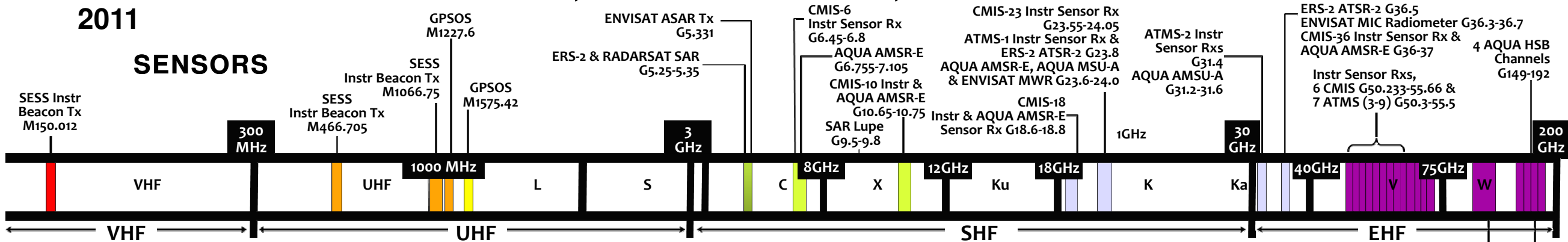


# SATELLITE EARTH OBSERVATION, METEOROLOGICAL, & MANNED SPACE-FLIGHT SPECTRUM

2011

## SENSORS



NOAA TIROS IPM 136.7-138 D/L  
NOAA APT M136.7-138 D/L  
ISS IVVCL Rx M139.208 C/L  
ISS IVVCL Tx M143.625 C/L  
ISS Amateur Radio M145.800 D/L, M145.99 U/L, M145.2 U/L, M144.49 U/L  
NOAA CMD M148.56 U/L

X-SAT M312-315, M400.15-401 D/L  
ISS-SSO-EMU SSCS M414.2 C/L, M417.1 C/L  
SSO Range Safety Tone M416.5 U/L  
SSO Rocket Loc Beacon M240  
SSO ATC M243-300 U/L D/L  
DMSP M400-401 D/L  
ISS VVCS M400.575 C/L  
DCS M401-403 U/L  
ENVISAT DORIS Nav Rx M401.25 U/L  
SPOT-5 Nav Rx M401.25 U/L

GOES WEFAX Data M1676-1707 D/L  
NOAA Stored Data M1676-1707 D/L  
DCS Report M1676-1707 D/L

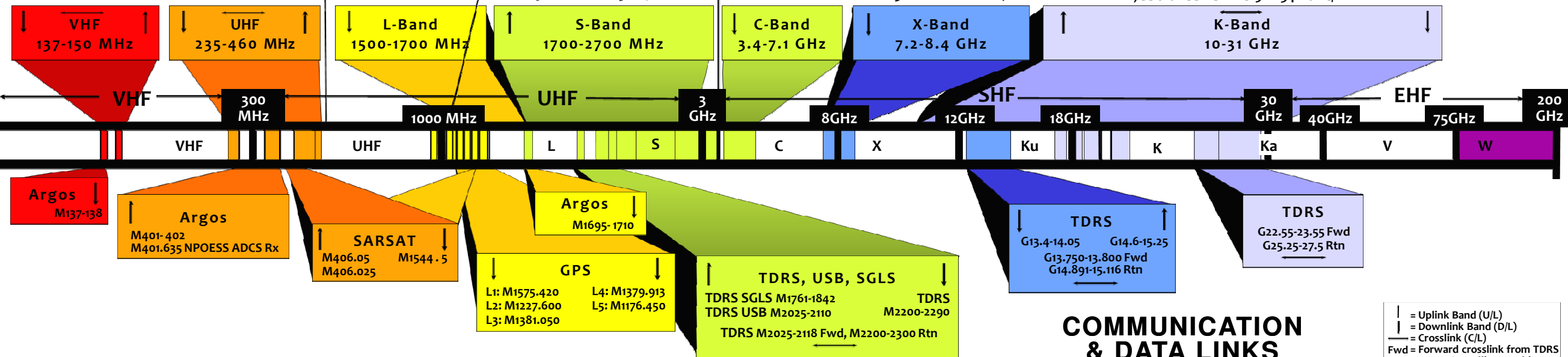
NPOESS ADCS Tx M465.9875 D/L  
GOES DCPI M468.825 & 468.8375 D/L  
SSO TACAN M962-1213 D/L  
ENVISAT DORIS Nav Rx G2.036 U/L  
SPOT-5 Nav Rx G2.036 U/L

ENVISAT Altimeter G3.2 D/L  
SSO Chase Aircraft RADAR G5.68-5.77 D/L  
NPOESS Altimeter G5.3 D/L

LANDSAT 7 G8.0075-8.4175  
NPOESS HRD Tx G7.79-7.85 D/L  
FORMOSAT-2 G8.275-8.395 D/L  
SPOT G8.198-8.308 D/L  
TERRA G8.025-8.400 D/L  
AQUA G8.085-8.235 D/L  
AURA G8.085-8.235 D/L  
ERS-2 G8.028-8.499 D/L  
ERS-2 G7.215-7.235 U/L  
ENVISAT G8.05-8.35 D/L  
RADARSAT G8.075-8.260 D/L  
X-SAT G8.210-8.395 D/L  
RAPIDEYE G8.12-8.20 D/L  
SAR LUPE G8.09-8.34 D/L  
RESOURCEAT-2 G8.02-8.23  
LISS-4 Data D/L, G8.195-8.405  
LISS-3 & AWIFS Data D/L

ERS-2 Altimeter G13.8 D/L  
SSO MSBLS G15.460 D/L  
SSO MSBLS G15.6 U/L  
SSO K-Band RADAR G13.9 C/L  
ISS-JEM-ICS Rx G23.275 C/L  
ENVISAT Data Tx G27.1 C/L  
NPOESS Data Tx G25.65 D/L  
ENVISAT Altimeter G13.575 D/L  
NPOESS Altimeter G13.575 D/L  
ISS-POCS & ISS-JEM-ICS Tx G26.375 C/L  
TERRA, SSO & ISS KSAF G13.775 Fwd C/L  
TERRA, SSO & ISS KSAR G15.0034 Rtn C/L

Instr Sensor Rx ATMS-10-15 G57.290344  
7 AQUA AMSU-A G50.1-57.79  
G60.5008-60.5168  
G60.42226-60.44726  
G60.4160-60.4244  
G60.400-60.416  
G60.3424-60.4000  
G59.72-60.16  
G59.24-59.52  
G56.5-56.8  
Instr Sensor Rx ATMS-16 G87.0-91.9  
CMIS-89 G87-91  
AQUA AMSR-E G87.5-90.5  
AMSU-A G86.0-92.0  
Instr Sensor Rx ATMS-17 G164  
CMIS-166 G165.2125-166.7875  
CMIS-183 G175.61-191.01  
ATMS-18-22 G183-31



## COMMUNICATION & DATA LINKS

↑ = Uplink Band (U/L)  
↓ = Downlink Band (D/L)  
↔ = Crosslink (C/L)  
Fwd = Forward crosslink from TDRS or DTRS satellite to orbiter  
Rtn = Return crosslink from orbiter to TDRS or DTRS satellite

## A

**ADCS** Advanced Data Collection System  
**AMSR-E** Advanced Microwave Scanning Radiometer-E  
**AMSU** Advanced Microwave Sounding Unit-A  
**APT** Automatic Picture Transmission  
**AQUA** Latin for water is a NASA Earth Observing System  
**ARGOS** System for locating and collecting data from environmental monitoring and scientific sensors  
**ASAR** Advanced Synthetic Aperture Radar  
**ATC** Air Traffic Control  
**ATMS** Advanced Technology Microwave Sounder  
**ATSR-2** Along Track Scanning Radiometer-2, passive sensor on ERS-2  
**AURA** The third NASA Earth Observing System will study the Earth's ozone, air quality and climate.

## C

**C-band** 3.4 to 7.1 GHz, in satellite communications  
**CMIS** Conical Scanning Microwave Imager Sounder  
**COMETS** Communications and Broadcast Engineering Test Satellite

## D

**DCPI** Data Collection Platform Interrogate  
**DCPR** Data Collection Platform Report  
**DCS** (Environmental) Data Collection System  
**DMSP** Defense Meteorological Satellite Program  
**DORIS** Doppler Orbitography and Radio-positioning, Integrated by Satellite  
**DRTS** Data Relay Test Satellite

## E - F

**EHF** In science, 30 to 300 GHz. In satellite communications, appx 20 to 50 GHz.  
**EMU** Extra-Vehicular Mobility Unit  
**ENVISAT** Environmental Satellite  
**ERS-2** European Remote Sensing Satellite-2  
**Fwd** Forward crosslink from TDRS (or DRTS) to the orbiter  
**FEP** FLTSATCOM EHF Package

## G

**GOES** Geostationary Operational Environmental Satellite  
**GPSOS** Global Positioning System Occultation Sensor

## H

**HRD** NPOESS High Rate Data Spacecraft transmitter  
**HSB** Humidity Sounder for Brazil

## I

**ISS** International Space Station  
**ISS ECOMM** International Space Station Early Communications System  
**ISS ICM** International Space Station Interim Control Module  
**ISS-JEM-ICS** International Space Station Japanese Experiment Module Inter-communication System, links to COMETS and DRTS Satellites  
**ISS POCS** International Space Station (ISS) Proximity Operations Communications System  
**ISS SSCS** International Space Station (ISS) Space-to-Space Communications System  
**IVVCL (ISS)** VHF Voice Communication Link  
**ISS VVCS (ISS)** Visiting Vehicle Communications system, for telemetry with the Japanese H-II Transfer Vehicle

## K

**K-band** 10 to 31 GHz, in satellite communications  
**Ka-band** 17 to 21 GHz and 27 to 31 GHz, in satellite communication  
**KSAF** K-band Single Access Forward  
**KSAR** K-band Single Access Return  
**Ku-band** 10.7 to 14.5 GHz, in satellite communications

## L

**L-band** 1.5 to 1.7 GHz, in satellite communications

## M

**MSBLS** Microwave Scanning Beam Landing System  
**MWR** Microwave Radiometer

## N

**NOAA** National Oceanic and Atmospheric Administration Satellite  
**NPOESS** National Polar-orbiting Operational Environmental Satellite System

## R - S

**RADARSAT** Canadian advanced Earth observation satellite equipped with a SAR for Earth imaging  
**RAPIDEYE** Federal Republic of Germany commercial imaging satellite  
**RESOURCESAT** Indian Space Research Organization (ISRO) imaging satellite  
**Rtn** Return Crosslink from the orbiter to TDRS (or DRTS)  
**ROCSAT-2** Republic of China Satellite-2  
**SAR** Synthetic Aperture Radar  
**SAR** Search and Rescue  
**SAR-Lupe** Federal Republic of Germany Synthetic Aperture Radar Satellite  
**SARSAT** Search And Rescue Satellite-Aided Tracking  
**S-band** 1.7 – 2.7 GHz, in satellite communications  
**SESS** Space Environmental Sensor Suite  
**SGLS** Space-Ground Link System  
**SPOT** Sys. of French commercial Earth observation satellites  
**SSO** Space Shuttle Orbiter  
**SSO MSBLS** Space Shuttle Orbiter Microwave Scanning Beam Landing System

## T

**TDRS** Tracking and Data Relay Satellite  
**TERRA** Latin for “land”, is the first NASA Earth Observing System (EOS) satellite. Previously named EOS-AM, TERRA is measuring the state of the Earth's environment and climate system.  
**TIROS** Television Infrared Observation Satellite (early version of NOAA satellite)  
**TIROS IP TIROS** Information Processor

## U - Z

**UHF** 235 – 460 MHz, in satellite communications  
**VHF** 137 – 150 MHz, in satellite communications  
**USB** Unified S-Band  
**VVCS (ISS)** Visiting Vehicle Communications system, for telemetry with the Japanese H-II transfer vehicle  
**WEFAX** Weather Facsimile  
**X-band** 7.2 – 8.4 GHz, in satellite communications  
**X-SAT** Singapore Nanyang Technological University, high-resolution imaging demonstration satellite

# SATELLITE COMMUNICATIONS SPECTRUM

2011

**Ku-Band SATCOM**  
 10.7-14.5 GHz  
 Typical: G10.95-12.75 D/L,  
 G14.00-14.50 U/L  
 Extended Ku  
 G10.7-12.2 D/L,  
 G12.75-13.25, G13.75-14.00 U/L  
**ECHOSTAR:**  
 G11.7-12.7 D/L, G14.0-14.5 U/L  
**Ka-Band SATCOM**  
 17-21 & 27-31 GHz  
**ECHOSTAR:**  
 G17.3-17.8, G28.35-28.6,  
 G29.25-30.0 U/L  
 G18.3-18.8, G19.7-20.2 D/L  
**SPACEWAY:**  
 G28.35-28.6, G29.25 - 30.0 U/L  
 G18.3-18.8, G19.7-20.2 D/L

**C-Band SATCOM**  
 Typical: G3.700-4.200 D/L, G5.925-6.425 U/L  
**Extended C**  
 G3.400-3.700 D/L, G6.425-6.725 U/L  
**INMARSAT:** G3.550-3.700 D/L, G6.425-6.575 U/L  
**Thuraya:** G3.400-3.625 D/L, G6.425-6.725 U/L  
**GLOBALSTAR:** G5.091-5.250 U/L, G6.875-7.055 D/L  
**New ICO:** G5.150-5.250 U/L, G6.975-7.075 D/L  
**L-Band Sat Phones**  
**INMARSAT:** M1525-1559 D/L, M1626.5-1660.5 U/L  
**THURAYA:** M1525-1559 D/L, M1626.5-1660.5 U/L  
**IRIDIUM:** M1616-1626.5  
**GLOBALSTAR:** M1610-1626.5 U/L, M2483.5-2500 D/L  
**ACeS/GARUDA:** M1610-1660.5, M1980-2010 U/L  
 M1525-1559, M2170-2200, M 2483.5, 2500,  
 M3400-3700 D/L  
**ICO G1:** M2000-2200 U/L, M2180-2200 D/L

## Commercial SATCOM Services

**SIRIUS XM Radio**  
 M2320-2345 | M7025-7075  
 ↓ SDARS Satellite Digital Audio Radio Service ↑

**DRTS**  
 M2025-2110 D/L, C/L Fwd  
 M2200-2290 U/L, C/L Rtn  
**GLOBALSTAR**

**INMARSAT**  
**IRIDIUM**  
**GLOBALSTAR**  
**Thuraya**  
**ACeS/GARUDA**

**Atlantic Bird**  
**AMOS-5i**  
**INMARSAT**  
**SatMex 5, 6**  
**ABS 5 (Agila 2)**  
**ACeS/Garuda** | **Badr c**  
**NSS**  
**ST-1,2**  
**Echostar**  
**Star One**  
**Brazilsat**  
**Anik**  
**Thaicom**  
**AsiaSat**  
**JCSAT**  
**Express**  
**Telstar**

**ABS**  
**APSTAR**  
**Sinosat**  
**Edusat**  
**Telecom**  
**Telkom 2**  
**Chinasat**  
**Insat**  
**MEASAT**  
**Yamal**

**Paksat**  
**Arabsat**  
**AMC**  
**Amazonas**  
**ICO G1**  
**Galaxy**  
**Thuraya**  
**Chinastar**  
**Intelsat**  
**Globalstar**

**Atlantic Bird**  
**AMOS-2, 3, 5i**  
**ABS 5 (Agila 2)**  
**Amazonas**  
**AMC**  
**Anik**  
**Apstar**  
**Arabsat**  
**AsiaSat**  
**Astra**  
**Badr**  
**Bonum**  
**Brazilsat**  
**BSAT**  
**Direct TV**  
**GE**  
**Echostar**  
**Eutelsat**  
**Express**

**Galaxy**  
**Hellas-Sat**  
**Hispasat**  
**Hot Bird**  
**Insat**  
**Intelsat**  
**KoreaSat**  
**MeaSat**  
**Nilesat**

**SatMex 5, 6**  
**Sirius**  
**ST-1,2**  
**Star One**  
**Superbird**  
**Telecom**  
**Telstar**  
**Thaicom**  
**Thor**  
**Turksat**  
**Yamal**

**K-Band SATCOM**  
 10-31 GHz  
 Includes Ku and Ka

**NIMIQ:**  
 G12.2-12.7, G19.7-20.2 D/L  
 G17.3-17.8, G29.5-30.0 U/L

**SIRIUS (Swedish):**  
 G11.7-12.5, G12.5-12.7 D/L  
 G17.3-18.1, G14.0-14.5 U/L

**DRTS**  
**Data Relay Test Satellite**  
 G23.0-23.55 D/L  
 G25.25-27.5 U/L  
 G23.0-23.55 Fwd C/L  
 G25.25-27.5 Rtn C/L

**IRIDIUM**  
 G22.55-23.55 C/L

**AMC**  
**AMOS-3**  
**NIMIQ2**  
**SIRIUS**  
**ECHOSTAR**  
**SPACEWAY**  
**DIRECT TV**  
**ICO G1**  
 Gateway links  
**IRIDIUM**  
 Gateway links

**Inter Satellite & Terrestrial Links**

**NIMIQ2**  
**ECHOSTAR**  
**SPACEWAY**  
**DRTS**  
**ICO G1**  
 Gateway links  
**IRIDIUM**  
 Gateway links  
**AMC**  
**AMOS-3**  
**DIRECT TV**

