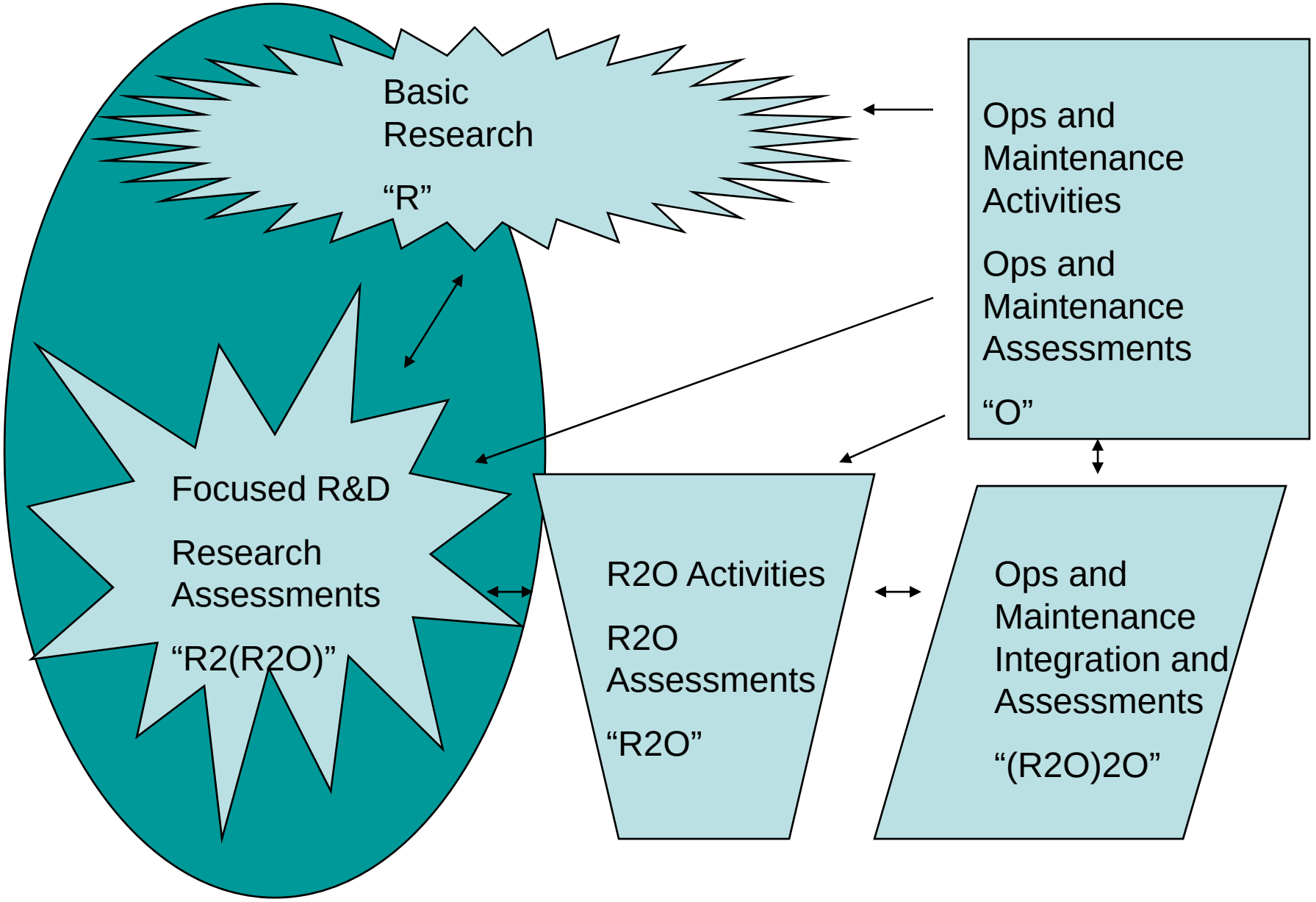
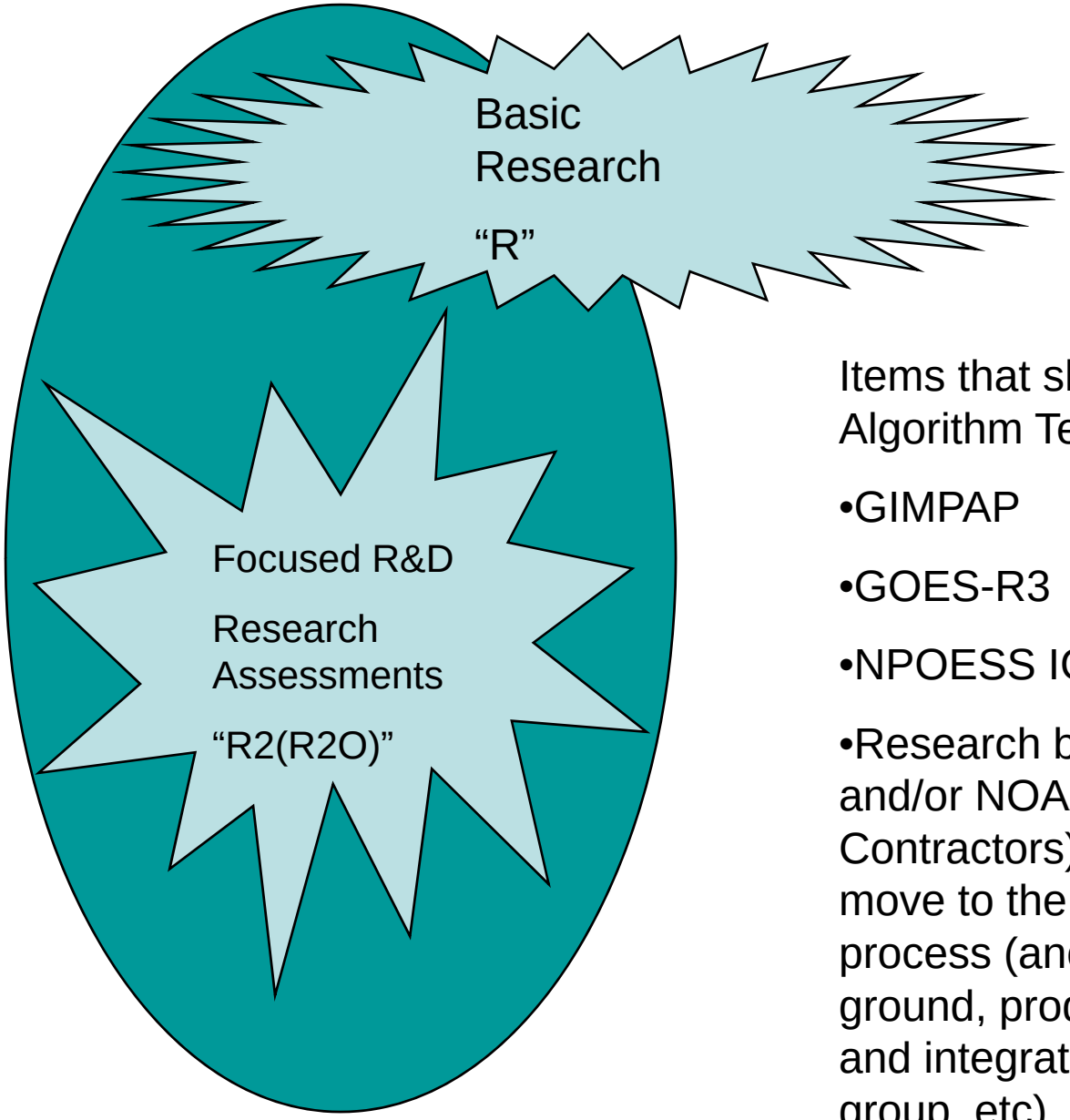


Scope of Satellite Algorithm Test Bed

Breaking down R2O Components

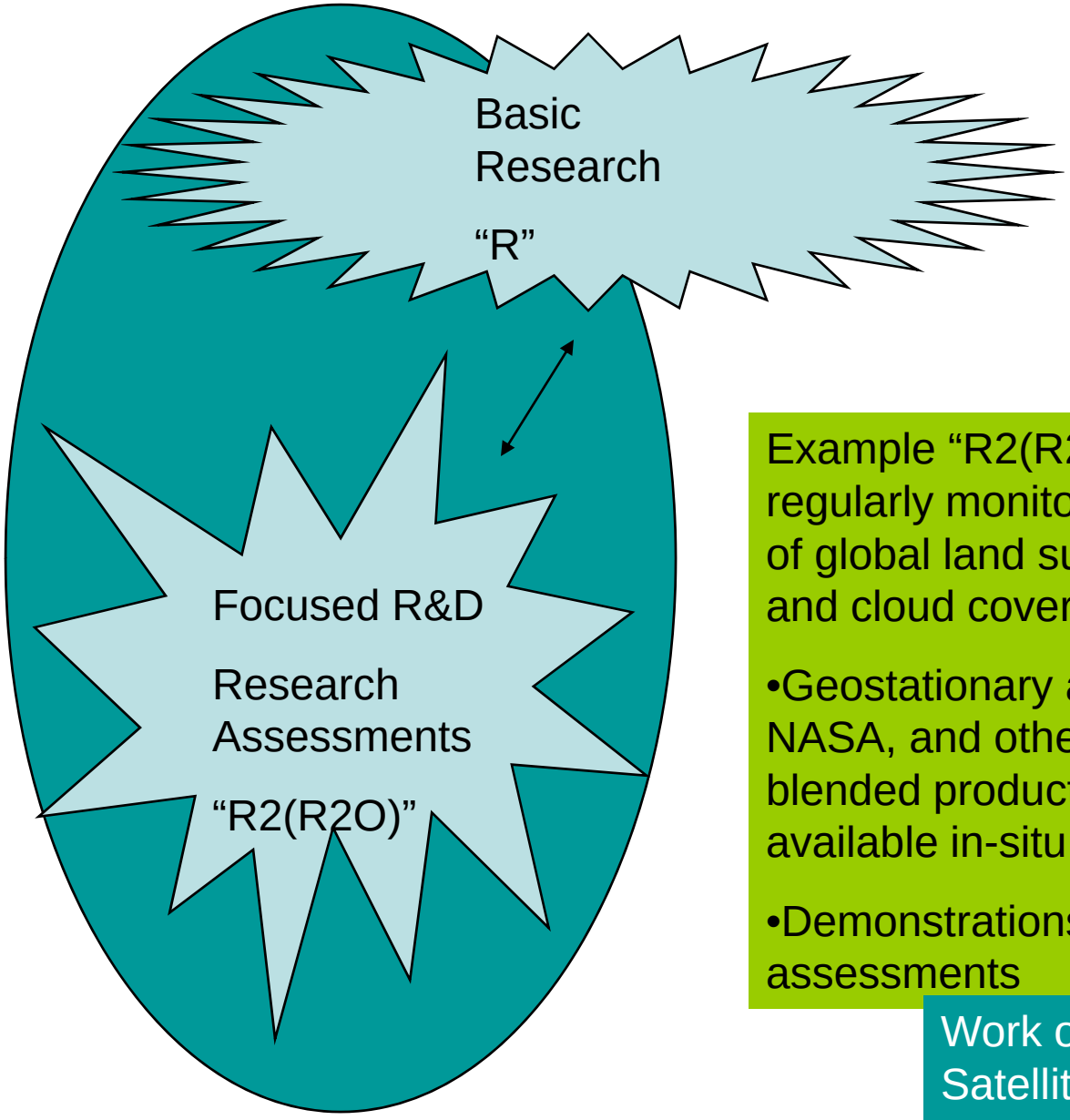


Scope of Satellite Algorithm Test Bed

Items that should be part of a Satellite Algorithm Test Bed

- GIMPAP
- GOES-R3
- NPOESS IGS
- Research being conducted by NOAA and/or NOAA partners (CIs, Contractors) that, if successful, would move to the next stage in the R2O process (another testbed, a proving ground, product systems development and integration, algorithm working group, etc)

Breaking down R2O Components



Example "R": Does a better understanding of the diurnal cycle of global land surface temperatures and cloud cover improve weather and/or climate forecasts?

Example "R2(R2O)": Can we regularly monitor the diurnal cycle of global land surface temperatures and cloud cover in a useful way?

- Geostationary and polar (NOAA, NASA, and other organizations) blended products combined with available in-situ measurements
- Demonstrations and user assessments

Work on these questions, **with** a Satellite Algorithm Test Bed, will be done in a framework that is similar to where it would run operationally if successful

Scope of Satellite Algorithm Test Bed

Example: ISCCP

- The International Satellite Cloud Climatology Project (ISCCP) was established in 1982 as part of the World Climate Research Program (WCRP) to collect weather satellite radiance measurements and to analyze them to infer the global distribution of clouds, their properties, and their diurnal, seasonal and interannual variations. The resulting datasets and analysis products are being used to study the role of clouds in climate , both their effects on radiative energy exchanges and their role in the global water cycle. The ISCCP cloud datasets provide our first systematic global view of cloud behavior of the space and time scales of the weather yet covering a long enough time period to encompass several El Nino - La Nina cycles.
  - "R": infer the global distribution of clouds, their properties, and their diurnal, seasonal and interannual variations.
  - "R2(R2O)": generating systematic global views of cloud behaviors
  - "R2O" (post-satellite algorithm test bed): Transitioning ISCCP GOES-West Processing from CIRA to NCDC

Example: GPCP

- The Global Precipitation Climatology Project (GPCP) was established by the World Climate Research Program (WCRP) to address the problem of quantifying the distribution of precipitation around the globe over many years. The general approach is to combine the precipitation information available from each of several sources into a final merged product, taking advantage of the strengths of each data type. The microwave estimates are based on Special Sensor Microwave/Imager (SSM/I) data from the Defense Meteorological Satellite Program (DMSP, United States) satellites that fly in sun-synchronous low-earth orbits. The infrared (IR) precipitation estimates are computed primarily from geostationary satellites (United States, Europe, Japan), and secondarily from polar-orbiting satellites (United States). Additional low-Earth orbit estimates include the Atmospheric Infrared Sounder (AIRS data from the NASA Aqua, and Television Infrared Observation Satellite Program (TIROS) Operational Vertical Sounder (TOVS) and Outgoing Longwave Radiation Precipitation Index (OPI) data from the NOAA series satellites. The gauge data are assembled and analyzed by the Global Precipitation Climatology Centre (GPCC) of the Deutscher Wetterdienst and by the Climate Prediction Center of NOAA.
  - “R”: quantifying the distribution of precipitation around the globe over many years
  - “R2(R2O)”: generating monthly precipitation analyses combining satellite and in-situ data sources

NASA A-Train

- Each satellite within the A-Train has unique measurement capabilities that greatly complement each other. For the first time, near simultaneous measurements of aerosols, clouds, temperature, relative humidity, and radiative fluxes (the change of radiation in a layer) will be obtained over globe during all seasons. This ensemble of observations will allow one to understand how large scale aerosol and cloud properties change in response to changing environmental conditions. It will further allow one to determine how changing cloud and aerosols distributions influence our climate with greater clarity than possible before.
  - "R": understand how large scale aerosol and cloud properties change in response to environmental conditions
  - "R2(R2O)": generating weekly global analyses combining a-train and other satellite and in-situ data sources
  - "R2O" (post satellite algorithm test bed) using weekly analyses in NOAA Climate Test Bed

Coastal and Inland Flooding Observation and Warning

- Research group working to find a way to connect all the water monitoring and prediction systems available in coastal North Carolina. Their goal is to combine satellite, radar, and rain-gauge data with information on streams and rivers from their sources in the mountains to the ocean. Partners hope to develop and test techniques to accurately identify and predict floods and flash floods along the coast and inland, and their impacts on the ecosystem, especially when threatened by hurricanes.
  - "R" How can we understand and predict floods in N. Carolina ecosystems?
  - "R2(R2O)" Combining radar, satellite, rain-gauge data with hydrology models to generate daily flood probability maps
  - "R2O" (post satellite algorithm test bed) Using flood probability maps in NOAA Hydrometeorology Testbed

Reynolds SST

- A real-time global sea surface temperature (SST) analysis has been developed by Richard Reynolds from the National Climatic Data Center (NCDC). Also, a monthly one-degree global SST climatology was constructed using these analyses by the Climate Prediction Center (CPC/NOAA). This climatology derived from monthly Optimum Interpolation (OIv2) SST analyses with an adjusted base period of 1971-2000 was used in computing the SST anomaly field using a weighted monthly mean climatology and the current observed Reynolds SST field. The actual areal coverage of the analysis and the anomally data is roughly between 60°S and 60°N globally. These analyses were based on ship and buoy SST data supplemented with satellite SST retrievals. The one degree climatology and analyses resolve equatorial upwelling and fronts.
  - "R" Understanding equatorial upwelling and fronts
  - "R2(R2O)" Blending ship and buoy SST with satellite SST for best real-time analysis
  - "R2O" (post satellite algorithm test bed) Using SST climatology at CPC

Sample “O”: Product meeting requirements produced daily and reliably with active monitoring and responsive maintenance.

Ops and Maintenance Activities

Ops and Maintenance Assessments

“O”

Sample “R2O”: Real-time demonstrations with formal user involvement to finalize product requirements, preliminary and detailed design reviews held, code developed, test data generated, documentation written, operational resources identified

R2O Activities

R2O Assessments

“R2O”

Ops and Maintenance Integration and Assessments

“(R2O)2O”

The length of time spent in these phases will be reduced if earlier work was done in the Satellite Algorithm Test Bed (much less code to rewrite since operational standards were followed as much as possible from the beginning)

Sample “(R2O)2O”: Operational resources finalized, maintenance plan finalized, code running on operationally-managed platform