



Next Generation Very Large Array

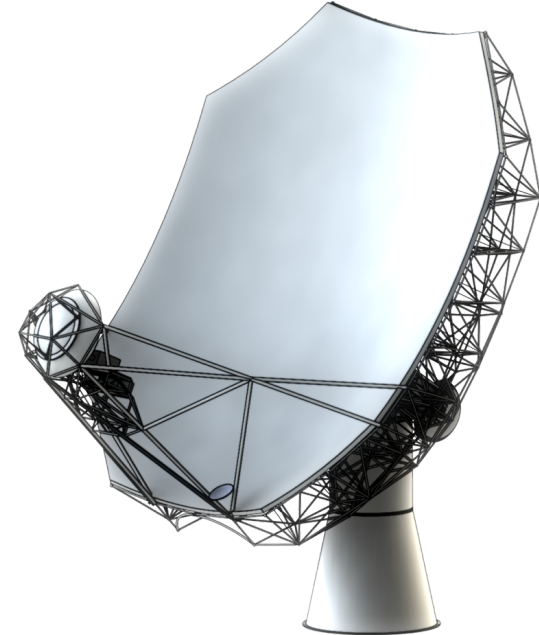
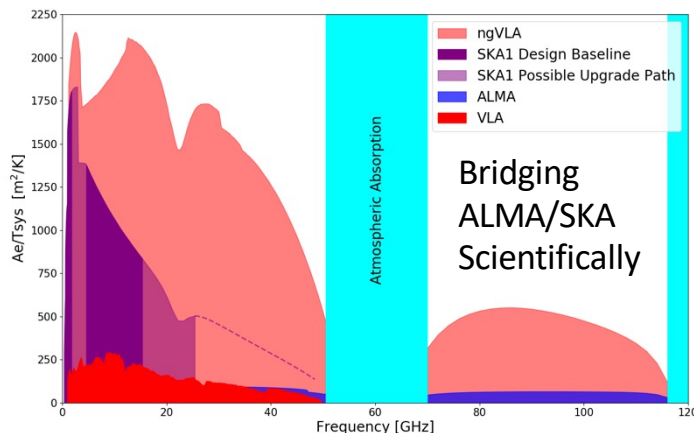
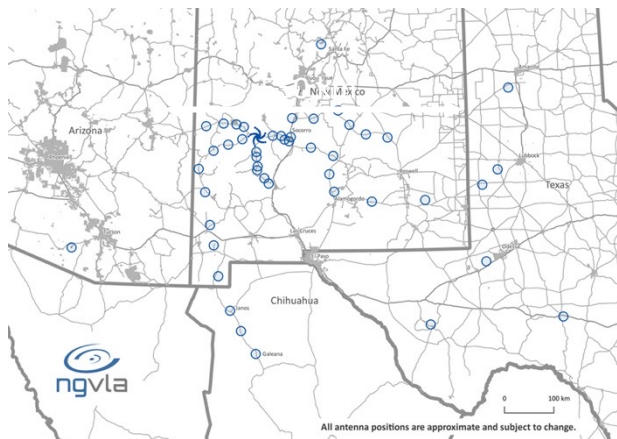


A next-generation Very Large Array



A next-generation Very Large Array (ngVLA)

- Scientific Frontier: **Thermal imaging at milli-arcsec resolution**
- Sensitivity/Resolution Goal: **10x sensitivity & resolution of JVLA/ALMA**
- Frequency range: **1.2 –116 GHz**
- Located in Southwest U.S. (NM, TX, AZ) & MX, centered on VLA
- Low technical risk (reasonable step beyond state of the art)



Complementary suite of meter-to-submm arrays for the mid-21st century

- < 0.3 cm: ALMA 2030
- 0.3 to 3 cm: ngVLA
- > 3 cm: SKA

<http://ngvla.nrao.edu>

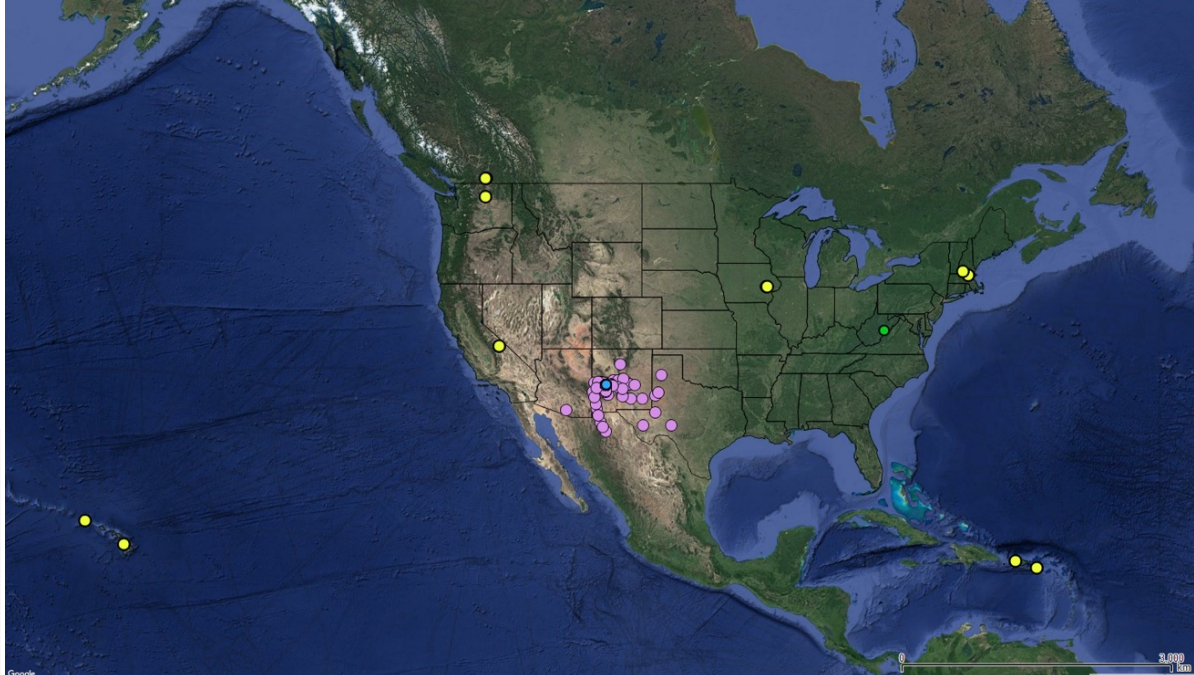
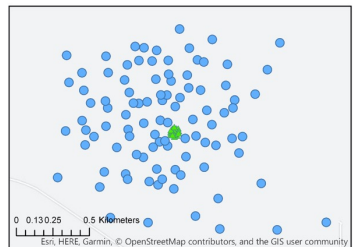
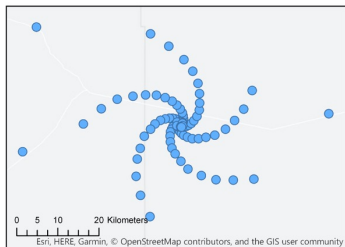
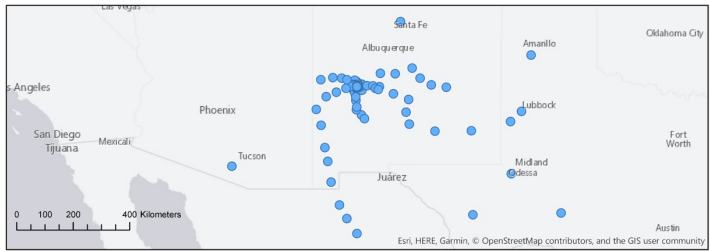


The ngVLA Key Science Goals

1. *Unveiling the Formation of Solar System Analogues on Terrestrial Scales*
2. *Probing the Initial Conditions for Planetary Systems and Life with Astrochemistry*
3. *Charting the Assembly, Structure, and Evolution of Galaxies Over Cosmic Time*
4. *Using Pulsars in the Galactic Center as Fundamental Tests of Gravity*
5. *Understanding the Formation and Evolution of Stellar and Supermassive BH's in the Era of Multi-Messenger Astronomy*

Current Distribution of Antennas

Radius	Collecting Area Fraction
0 km < R < 1.3 km	44% (94 antennas)
1.3 km < R < 36 km	35% (74 antennas)
36 km < R < 1000 km	21% (46 antennas)



Qty	Location	Notes
3	Puerto Rico	Arecibo Site
3	St. Croix	VLBA Site
3	Kauai, HI	Kokee Park Obs.
3	Hawaii, HI	Not MK Site
2	Hancock, NH	VLBA Site

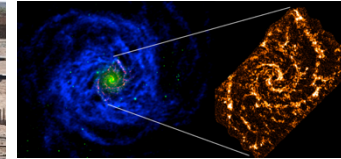
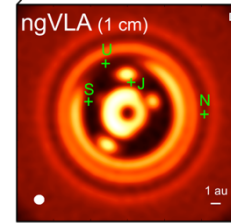
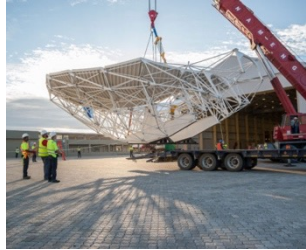
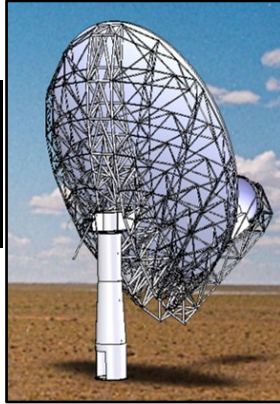
Qty	Location	Notes
3	Green Bank, WV	GBO
2	Brewster, WA	VLBA Site
3	Penticton, BC	DRAO
4	North Liberty, IA	VLBA site
4	Owens Valley, CA	VLBA site

+30 additional LBA antennas

Project Timeline

Astro 2020
Decadal Survey on Astronomy and Astrophysics

The National Academies of
SCIENCES
ENGINEERING
MEDICINE



2019

2021

2023

2025

2028

2034

ngVLA
Submission
to Astro2020

Prototype Delivered
to VLA Site

Submit ngVLA Proposal to
NSF/MREFC

Astro2020 Recommendation Published

Complete NSF/MREFC FDR

ngVLA Construction →

Initiate ngVLA Early Science
(> VLA capabilities)

Achieve Full
Science Operations