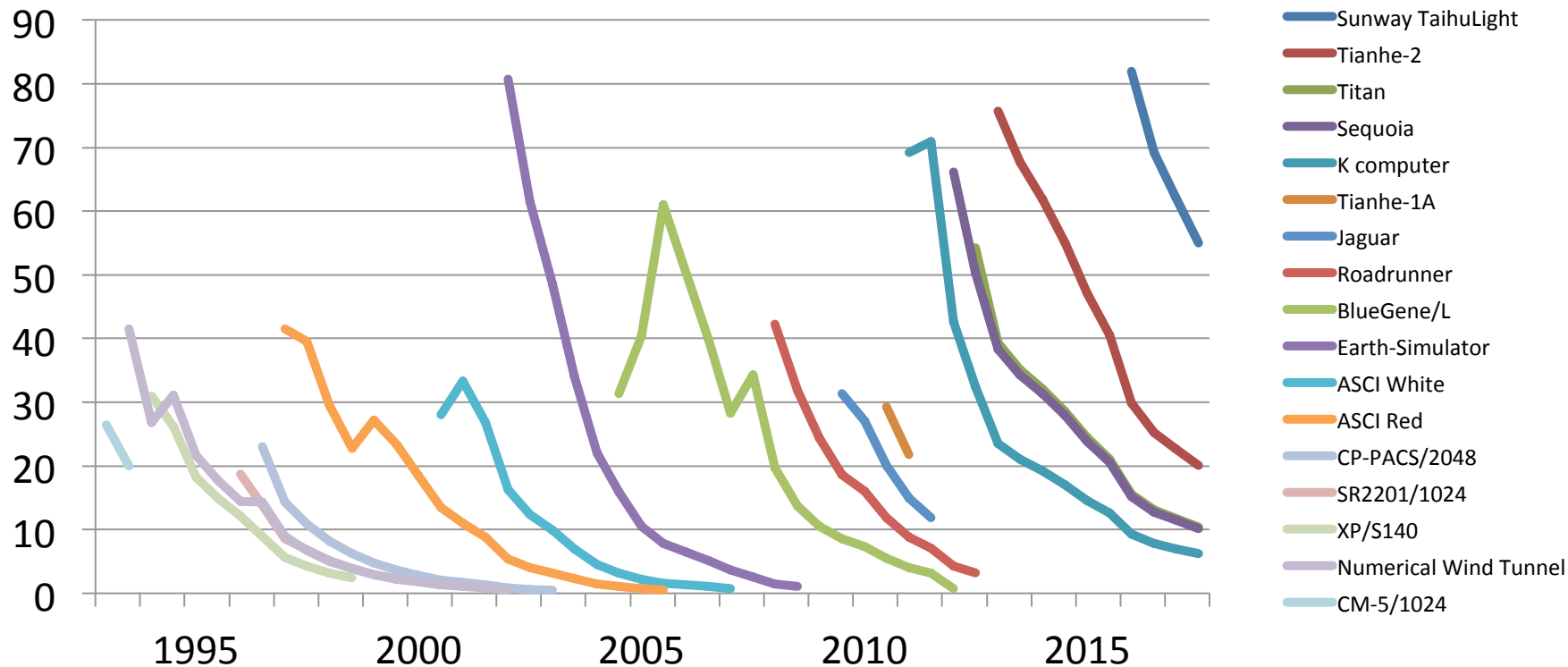
## How do we integrate/aggregate over time/editions?

- System counts are focused on the low end
- Moore's Law overpowers everything performance based
- **Normalize each list by average performance**
  - HPL not Peak - **Norm-HPL**
  - Average performance not max (#1) or min
- Add up contributions from various lists over time
  - Each full lists contributed a total of 500 -  **$\Sigma$  Norm-HPL**
  - 50 lists together have a total weight of 25,000

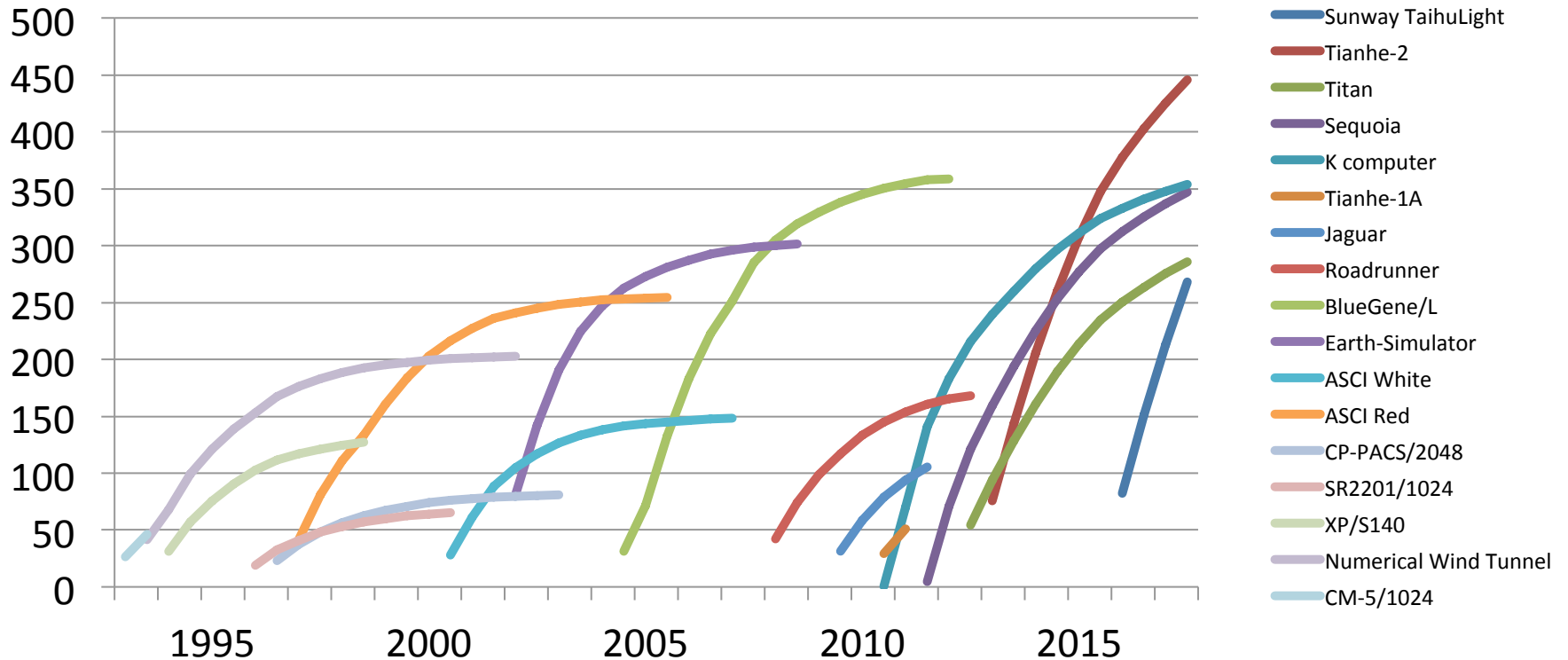
# No. 1's - HPL R\_max














# HPL compared to Average System = Norm-HPL














# # 1's - Accumulated Norm-HPL



# Dominant Sites












#	Site	Country	Norm-HPL	
1	LLNL	USA	1,466	
2	LANL	USA	810	
3	ORNL	USA	737	
4	SNL	USA	652	
5	NSCC Guangzhou	China	449	
6	RIKEN AICS	Japan	354	
7	NASA/Ames	USA	352	
8	FZ Jülich	Germany	333	
9	JAMSTEC	Japan	325	
10	NERSC	USA	303	
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**DOE**

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New Sites

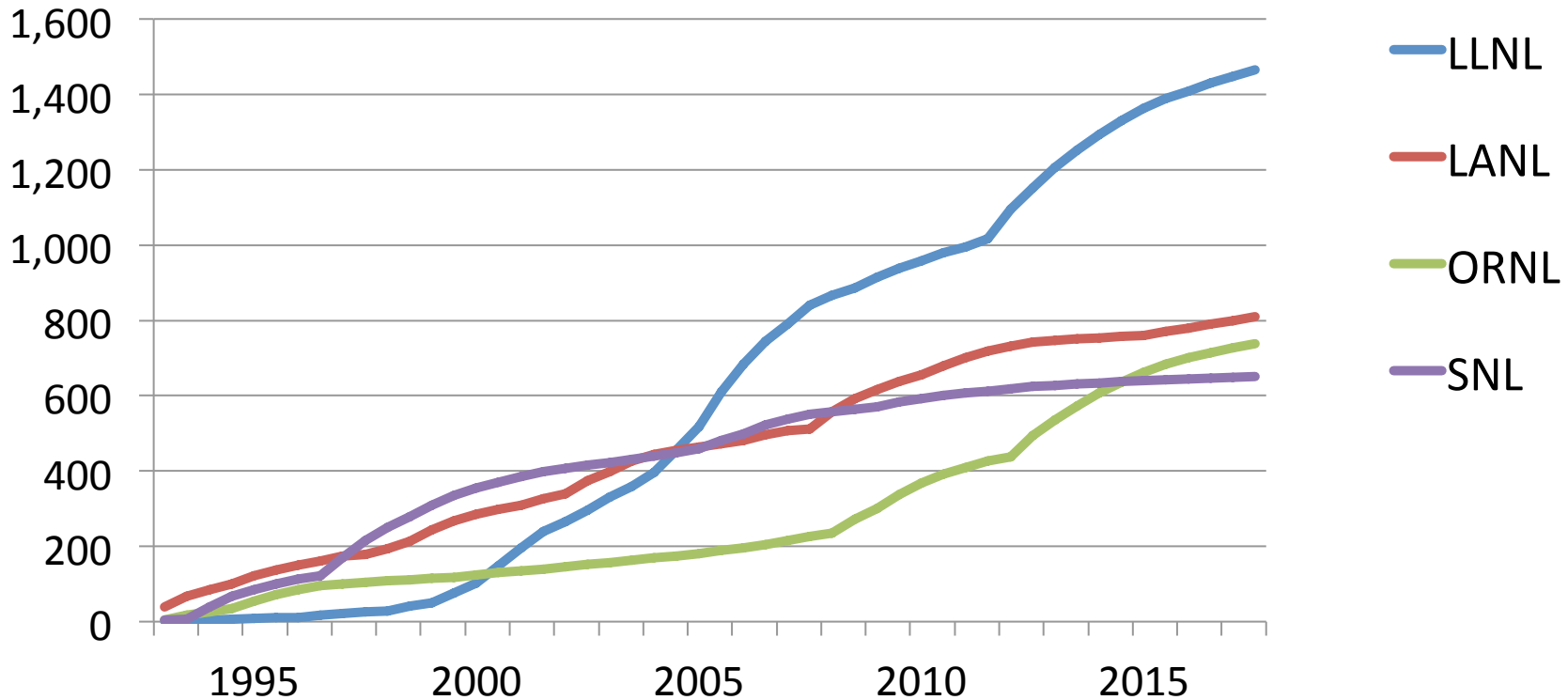
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**Steady Sites**  
**Never #1**



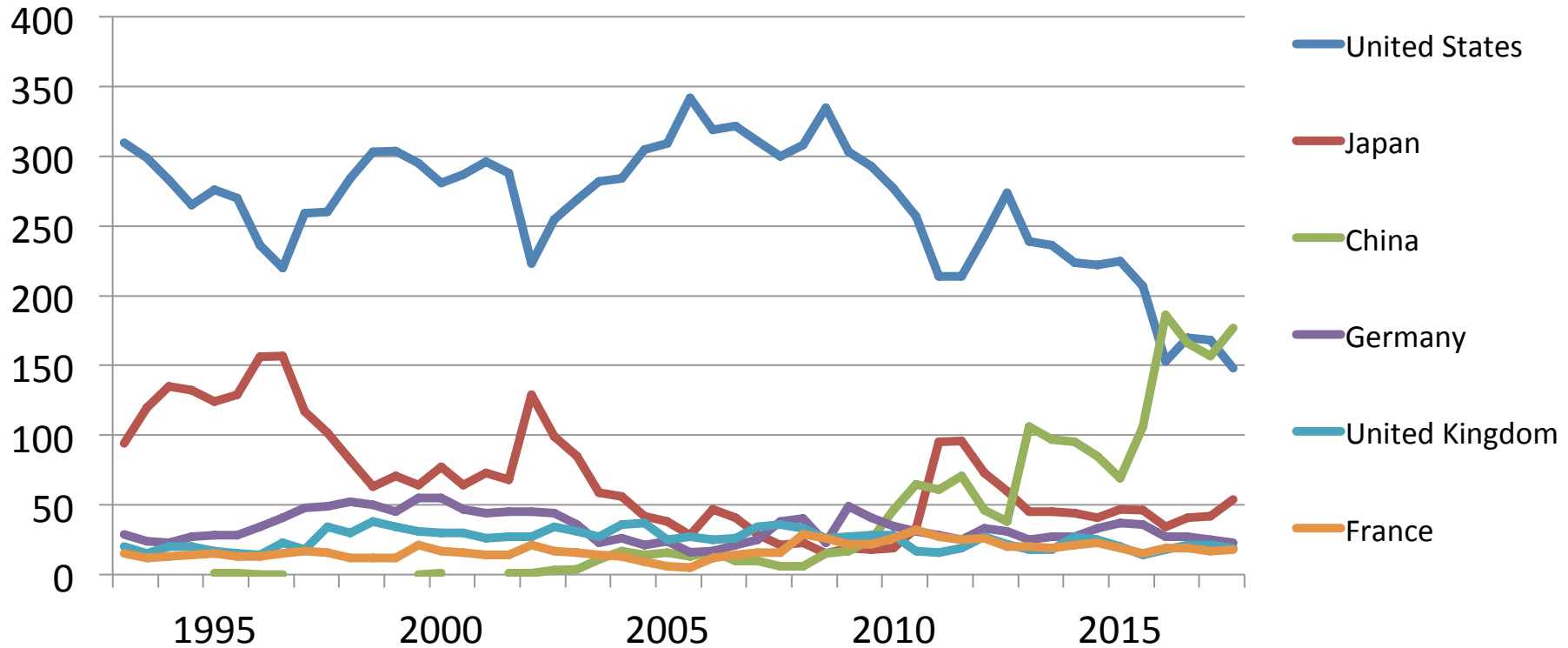
# Sites - Accumulated Norm-HPL



# Countries








#	Country	Norm-HPL	
1	United States	13,258	
2	Japan	3,377	
3	China	1,740	
4	Germany	1,686	
5	United Kingdom	1,253	
6	France	866	
7	Switzerland	287	
8	Canada	265	
9	Italy	263	
10	South Korea	224	

# Countries – Norm-HPL



# System Design

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#	Country	Norm-HPL	
1	MPP non-intel	11,962	
2	MPP intel based	7,618	
3	Vector	3,103	
4	NVIDIA GPU	1147	
5	Intel Xeon Phi	792	
6	Other Accelerator	274	
7	SIMD	103	

# System Designs - Norm-HPL

