

Senior Review 2005



Reviewed 12 Earth Science Missions

- ☐ **Ranked missions from compelling to modest contribution**
- ☐ **Compelling**
 - Jason, Terra, GRACE
- ☐ **Excellent, but not compelling**
- ☐ **Modest contribution**
 - UARS, SAGE, ERBE

Accomplishments (1980-2005)



Evolution of satellites in our daily lives

☐ Transition

- Small focused missions (e.g., ERBS)
- Experimental missions with new proof of concept sensors (TOMS, CZCS)
- Modest operational prototype missions (TIROS-N)

☐ Everyday use

- Google maps with Keyhole satellite context
- Geosynchronous on evening news worldwide, weather and severe storms
- Terra/Aqua images of fires in western US
- TOPEX/Poseidon and Jason images and movies during El Niño & La Niño events
- TRMM measurements of ocean heat loss after hurricanes and use in improved skill of hurricane landfall prediction

Accomplishments (1980-2005)



Use of satellites in numerical weather prediction

☐ **Transition**

- Radiosondes, buoys and aircraft dominant data sources
- **99,99% of data now come from satellite (Louis Uccellini)**

Time series

☐ **Long-enough time to show changes in Earth-system environment**

- **Shrinking sea ice in Arctic**
- **Urban expansion**
- **Biomass burning & forest transformation**
- **Ozone loss in Antarctic & start of recovery**

Accomplishments (2005-2030)



Moore's Law

- ☐ Five orders of magnitude increase in computer power (Moore's Law)
- ☐ Demise of journals and increase of electronic media for communications

Environmental concerns will be worldwide & not debated

- ☐ Satellite observations accepted as monitoring tool across international borders will be indispensable
- ☐ Articulated by President Chelsea Clinton

Numerical Weather Prediction

- ☐ Models will use only satellite observations, radiosonde exclusion will have no impact on weather forecasts
- ☐ NWP models will approach 1 km resolution like Earth simulator (Japan) of today

Accomplishments (2005-2030)



Data fusion

- ❑ **Boundary between research and operations will largely disappear**
- ❑ **Data from one satellite goes to directing what data another collects**
 - **Cloud mask from VIRSS+ will be used to tell subsequent Chinese satellite when scene is clear**