

Mexico-Russia nanosatellite for earthquakes precursors monitoring

Pulinets S.¹, Landeros S.², Bisiacchi G.³, García-Garduño V.², García J.-L.², De la Rosa S.², Brekhov O.⁴, Panasyuk M.⁵, Grigoryan O.⁵, Selivanov⁶, Bergman J.⁷

¹Institute of Geophysics, UNAM, Mexico ¹*pulse@geofisica.unam.mx*

³Ingeneering Faculty, UNAM, Mexico

³Techological Center “Aragon”, UNAM, Mexico

⁴Moscow Aviation Institute, Russia

⁵Skobeltsyn Institute of Nuclear Physics, Moscow State University, Russia

⁶RNII KP, Russia,

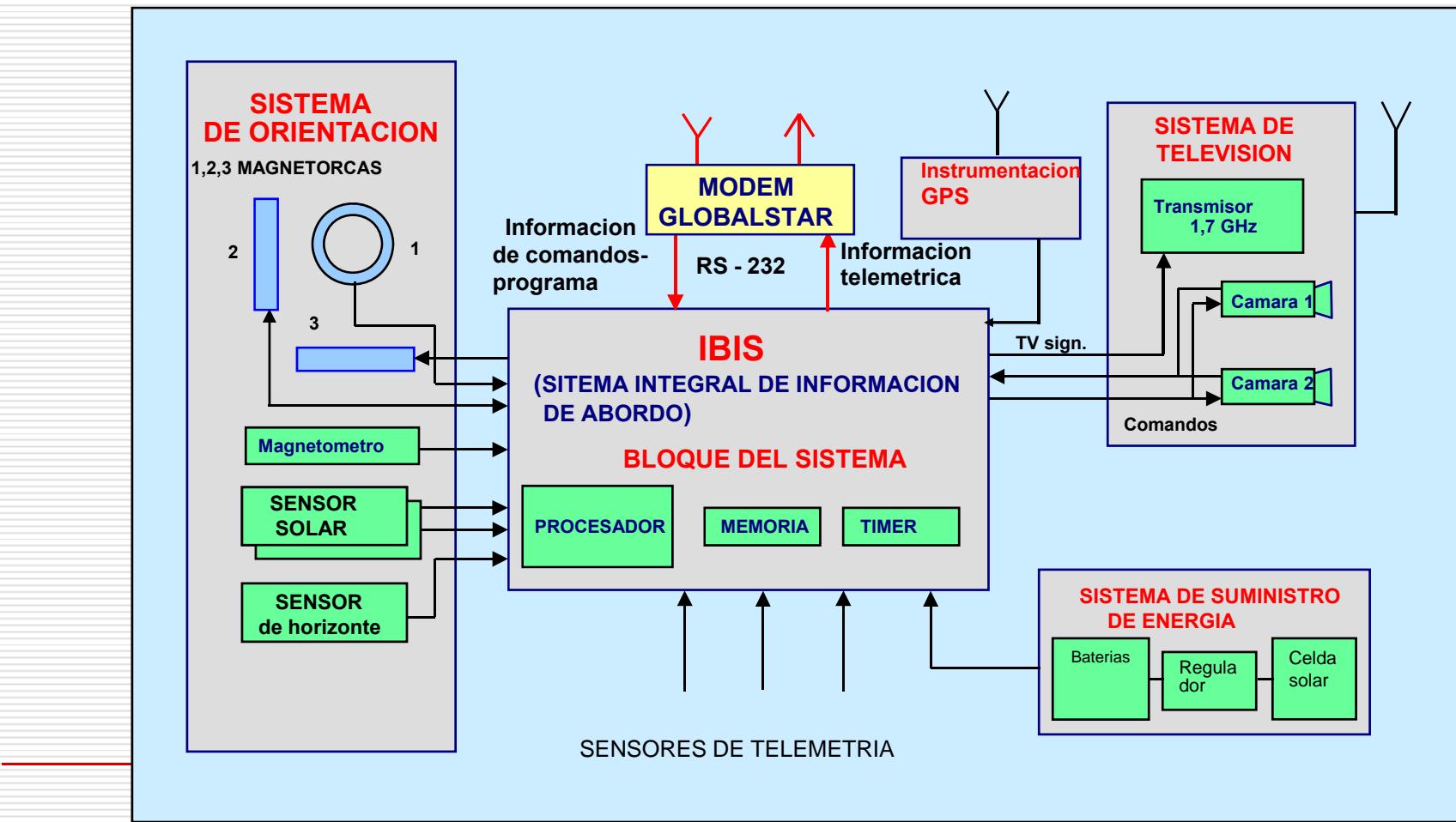
⁷Swedish Institute of Space Physics, Sweden

Nanosatellite platform TNS-1



- Circular platform of 500 mm diameter (aluminium – carbon plastic)
- Side A – solar panels
- Side B – payload
- Passive and active orientation
- Absence of the moving components
- Passive thermoregulation

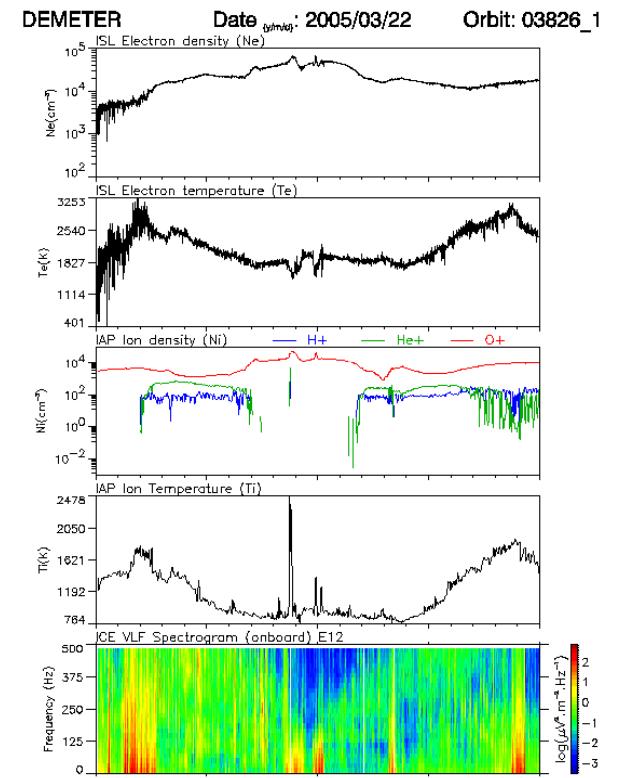
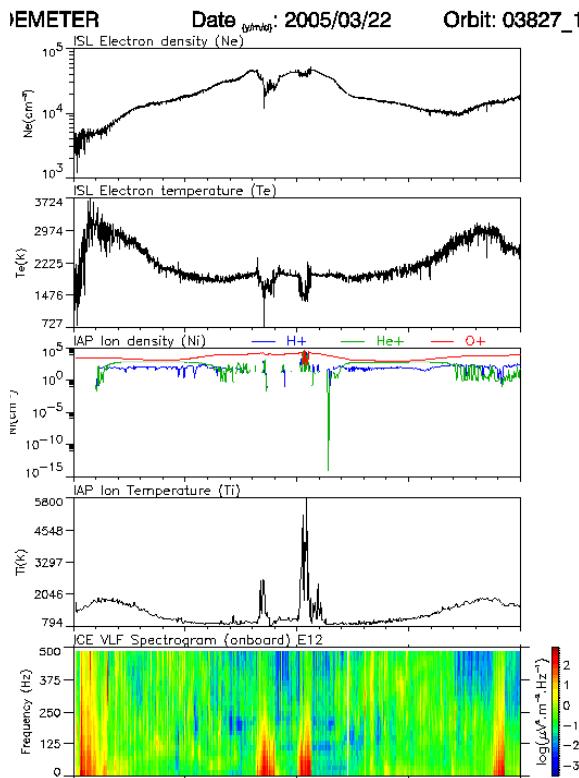
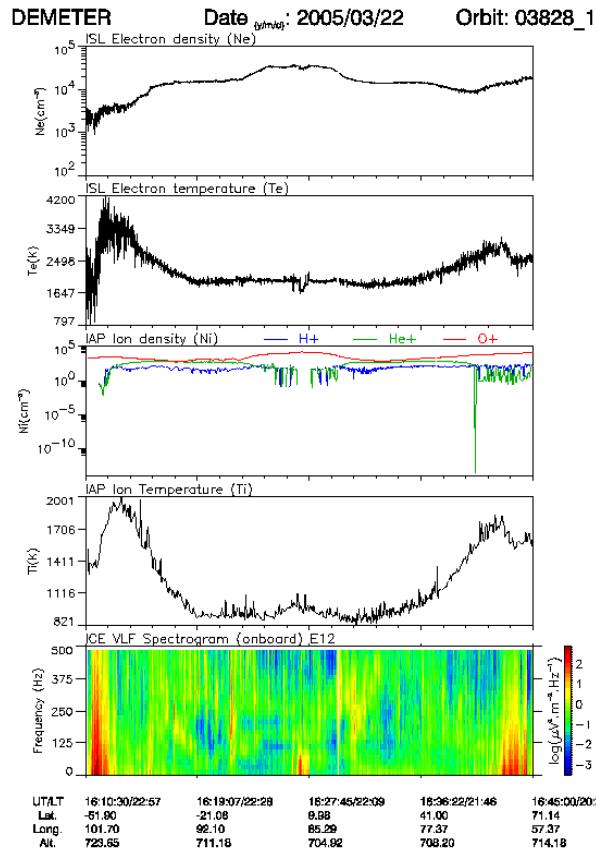
Payload structure of the TNS-1



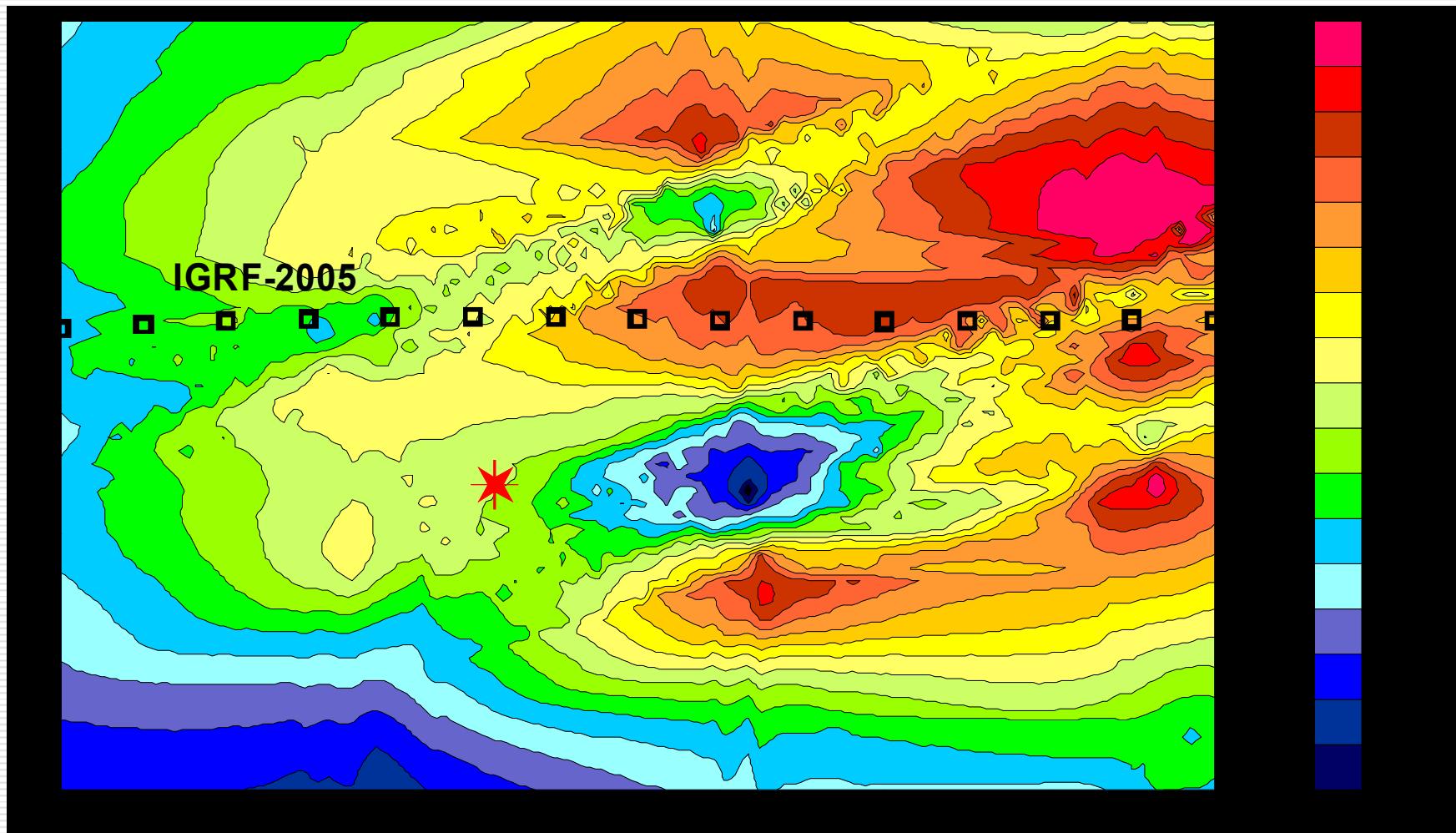
Payload selection

- Price
 - Ability to register precursors
 - Accommodation to platform
 - Possibility to use in educational purposes
-

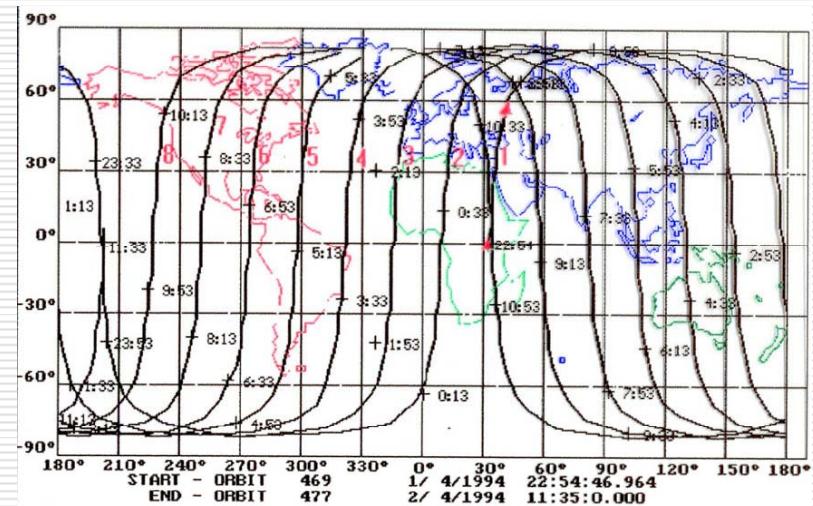
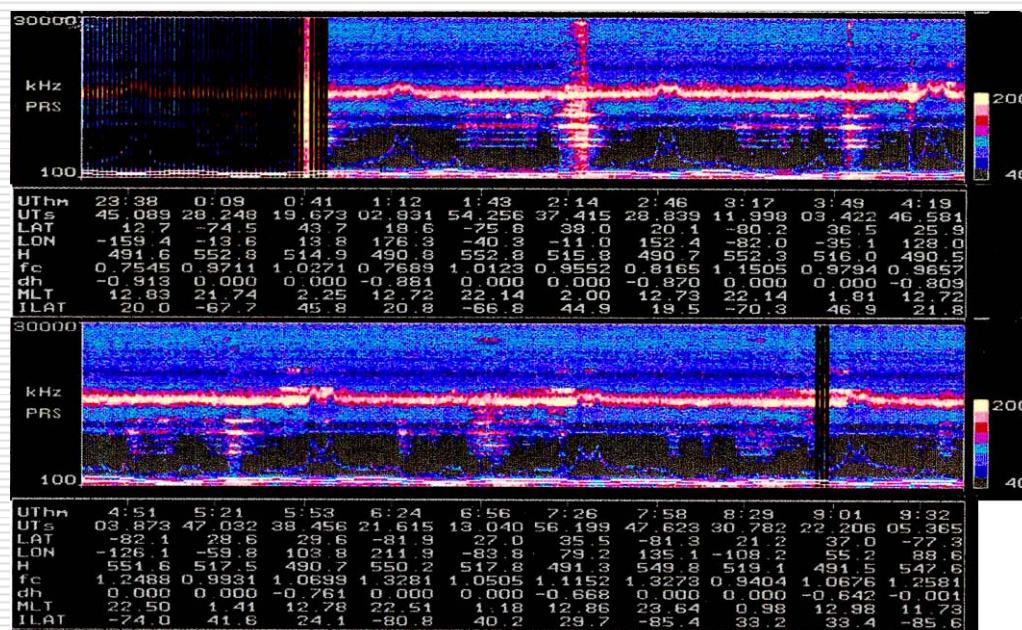
March 22, 2005 (Sumatra-2)



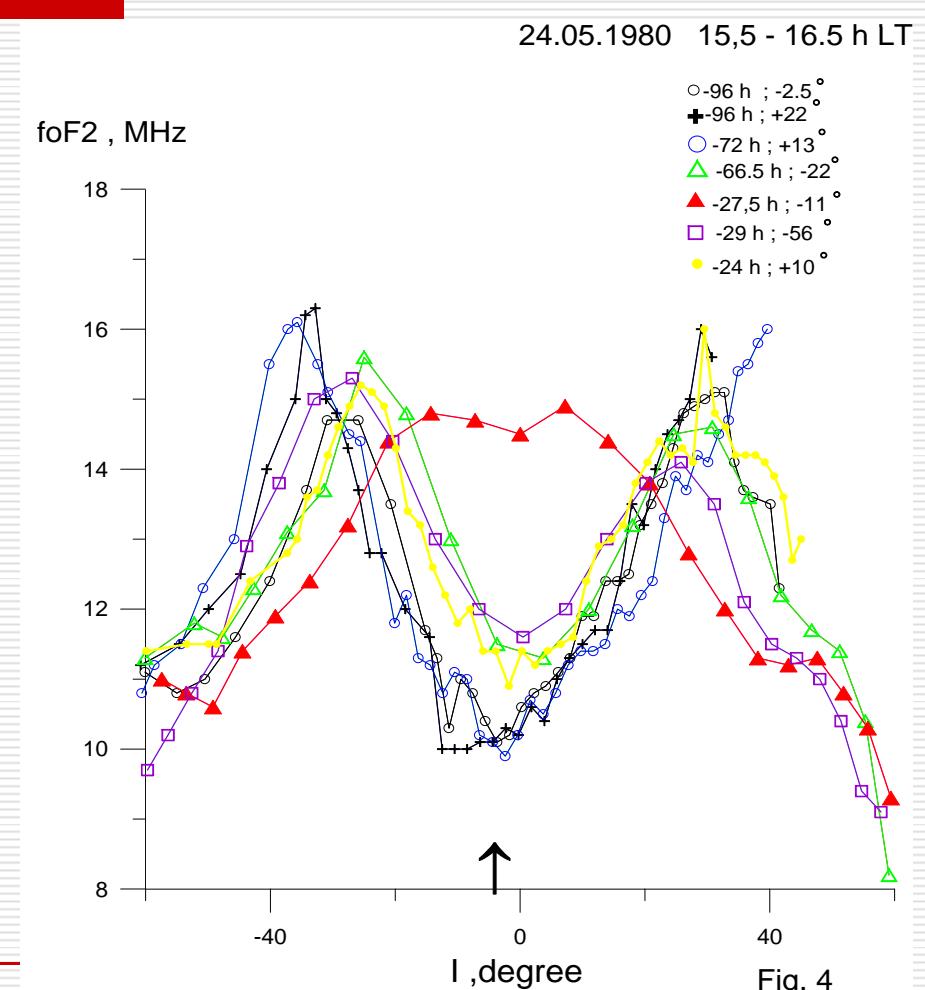
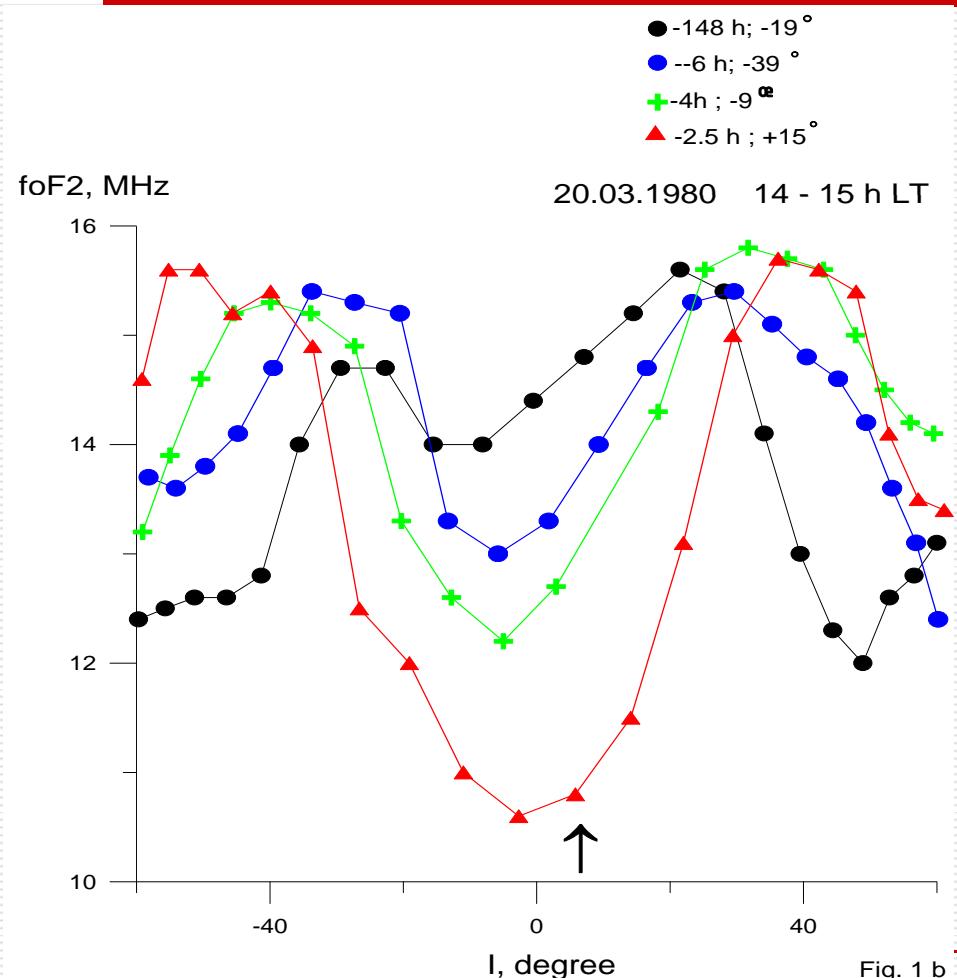
Ion density map 22 of March



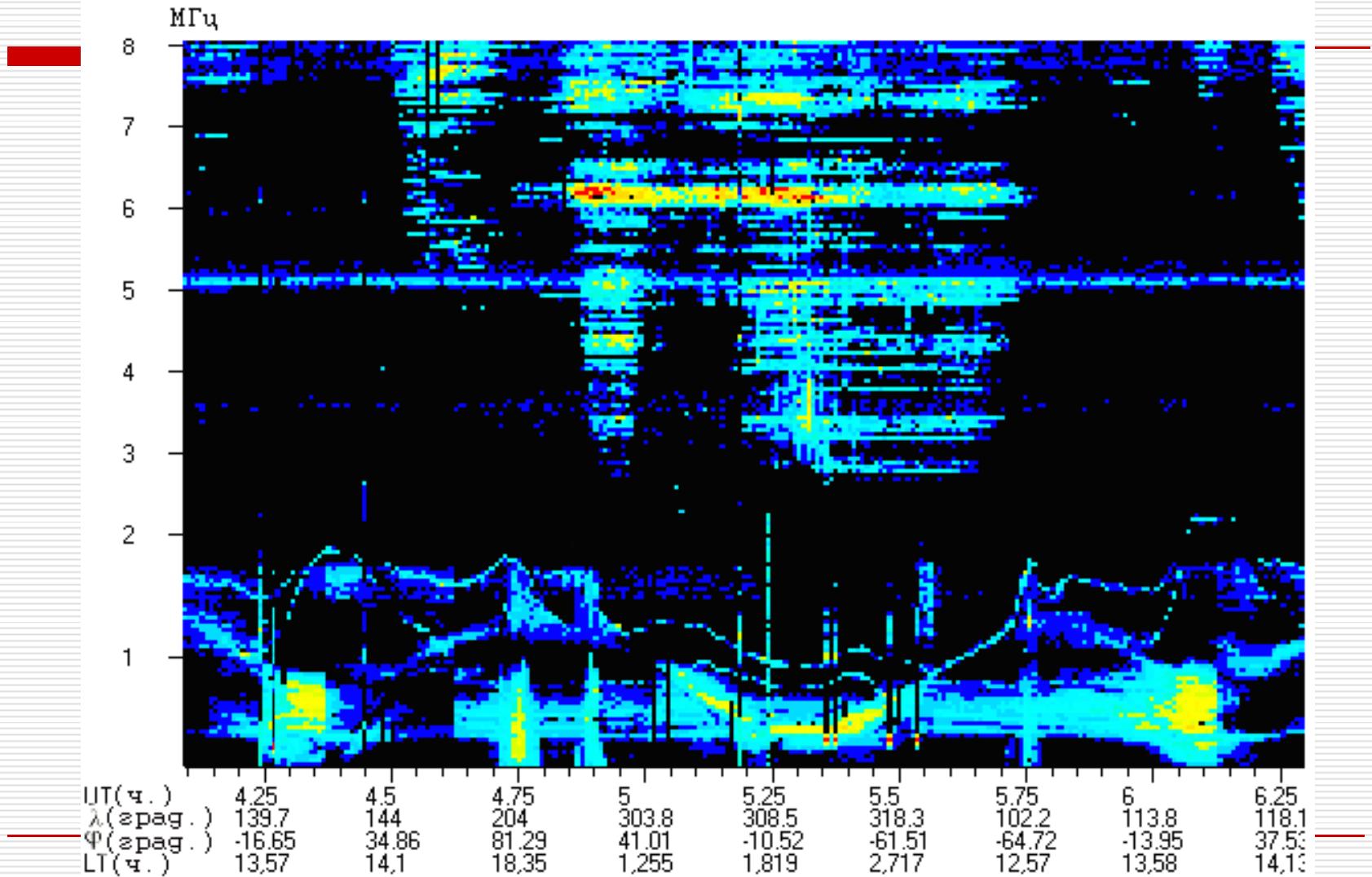
Coronas



Effects in equatorial anomaly



Wave image of the ionosphere



Energetic particles

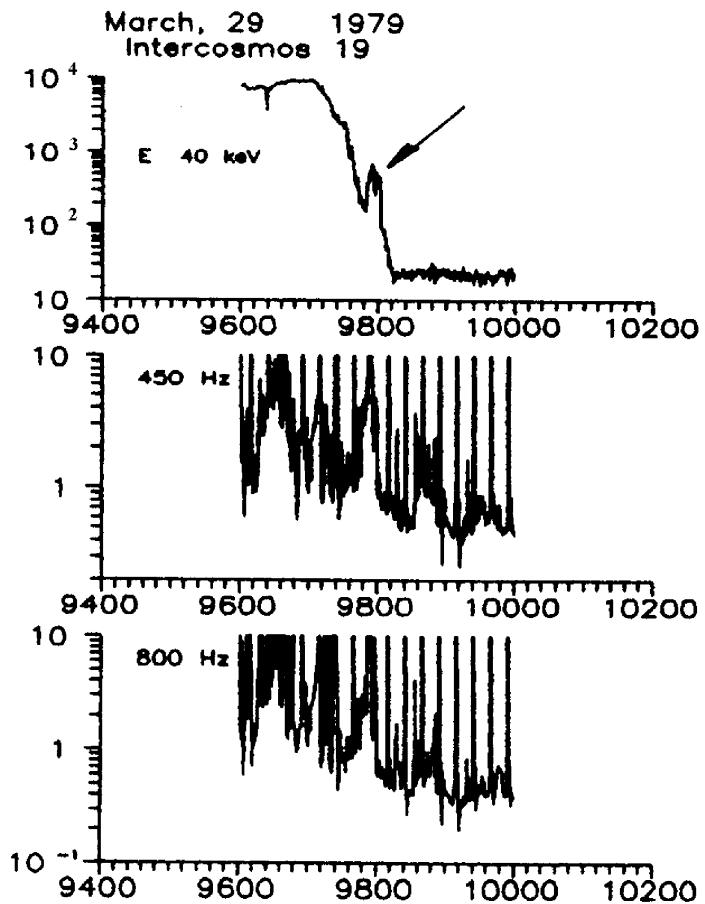
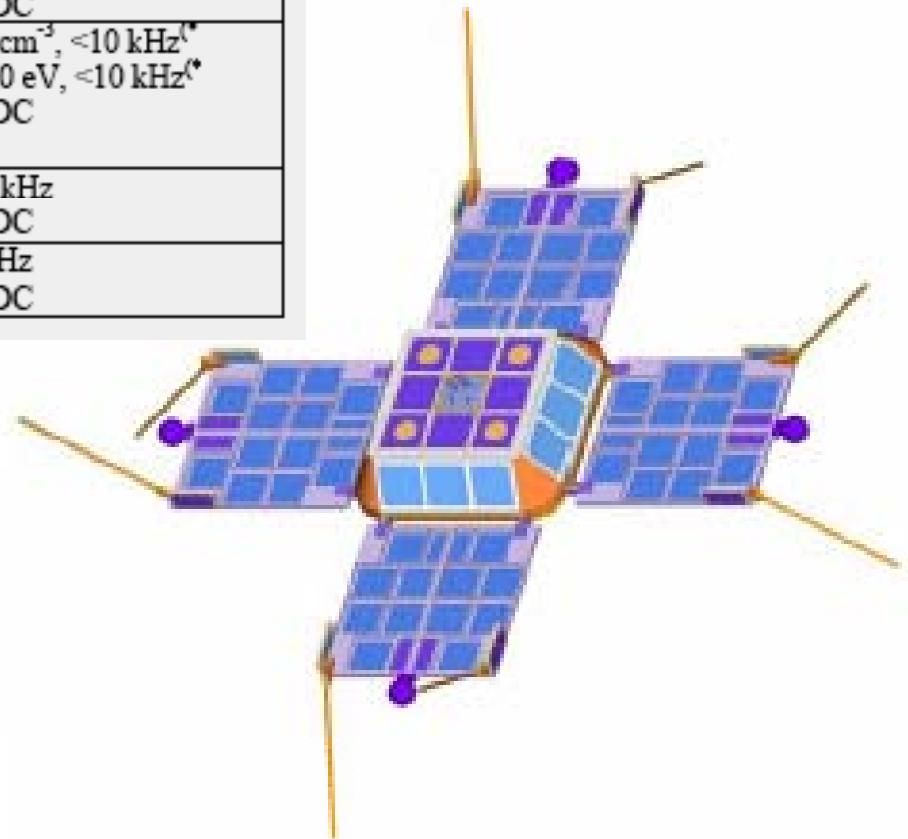


Fig.18 Particle and VLF emission of 'Intercosmos-19' onboard registration is shown. The precursor pulse is marked by arrow. Pulse duration is about one minute.

Swedish nanosatellite

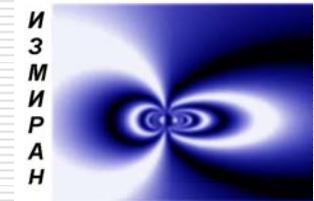
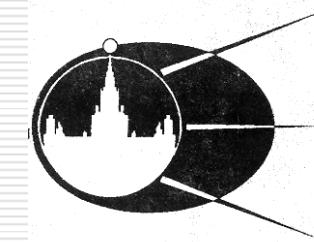


Instrument	Measured Quantities	Range
EFVS	<i>Electric field</i> (3D vector)	Few kHz–20 MHz 14 bit ADC
LP	<i>Plasma density</i> <i>Electron temperature</i>	$10 - 10^8 \text{ cm}^{-3}$, <10 kHz* 0.001 - 10 eV, <10 kHz* 18 bit ADC
ARM	<i>Magnetic field</i> (3D vector)	DC – 16 kHz 16 bit ADC
FGM	<i>Magnetic field</i> (3D vector)	DC-100 Hz 22 bit ADC





UNAMSAT-3



Langmuir probe

variations of the electron density
and temperature

Particle detectors

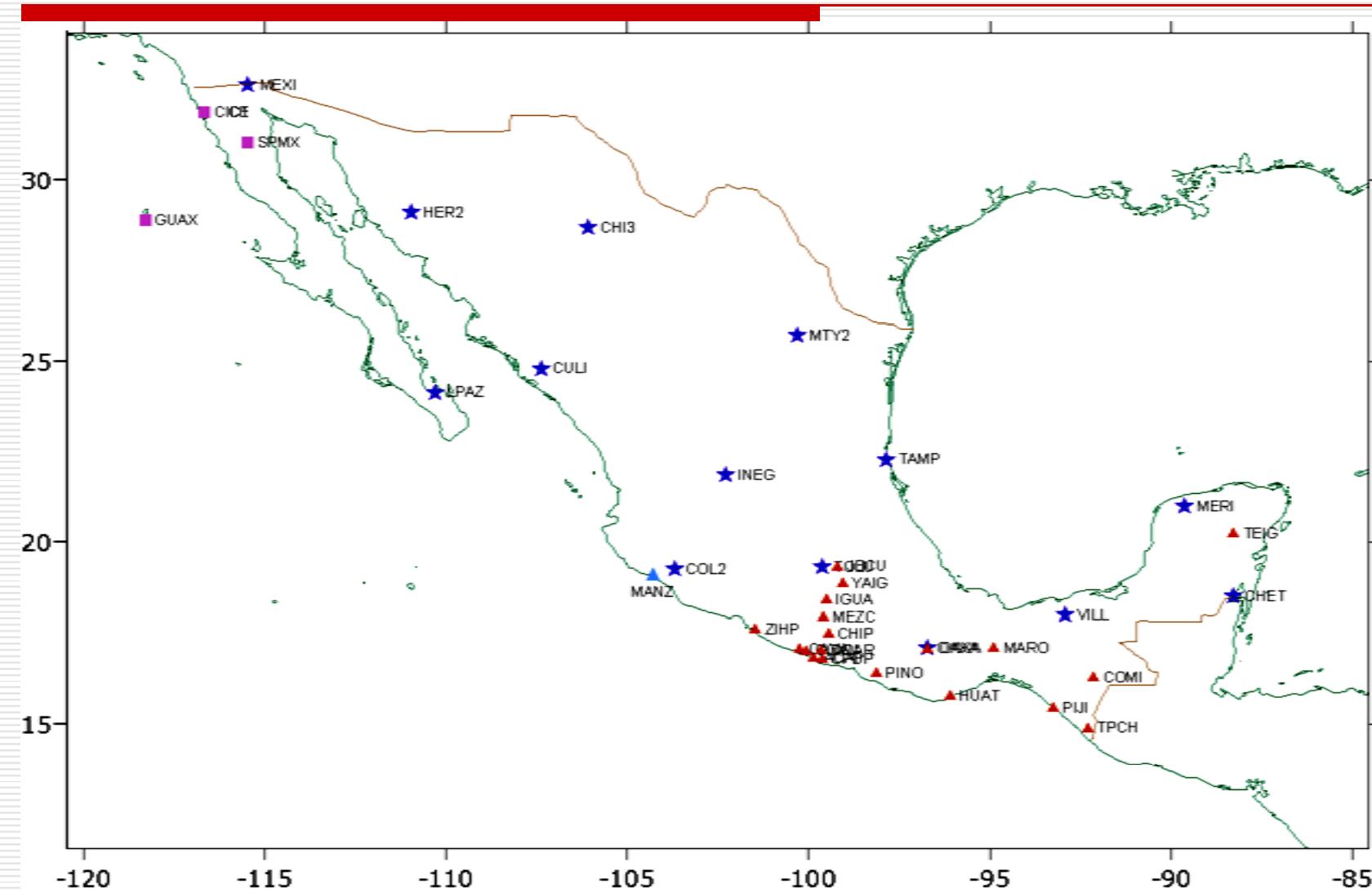
110 keV - 80 MeV

HF radiospectrometer

0.1 – 15 MHz

GPS receiver

Ground support



Rector of UNAM, Huan Ramón de la Fuente in Moscow

