

Radio Astronomy, NRAO & the VLA



T. Beasley
NRAO

Atacama Large Millimeter/submillimeter Array
Karl G. Jansky Very Large Array
Robert C. Byrd Green Bank Telescope
Very Long Baseline Array



History

- Radio astronomy is a subfield of astronomy that studies celestial objects at radio frequencies...
- 1874 – Maxwell’s equations – light had components invisible to the eye
- 1889 – radio experiments
- 1890-1900’s – early experiments..... No detections of radio waves from the sky
- 1902 – prediction that nothing would be seen...
- 1930s – transatlantic radio phone calls... additional “noise”
- 1932 – Bell Labs – Karl Jansky

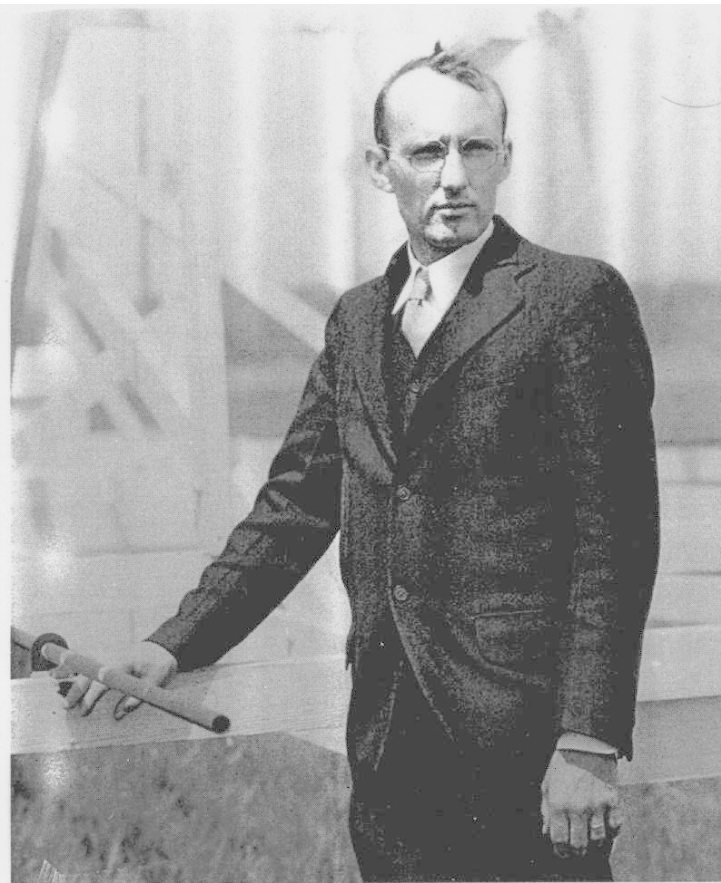
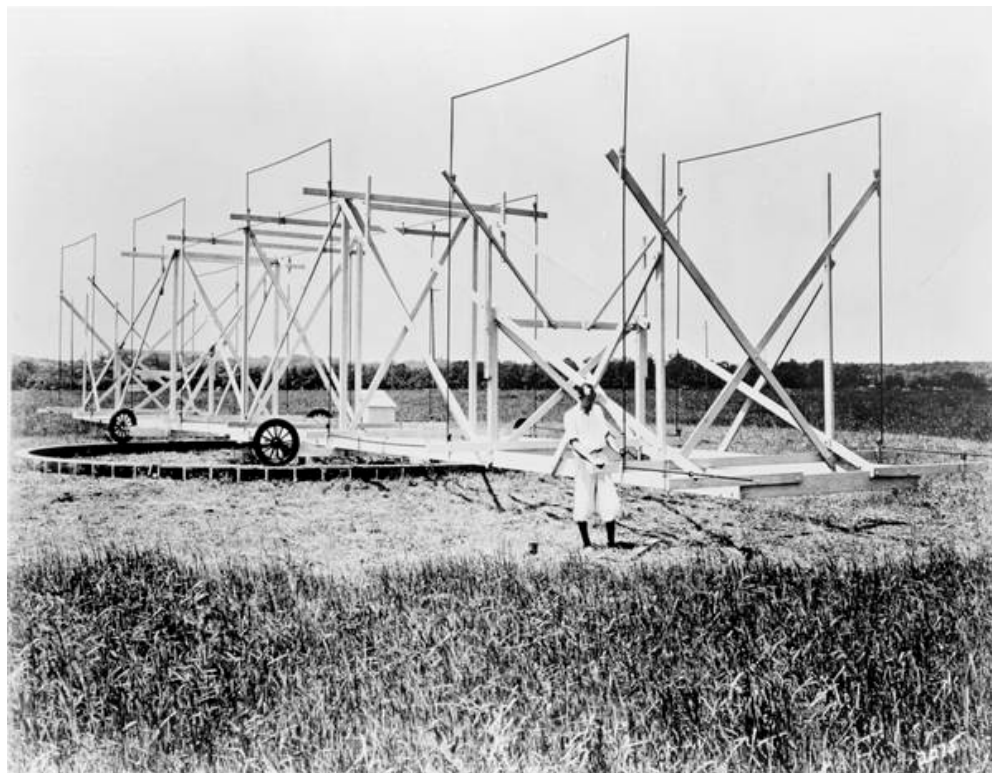
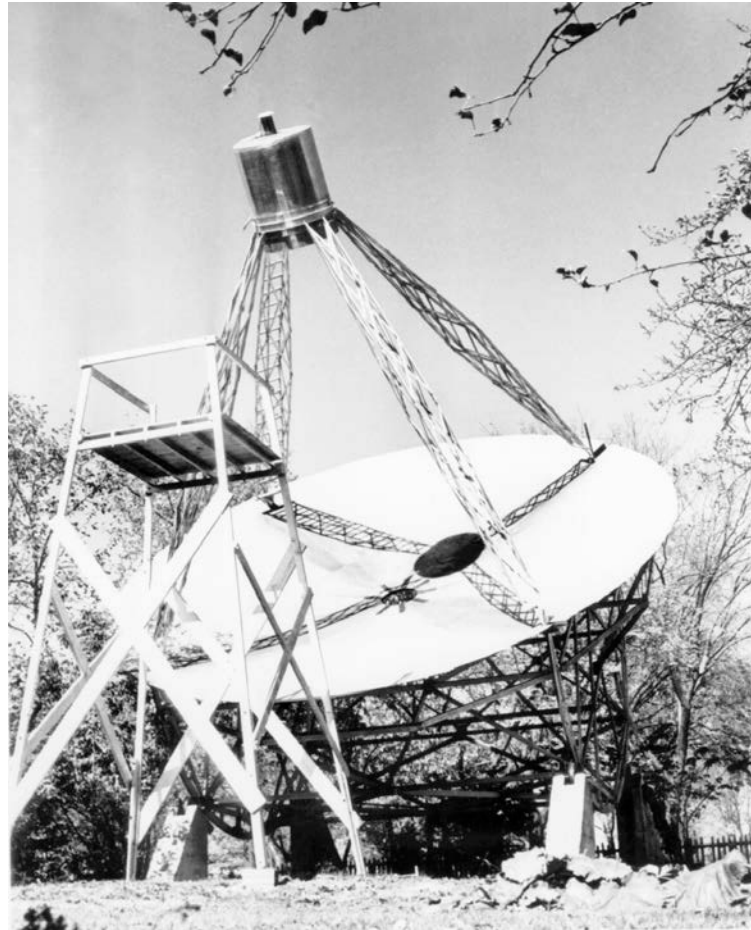


FIG. 1—Karl Guthe Jansky, about 1933.





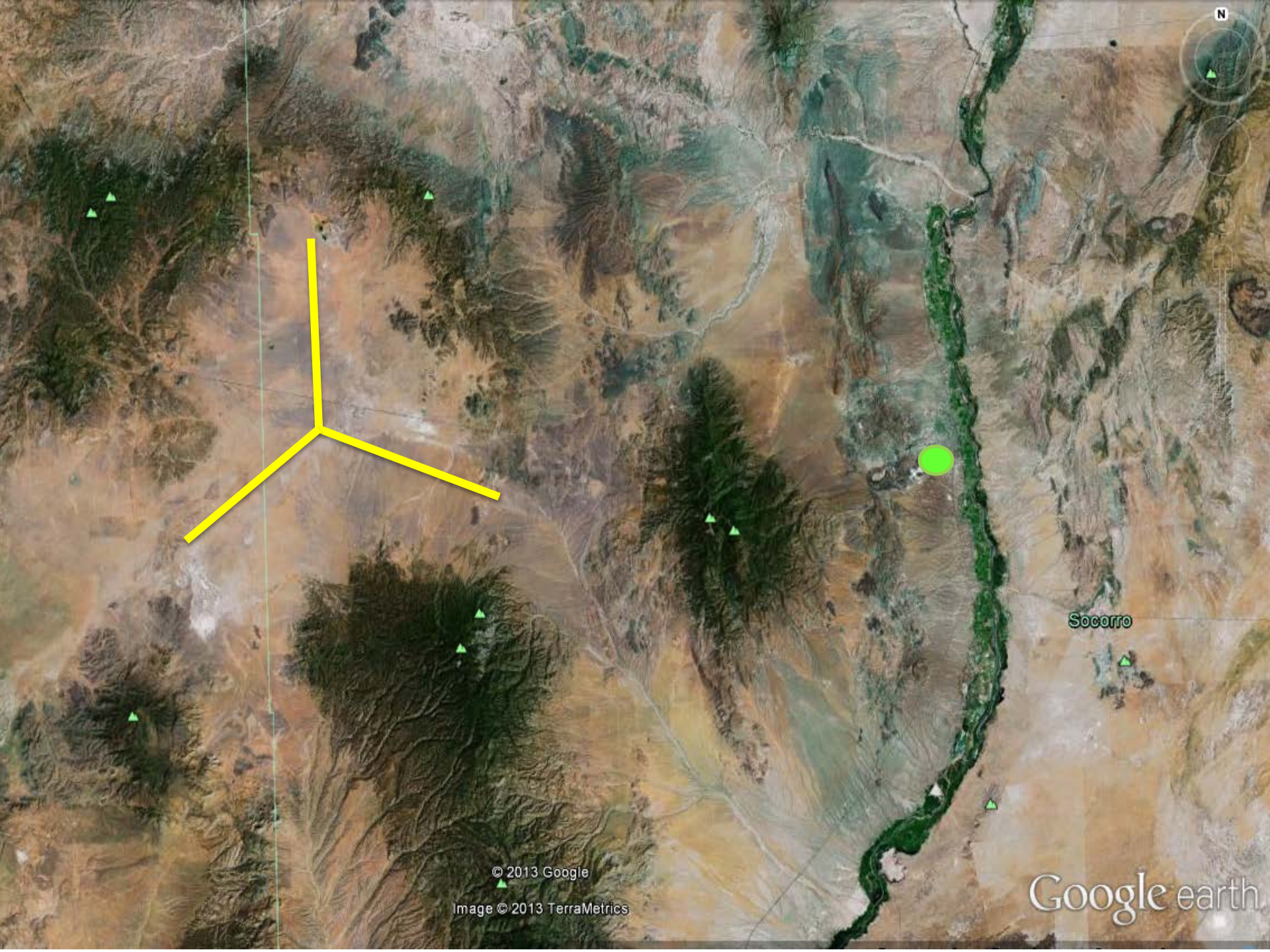
- WWII – significant funding into radio/radar technologies...
- Post WWII – Australians, English, Dutch – move expertise into radio astronomy
- Post WWII – US – NSF
- Mid 1950's – major facility required – contract with Associated Universities Inc. to develop a National Radio Astronomy Observatory
- Single-dish telescopes.... US begins in Green Bank, WV



Singe Dishes → Arrays of dishes

- Resolution – depends on size of dish D (weight goes a D^3)
- Arrays of dishes, returning signals which are processed into images
- Early arrays in Australia, UK, Netherlands...
- Late '60s – Very Large Array
 - 1972 August: approved by Congress
 - 1973 April: construction started
 - 1975 September 22: first antenna put in place
 - 1976 February 18: first fringes
 - 1980: formal dedication of the VLA
- VLA today – preeminent cm radio telescope in the world





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Google earth

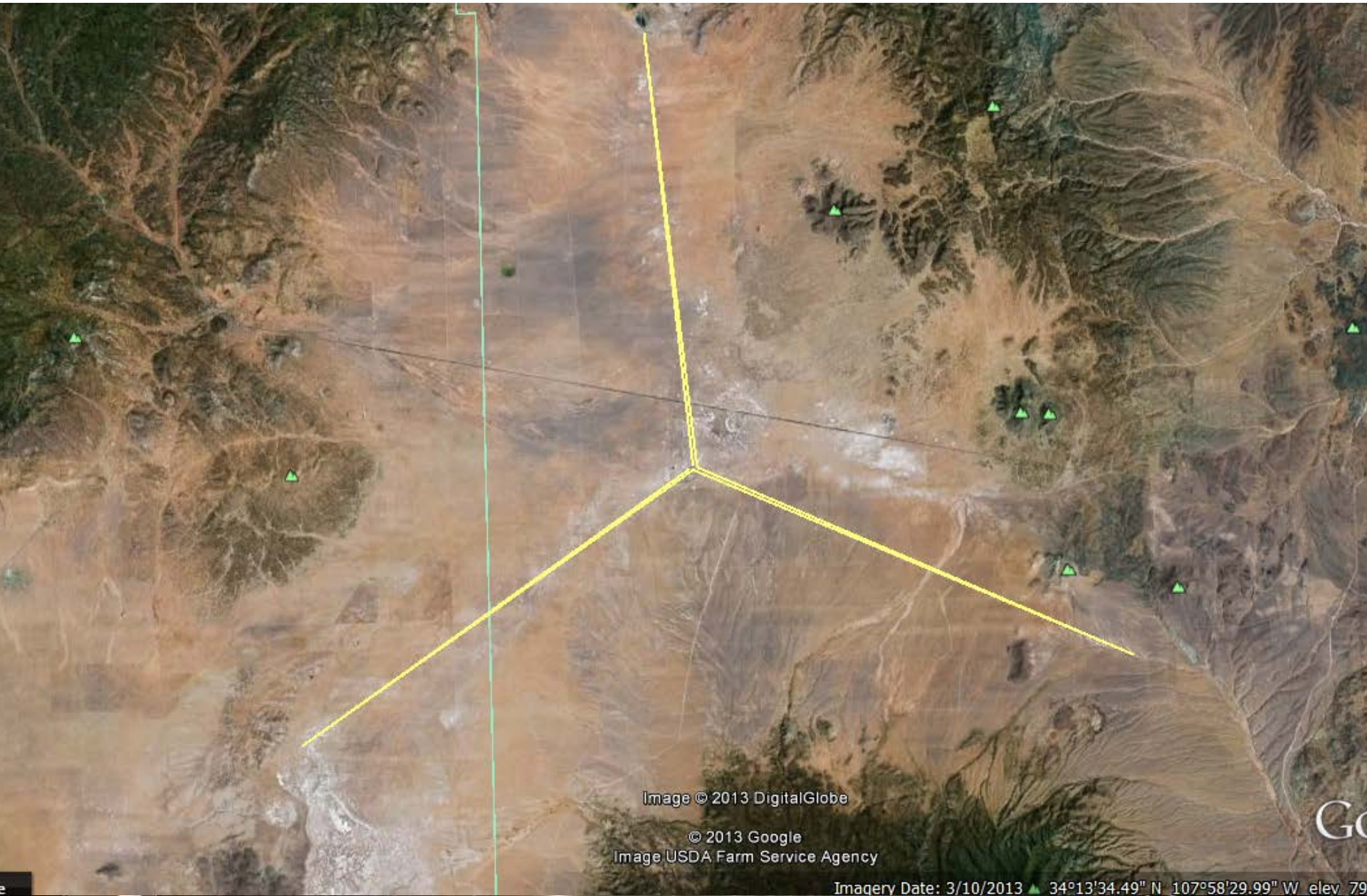


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Image USDA Farm Service Agency

Imagery Date: 3/10/2013 ▲ 34°13'34.49" N 107°58'29.99" W elev 79

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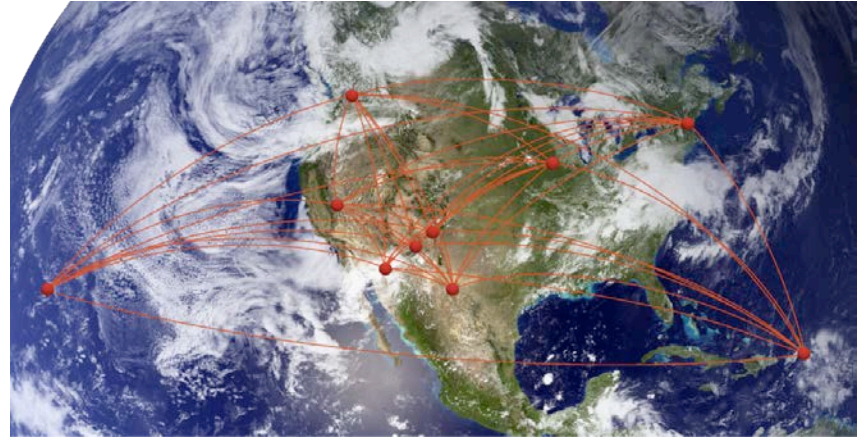
Tour: avoid snakes and the Sun. 7000'

NRAO/AUI Today

Very Large Array



Very Long Baseline Array



Green Bank Telescope



Atacama Large Millimeter/submm Array

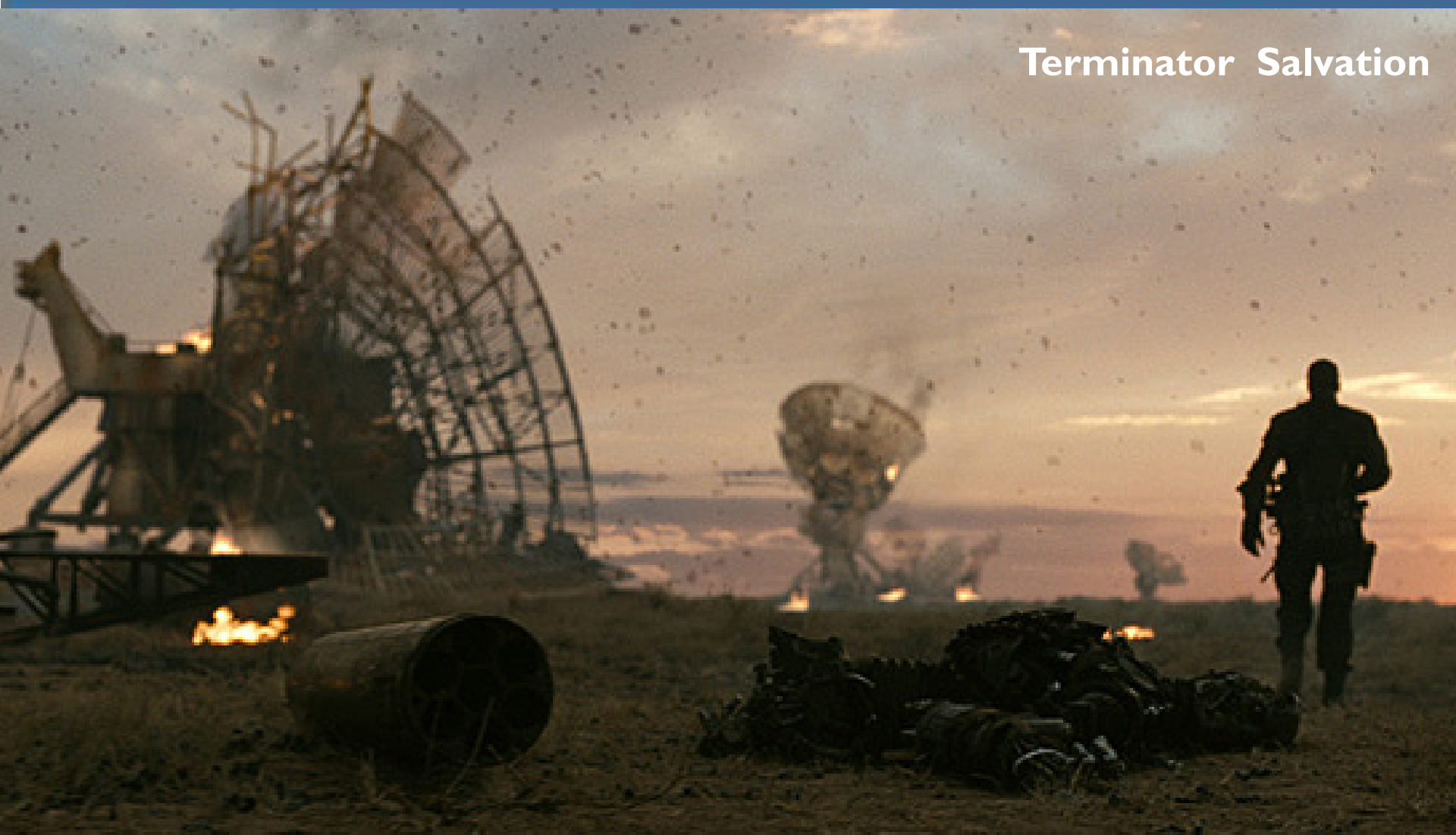


+ HQ, Central Development Laboratory (CV) + AUI Corporate (DC)

ATACAMA LARGE MILLIMETER ARRAY: ALMA



Terminator Salvation





The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc

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