

NEROC Vision 2020

Min S. Yun

University of Massachusetts

2020 NEROC Symposium

November 16, 2020

Northeast Radio Observatory Corporation

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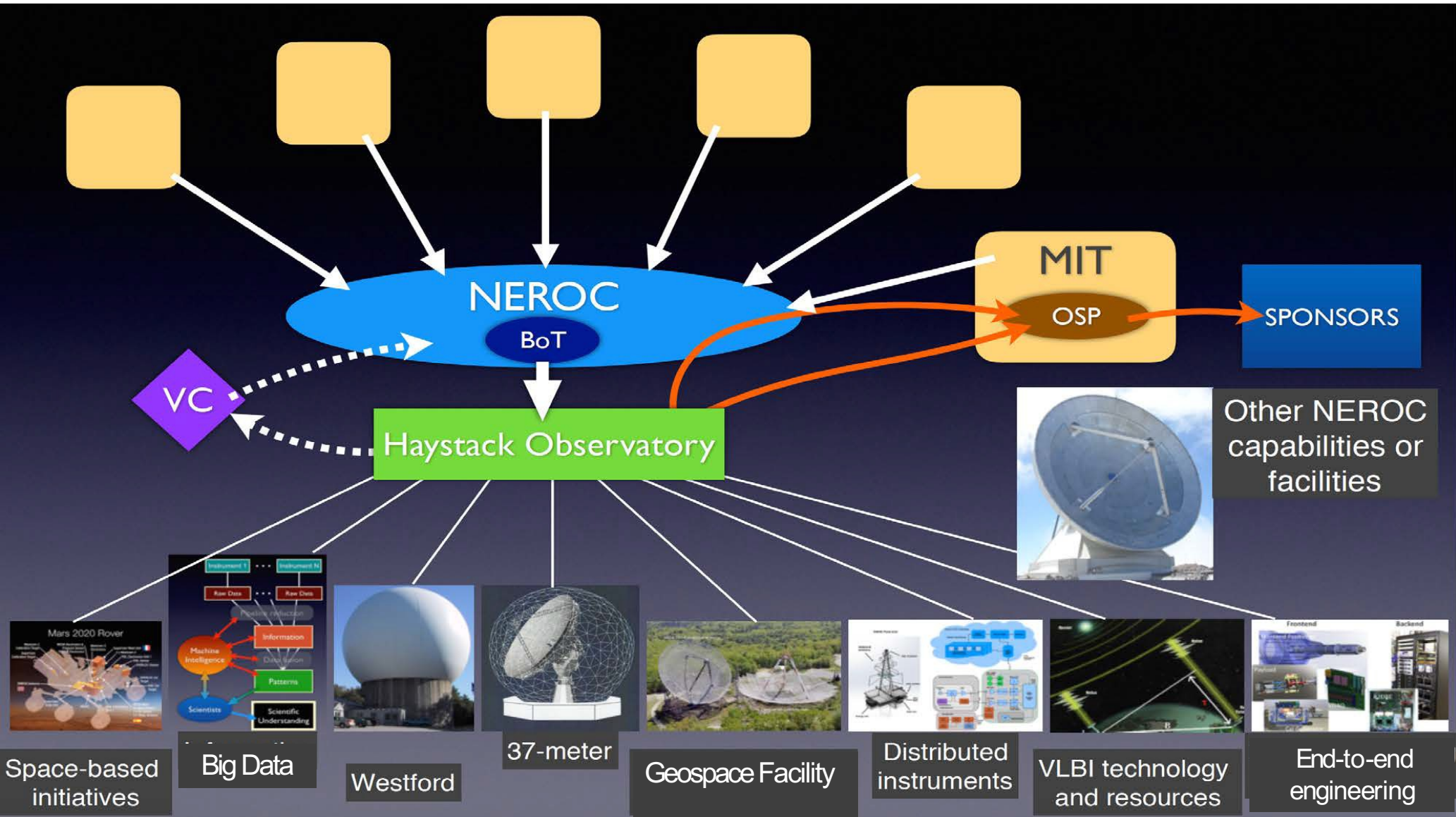
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A Brief History of NEROC

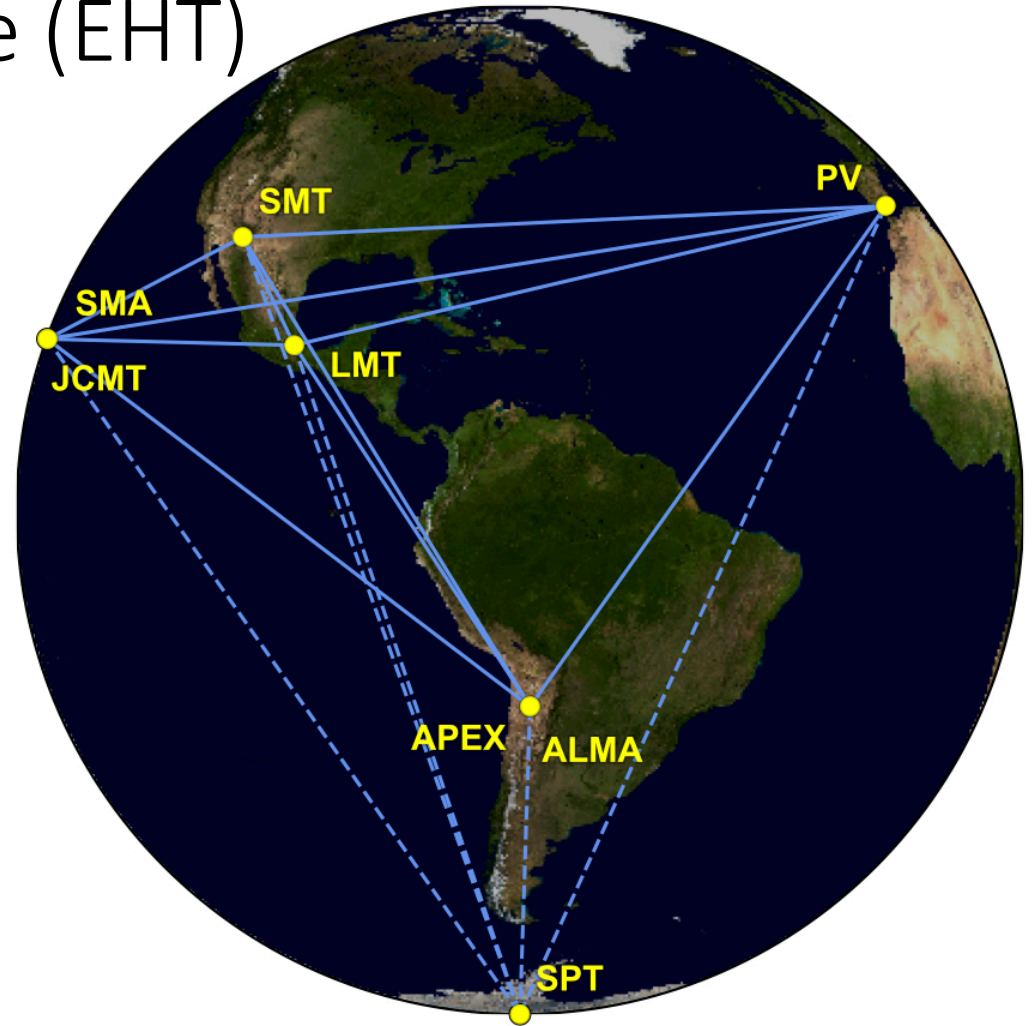
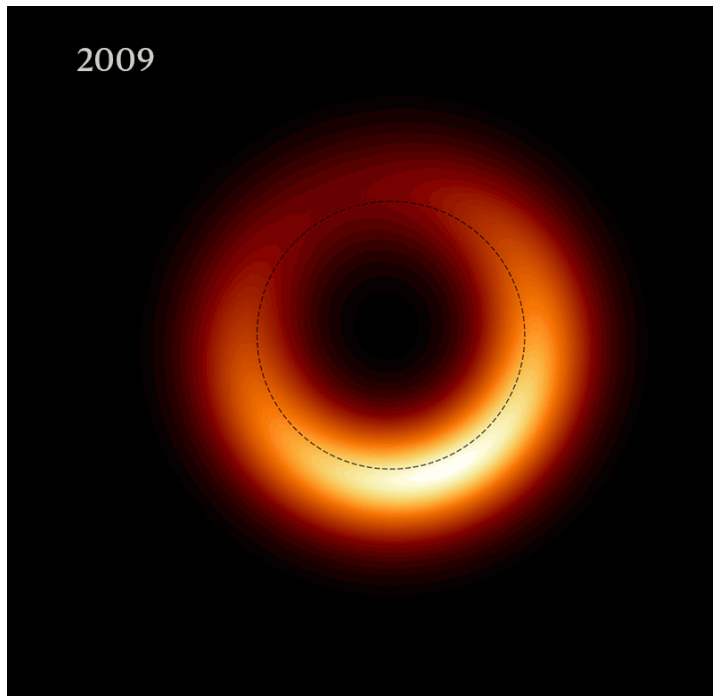
- Haystack was formed in 1970 around a world-class 37-meter research telescope that was in demand by a regional community of astronomers.
- NEROC was formed to facilitate and regulate access to this unique resource, and to provide guidance and oversight to Haystack.
- As research interests of NEROC partners evolved, the Haystack VLBI group became a valuable resource for the NEROC community.
- NEROC colleagues increasingly engage with Haystack's upper atmospheric research and technology program.
- The 37-meter became less competitive in the 1990s. Operations were suspended in 2006 for a major Lincoln Lab upgrade.





Event Horizon Telescope (EHT)

Breakthrough Prize (2019)



NEROC Collaborations

(current and/or developing)

- University of New Hampshire

UNH Staff/Faculty	Topic	Haystack Staff
Marc Lessard	Antarctic & arctic studies	Coster, Erickson, Foster
Ningyu Liu, Joseph Dwyer	Lightning Imaging	Lind, Lonsdale
Harlan Spence	MMS mission	Erickson, Foster
Joachim Raeder	Magnetospheric modeling, Themis	Erickson, Foster
Hiroshi Matsui	Magnetospheric/ionospheric coupling	Erickson, Foster

NEROC Collaborations

(current and/or developing)

- Dartmouth College

Dartmouth Staff/Faculty	Topic	Haystack Staff
Simon Shepherd	SuperDarn	Coster, Erickson
Robyn Milan	Antarctica	Erickson, Foster, Coster
Kristina Lynch	ISINGLASS rocket campaign	Coster
Jim Labelle	Radio waves, HF propagation, AERO	Lind, Erickson, Coster

NEROC Collaborations

(current, developing, or strong potential)

- **Boston University**

BU Staff/Faculty	Topic	Haystack Staff
Joshua Semeter	MAHALI, ISR theory	Pankratius, Erickson, Lind, Coster
Carlos Martinis, Min-Chang Lee	Optics, GPS	Coster, Erickson
Brian Walsh, Toshi Nishimura, Wen Li	Magnetosphere, ionosphere	Erickson, Foster, Swoboda, Zhang, Coster
Meers Oppenheim	Lecturing	Erickson, Coster
Tom Bania, Alan Marscher	HII region and VLBI science with 37-meter	Astronomy group

NEROC Collaborations

(current and/or developing)

- MIT

MIT Staff/Faculty	Topic	Haystack Staff
Jeff Hoffman	MOXIE, aerospace engineering	Hecht, Elosegui
Kerri Cahoy	Aerospace engineering	Coster, Hecht
Tom Herring	Geodesy	Elosegui
Lincoln Lab (many)	HeRO, AERO, drones, various programs on the Hill	Many

NEROC Collaborations

(current and/or developing)

- Harvard-Smithsonian CfA

CfA Staff/Faculty	Topic	Haystack Staff
Shep Doeleman, et al.	Event Horizon Telescope	Fish, Lonsdale et al.
Neal Evans	Stellar astrophysics	Matthews

NEROC Collaborations

(current and/or developing)

- Merrimack College

Merrimack Staff/Faculty	Topic	Haystack Staff
Allan Weatherwax	Antarctica	Coster, Goncharenko, Erickson

NEROC Collaborations

(current and/or developing)

- U. Massachusetts Lowell

UML Staff/Faculty	Topic	Haystack Staff
Supriya Chakrabarti	Small satellites	Hecht, Erickson, Coster
Paul Song, J. Tu	Ionosphere/magnetosphere	Erickson, Foster, Zhang
Bodo Reinisch, Ivan Galkin	Digisondes	Goncharenko, Coster, Erickson

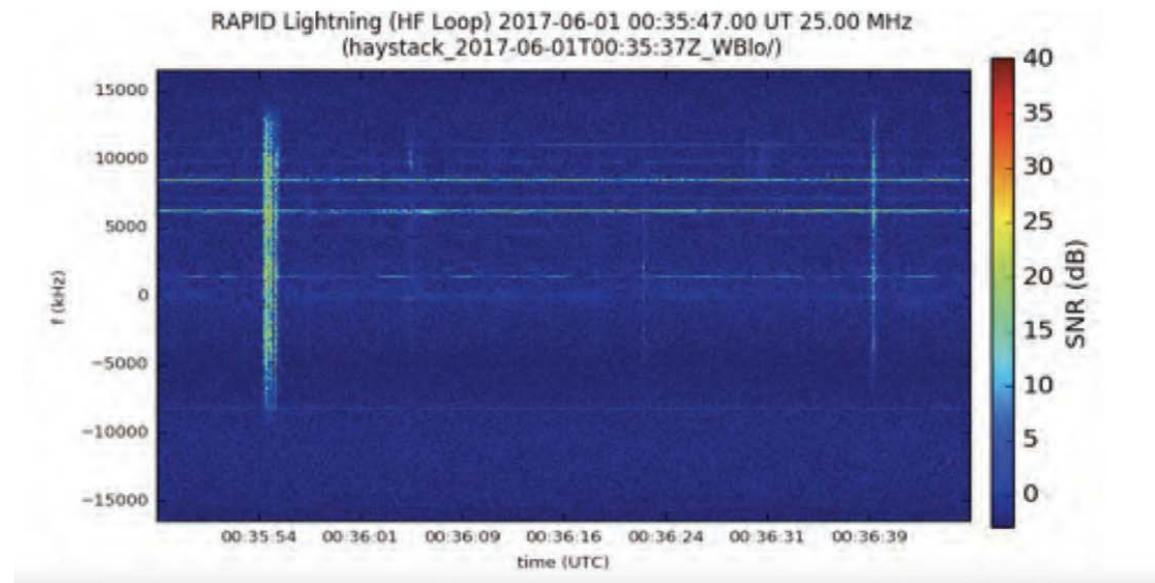
NEROC Collaborations

(current and/or developing)

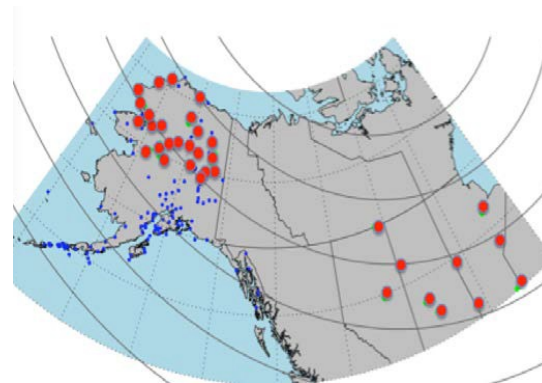
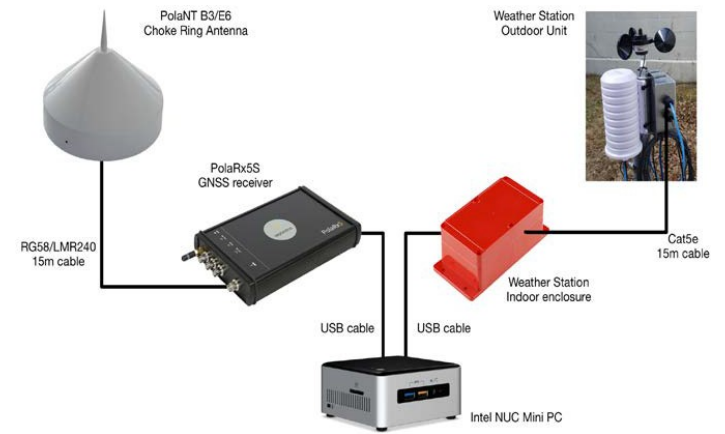
- Boston College

BC Staff/Faculty	Topic	Haystack Staff
Patricia Doherty	Africa training/education, DMSP	Coster, Erickson
William Burke	Magnetosphere	Erickson
Keith Groves	Radars, GPS	Erickson, Coster
Endawoke Yizengaw	Magnetospheric/ionospheric coupling	Coster

NEROC MRI Proposal (UNH and Haystack) has been submitted based on connections made at symposium



Two Merrimack College Students have been helping an awarded NEROC MRI



Large Millimeter Telescope (LMT)

A photograph of the Large Millimeter Telescope (LMT) at Volcan Sierra Negra. The telescope is a large, white, parabolic dish mounted on a complex, white, multi-tiered support structure. The dish is tilted upwards. In the background, a large, dark, conical volcano (Sierra Negra) is visible under a clear blue sky. The foreground shows rocky terrain and some small red buildings. The lighting suggests it is either dawn or dusk, with a warm glow on the telescope's surface.

- EHT MSIP & MSRI Grants
 - New receiver development
 - Surface performance improvement
- NSF/MSIP grant to support US Community Access
- NSF/MSIP grant for TolTEC instrument

Volcan Sierra Negra
altitude 4600 m

Goals of a Re-invented NEROC

- Expand and broaden radio science research in the region
- Exploit facilities and capabilities across the NEROC community
- Generate opportunities for research collaboration and funding
- Enrich and expand educational programs

Proposals: NEROC Collaboration

- NEROC staff, student training at Observatory
 - Scientific and technical, as appropriate
 - Grad student mentoring, thesis advising
- Focused NEROC student workshops
 - Enrichment of research education, grow our community
- Periodic NEROC symposia
 - Local, low overhead, massively increase bandwidth
 - Rotating venues
- Haystack outreach via seminars at NEROC sites
- Students in residence at Haystack
 - Summer, UROP etc., maintains bandwidth

