



International Committee on
Global Navigation Satellite Systems

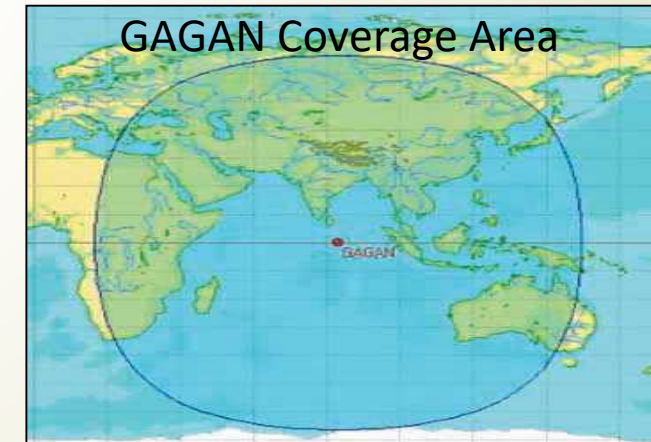
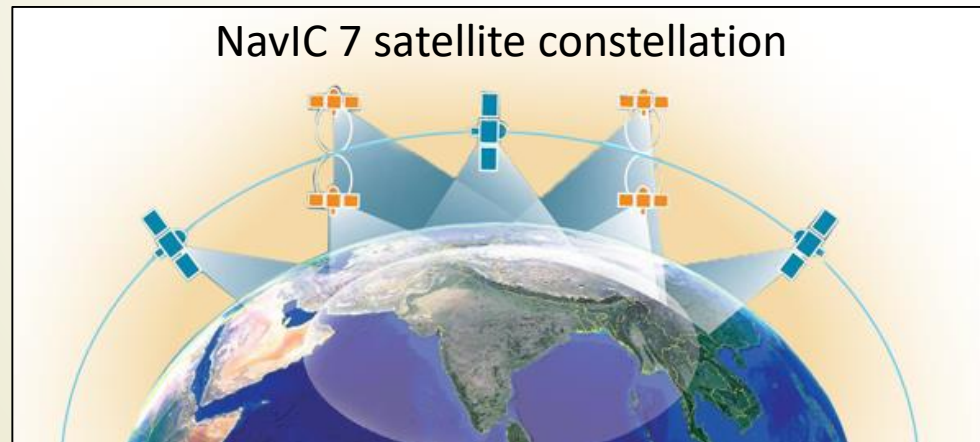


NavCom and Other Novel Applications of NavIC/GAGAN

SATNAV PO, ISRO HQ

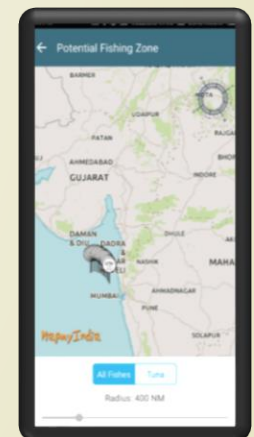
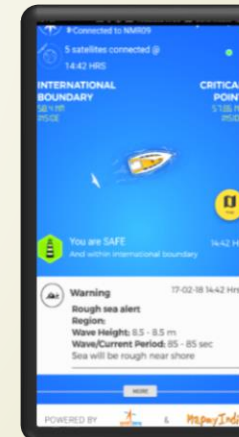
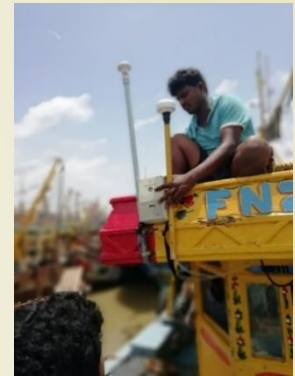
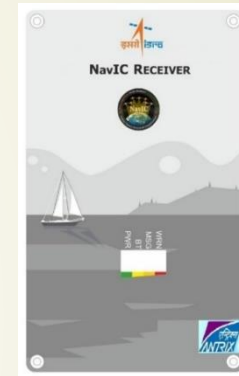
NavIC / GAGAN Applications (Introduction)

- ▶ NavIC constellation of 7 satellites is complete
- ▶ GAGAN has been certified for APV-I (precision approach) operations by DGCA on April 21, 2015
- ▶ As part of proliferation of NavIC & GAGAN usage in India, ISRO has initiated multiple pilot projects as part of the Utilization Programme



Messaging Receivers for Fishermen

- Started as pilot project in the states of Kerala, Tamil Nadu, Andhra Pradesh & Karnataka
- Full deployment is expected by Jun'19
- Features:
 - Disaster warning alert messages for Cyclone, Tsunami, High Wave, etc.
 - Alerts on crossing international boundary
 - Potential Fishing Zones Information extracted from Indian Remote Sensing Satellite data
 - Native language support



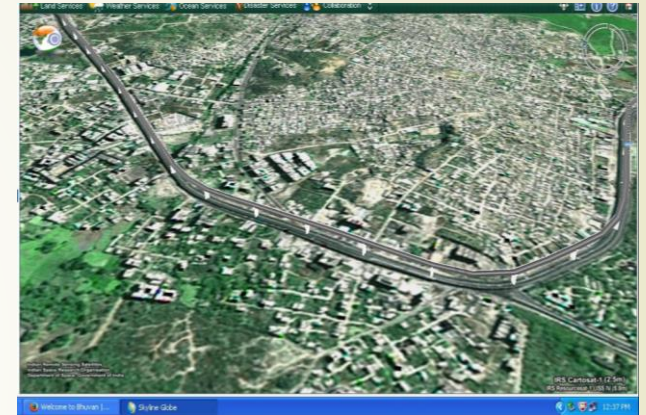
Warning Systems for Un-Manned Level Crossings

- ▶ Around 6500 un-manned railway level crossings exist in India
- ▶ Initiative to eliminate risk at the level crossings by using NavIC & GAGAN based tracking receivers in Trains.
- ▶ The hooters are installed at Level Crossings and also in Train Engines. Automatic warning at the crossing when train is 1-2 km away
- ▶ Pilot project in 4 locations of East Central Railway Network of India



Smart City Applications

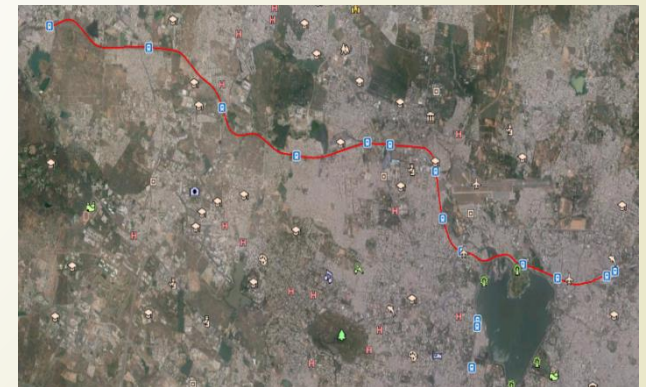
- ▶ Tracking of all public transportation systems with NavIC + GAGAN based trackers by April'19
 - ▶ Pilot projects carried out in Mysore, Delhi, Ahmedabad
- ▶ MMTS Railway line mapping in Hyderabad, 3D models of Bridges/ Flyovers using NavIC/GAGAN
- ▶ NavIC/GAGAN Apps for heritage site management & civilian construction approvals



PVNR Elevated Expressway



- Protected
- Prohibited
- Regulated



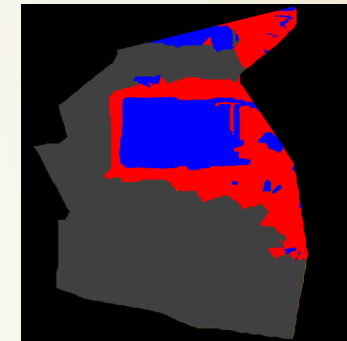
MMTS Rail network

Resource monitoring

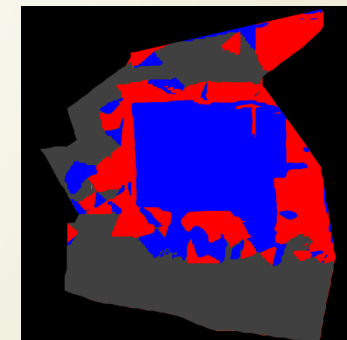
- ▶ Pilot project to combine High Resolution Satellite Imagery with NavIC/GAGAN receivers for monitoring mining activities



TEMPORAL CHANGES OF LIMESTONE MINE FROM REMOTE SENSING DATA

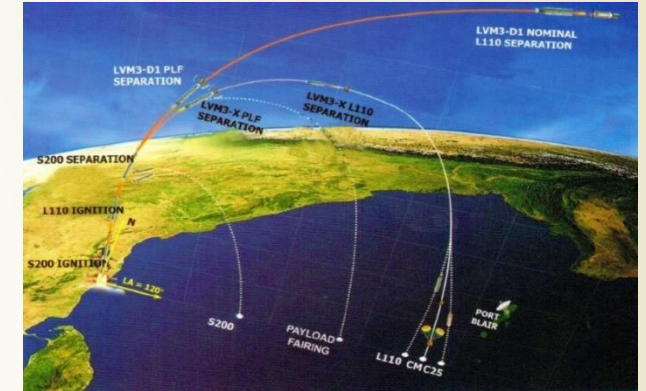


- Overburden
- Unchanged
- Cut



Launch Vehicle Tracking

- NavIC + GAGAN/GPS receiver integrated into ISRO's Launch vehicles
- 3 to 6 NavIC satellites were tracked & used to derive trajectory
- Integrated INS for operation during non-availability of satellites
- Since Dec 2016 the receiver has been flown in ISRO launch missions



Other Applications

- ▶ 360° Image Acquisition system developed with GAGAN for developing digital walkthroughs of historical sites/ tourist locations
- ▶ Differential NavIC positioning solutions are under evaluation
- ▶ NavIC based positioning solution for Radio-Sonde applications
- ▶ IMO certification of NavIC system for maritime services





Thank You

Akhileshwar Reddy P.

Deputy Programme Manager,

Satellite Navigation Programme Office,

ISRO Headquarters, Bengaluru

Phone: +91-80-22172194 (O); +91-9726343662 (M) E-Mail: akhileshwar@isro.gov.in