Lecture 6 (10-10-83)
10 October 1983

ROLE OF DIRECT BROADCAST IN DATA DISSEMINATION METEOROLOGICAL SATELLITE ~~DATA RECEPTION, PROCESSING~~

TOPICS TO BE COVERED:
- TIROS N DIRECT BROADCAST RECEIVING STATIONS WORLDWIDE - STATUS, PROBLEMS, OUTLOOK WORLDWIDE.
- ROLE OF DIRECT BROADCAST IN DATA DISSEMINATION:
  - APT
  - HRPT
  - PDUS
  - WEFAX (LR FAX)
  - DSB

[(Maybe) FORMERLY LECTURE 8 14 OCT.
- INTERACTIVE COMPUTER SYSTEMS AND THEIR FUTURE.
- UNIQUE ASPECTS OF THE ORGANIZATION AND MANAGEMENT OF SATELLITE DATA PROCESSING SYSTEMS.]

* Figure 6-1 (Vu-graph): Review of direct broadcast signals (U.S.)
  USSR-Meteor also has APT, visible channel only.
  Other Geostat. satellites (except INSAT) have WEFAX equivalent.
  Hi-resolution geostationary image broadcast systems are different for each type of spacecraft.
* Figure 6-2 (Vu-graph): Distribution of direct broadcast receiving stations.
  (Emphasize approximate nature of numbers; probably considerably lower than actual.)
  [Some are as of June 1981, others Aug. 1983]
  E.g., most stations in China not included.

* Discuss distribution of stations:
  APT is almost universal — it's been available for two decades and receiving & processing equipment is the simplest. (Maintenance is still a problem)
  WEFAX (or equivalent) is gaining, where available.
  Power of more frequent observations; minimum added complexity to APT; transmit weather maps.
  Limitation of both APT & WEFAX is format.
  Intentionally not changed (impact on receivers)
  How long analog? How/when to change?

U.S. METSAT DIRECT BROADCAST LINKS.

* POLAR ORBIT (NOAA SERIES)
  - AUTOMATIC PICTURE TRANSMISSION (APT)
    - FREQUENCY = 137.50 OR 137.62 MHz
    - ANALOG FORMAT, LINEARIZED, 4 KM VISIBLE & IR. (SEE WMO No. 411)
  - HIGH RESOLUTION PICTURE TRANSMISSION (HRPT)
    - FREQUENCY = 1698 OR 1707 MHz
    - ALL AVHRR CHANNELS, FULL RESOLUTION, AND "TIROS INFORMATION PROCESSOR" (TIP) OUTPUT
    - DIGITAL (SEE WMO No. 411)
  - DIRECT SOUNDER BROADCAST (DSB)
    - TIP DATA TRANSMITTED ON BEACON CHANNEL
    - FREQUENCY = 136.77 OR 137.77 MHz.
* GEOSTATIONARY ORBIT (GOES SERIES)
  - "WEFAX" (WEATHER FACSIMILE BROADCAST)
    - FREQUENCY = 1691 MHz. } SAME FOR GMS, METEOSAT, AND GOMS (?)
    - FORMAT = SAME AS APT. }
  - "STRETCHED VISSR" (NOT RELEVANT TO CHINA)
    - FREQUENCY = 1687.1 MHz
    - BANDWIDTH = ~ 1.75 MHz
    - FORMAT: FULL RESOLUTION VISIBLE & IR, DIGITAL.

(BROADCAST OF DATA COLLECTION OUTPUTS WILL BE COVERED WEDNESDAY, 12 OCTOBER.)

Figure 6-1

	Total	United States				Other Countries			
Polar (Est. 1983)		Gov't.	Companies.	~~Univ.~~	Misc.*	Gov't.	Companies	Univ.	Misc.*
APT	~900		5	12	~200*	>450	15	50	100*
HRPT	>76	23	—	>4		46		>23	
DSB	>7	1		2		4		?	
Geostationary (GOES)		(Est. as of June 1981)							
WEFAX	~110	69				38 in 32 ~~countries~~ nations.			
STRETCHED VISSR	~17	6		2 (low!)		5 in 4 ~~countries~~ nations.			

Number of countries having receivers (Est. as of June 1981):

APT	123	WEFAX	32
HRPT	19	STRETCHED VISSR	4
DSB	2 (low)		

*Miscellaneous includes mostly radio amateurs and, in the U.S., many high schools (APT)

~ is "about," or "approximately."

> is "greater than"

Role of WMO Members in decision?

* Disadvantages of APT and WEFAX:
  - Limited quality, especially in noisy (RF) environment.
  - Inefficient transmission limits data transfer.
* HRPT and Stretched VISSR (OR equivalent) overcome these limitations, but are complex.
  - Should we convert to digital format for APT & WEFAX?
  - OR should we wait for HRPT/stretched VISSR to be used by more nations and assume that several will stick to APT/WEFAX because of cost and technological development?
* Clearly, the highest resolution, most frequent images are desired.
  - Problem of dissemination of information extracted from images in a large nation like China.
* DSB - derived from either HRPT or beacon signal from NOAA satellites.
  - Requires high state of technical development: Medium size computer & software capabilities.
  - Powerful tool in providing higher spatial & temporal (4 x/day) soundings for improved weather analysis.
* Outlook for the future:
  - Geostationary sats for images.
    * Hi res. images for national/regional use.
    * WEFAX/LRFAX for provincial use.
    * Develop met. communications capability.
  - Polar sats for mesoscale soundings.
    * Specialized imaging (mostly non-met.)