

## **Reprocessed datasets and climate: Creation of 1960's Sea-Ice Extent CDRs /ESDRs from Historic Satellite Data**

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A critical need in climate research is to obtain continuous high quality data records and images as far back in time as is practical. There is a wealth of early Earth-observing satellite data that were never fully explored due to the limitations of historical programs and processing systems. With the recent recovery of some of these data, there is now an opportunity to use this 1960s vintage data to create sea ice extent, climate data records (CDRs)/earth science data record (ESDRs) for this era. The original engineers and researchers are now mostly in their late 70s and 80s, and contact with them is critical to answering some of the necessary instrumentation questions. Only a portion of the original 6-bit, 7 track tapes have been recovered and none has been converted to modern formats. If this work is not done now, we will have forever lost the opportunity. Satellites dedicated to polar visible or near infrared imaging for weather or climate purposes did not practically begin until the mid 1960's. NASA began this effort with the Nimbus series of spacecraft. Nimbus I collected data from August 28th-September 22nd 1964. Nimbus II collected data from May 15th, 1966-January 18th, 1969. The polar orbiting TIROS 9 and 10 collected data from January 22nd, 1965- April 20th, 1966. Nimbus III collected data from April 14th 1969- January 22nd 1972. Data coverage was global with twice daily acquisitions (day & night). NASA Goddard saved and is maintaining the higher-level products derived from the raw data, unfortunately without some of the timings and calibration. The Nimbus HRIR (High Resolution Infrared Radiometer) Instrument (Nimbus I, II, and III), used a lead Selenide (PbSe) detector to detect  $\pm 1$  degree K IR Radiation. Since the HRIR data coverage is global, the reprocessing techniques could make new, 1960s-era data available to the entire Earth science community. The techniques we use will bring the quality of archaic data from other Earth-observing satellites (not limited to Nimbus instruments) up to contemporary standards, reinvigorating the data sets for current applications. The objective of this project is to generate monthly (or better) sea-ice extent ESDRs/CDRs for the time intervals covered by NIMBUS I, II and III and TIROS 9 & 10. This will require a multi-step process to define and build the CDRs. The initial step is the reprocessing and correcting of all the available High Resolution Imaging Radiometer (HRIR) data. The available MRIR data will be examined to see whether they would help. The Nimbus and TIROS AVCS visible band video images (film) will be acquired to help in the analysis. There are AVCS 167,000 images from Nimbus I, II and III. This data which was preserved by the National Climatic Data Center (NCDC) will be scanned and undergo optical character recognition (OCR). OCR timestamps will be linked the orbital data recovered from the HRIR tapes to improve image locations. Select polar images will be ortho-rectified. Next techniques must be developed to determine the monthly average sea-ice extent from these data. We expect clouds will be the most difficult challenge in the process. With data records provided on multiple orbits on a daily basis, our preliminary research confirms that we can separate clouds from ice by animating the data in Google Earth allow researchers to separate clouds from ice. Finally, the standards for these 1960s CDRs must be published along with the resultant data.