

SPoRT and the Pathway to TEMPO Applications

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EMILY BERNDT & AARON NAEGER

NASA MSFC

SHORT-TERM PREDICTION RESEARCH
AND TRANSITION CENTER

SPoRT Mission

Mission: Transition unique NASA and NOAA observations and research capabilities to the operational weather community to improve short-term weather forecasts on a regional and local scale

SPoRT prepares the **community** of **end users and mission scientists** for next generation satellite missions and capabilities through an interactive R2O/O2R paradigm

Current/Future Activities:

Successful partnerships to prepare NWS forecasters for GOES-R and JPSS through use of experimental proxy products

Expanding partnerships to other government agencies and new NASA missions

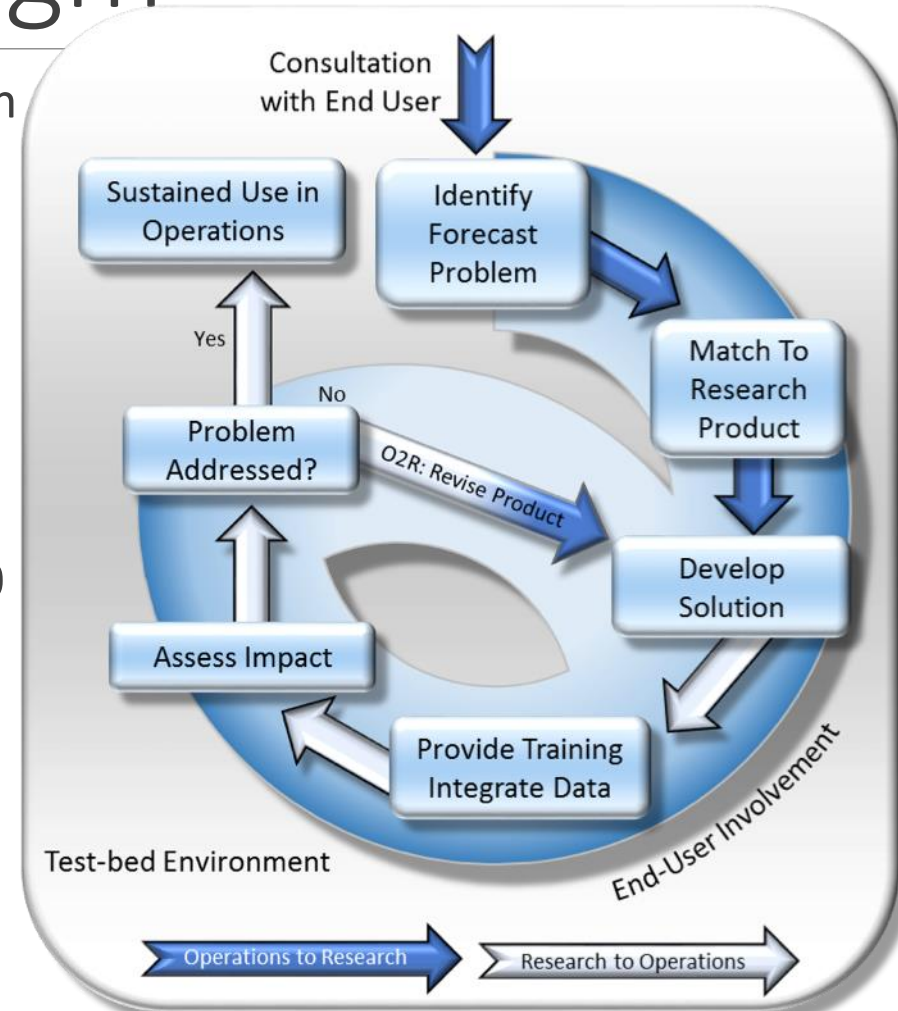
R2O/O2R Paradigm

Bridge the “Valley of Death” through interactive partnership with end users and product or algorithm developers

- Integrate data into user decision support tools
- Create product training
- Conduct product assessments

Concept has been used to successfully transition more than 40 satellite datasets to operational users for nearly 15 years

Other groups in the community have adopted this paradigm



“Bridging the gap” between experimental and operational

SPoRT prepares the **community** of **end users and mission scientists** for next generation satellite missions and capabilities through an interactive R2O/O2R paradigm

Keys to successful day 1 readiness include:

- Data in the end users’ display system or preferred application
- Targeted training
- Assessments to gather feedback from users for the mission scientists

Pre-launch R2O/O2R activities can provide valuable input to data processors, mission scientists, algorithm developers, and guide baselining of products/capabilities

Application Activities

(1) SPoRT Core Activities to partner with Western U.S. Air Quality End Users to assess TEMPO Proxy data

(2) Pending Proposal Pilot Projects

(3) Other Potential Activities

R2O/O2R Paradigm

Collaborate with Western U.S. partners in conjunction with WRAP to identify main forecasting challenges to address with TEMPO

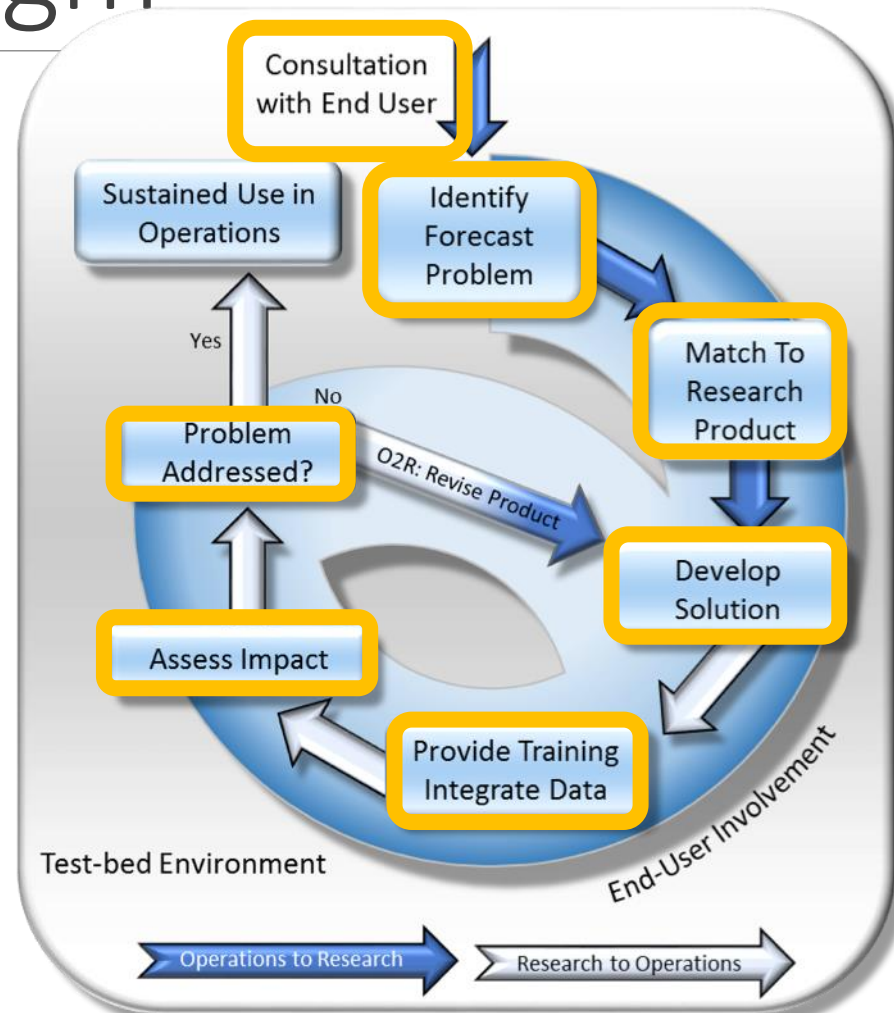
How can TEMPO proxy data demonstrate the capabilities of TEMPO to address the forecasting challenges

Provide TEMPO proxy data in WMS format and understand how RSIG and Lance can use used

Are there existing foundational training materials?

- Foundational training by ARSET
- Targeted applications training by SPoRT

Assessment and feedback on use of TEMPO proxy data for Western U.S. applications



TEMPO Proxy Data

What are the limitations and advantages

What fields do end users prefer to use?

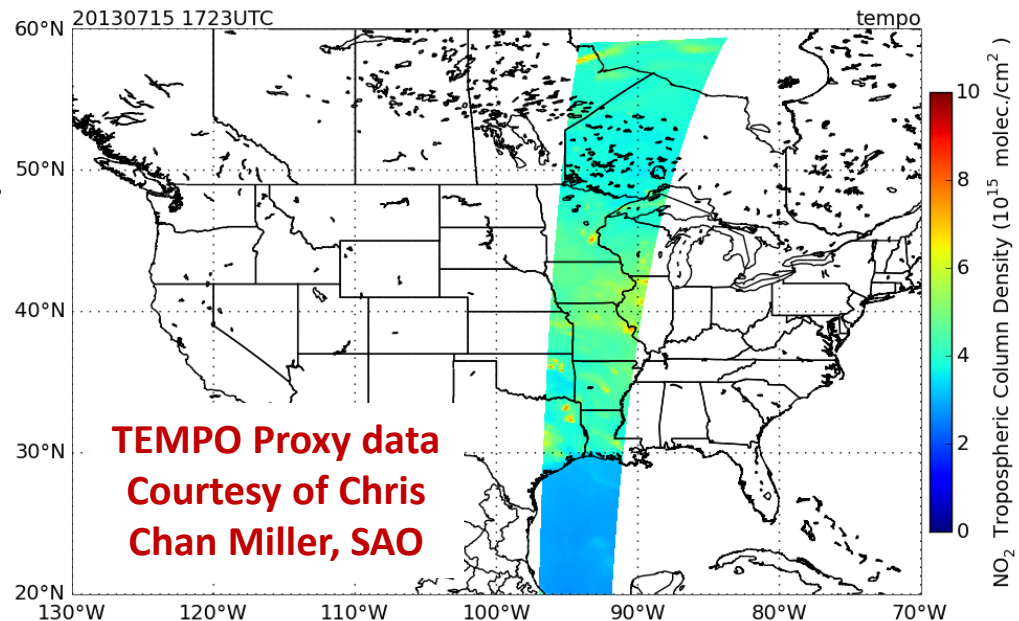
Are there additional L2 / L3 derived products requested

Preferred color maps / display formats

Are features sufficiently captured by algorithms?

What biases exist?

Are expected latency and resolution sufficient?



Application Activities

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Pilot Project

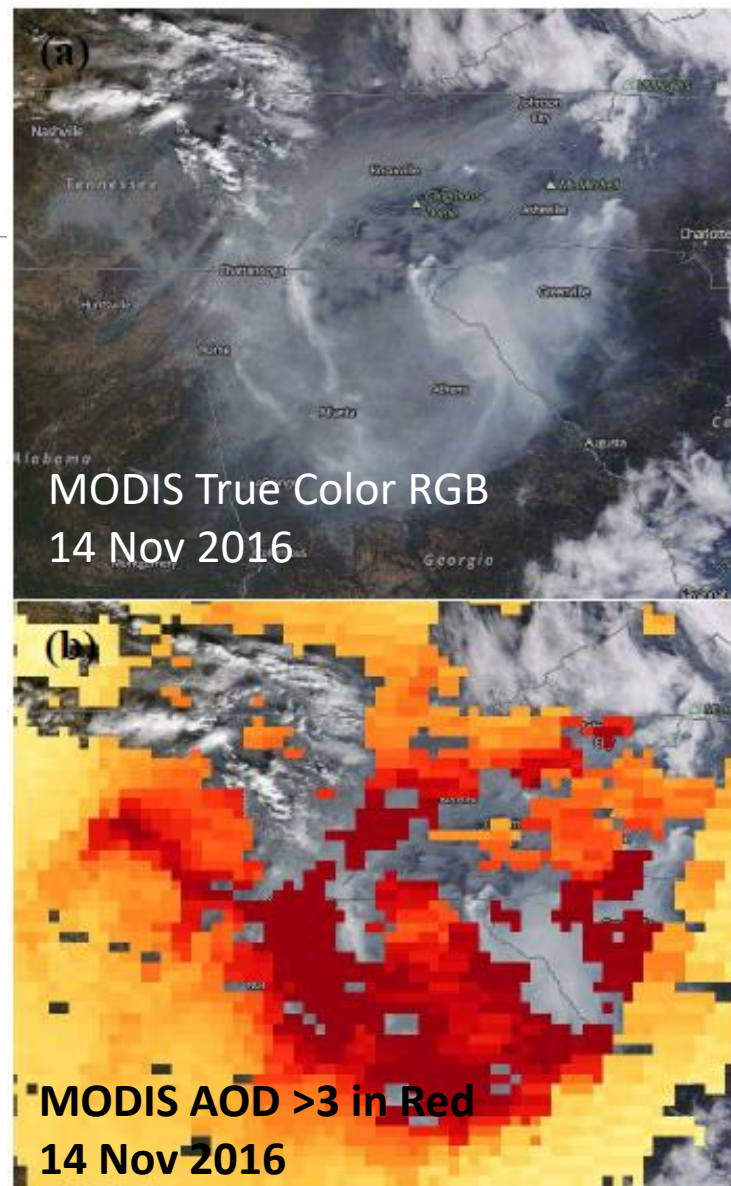
How can TEMPO enhance monitoring the impact of exceptional events on air quality and human health?

Focus on use of proxy data in partnership with the Chattanooga-Hamilton County Air Pollution Control Bureau

TEMPO Advantage:

- Accurate retrievals of AOD
- Boundary layer trace gas concentrations
- Better temporal/spatial resolution to document exceptional events

End users provide feedback to researchers and prepare to integrate TEMPO data in daily operations quickly after launch



Pilot Project

How can TEMPO be used to identify exceptional events caused by wildfires or stratospheric intrusions in complex terrain?

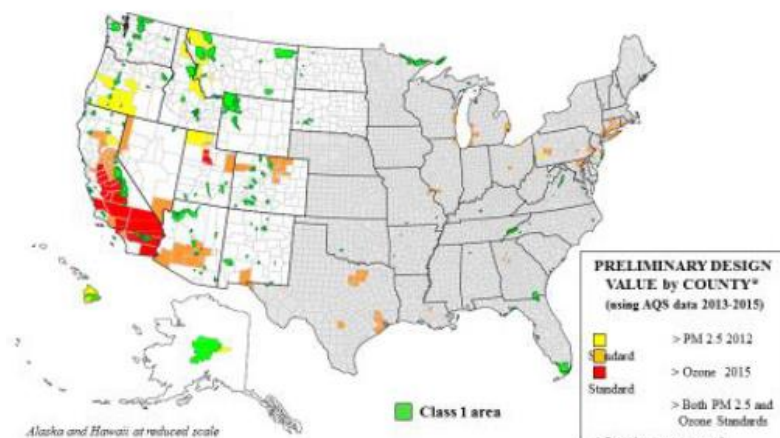
- Distinguish between transport and source events
- Identify frequency of exceptional events

Focus on complex terrain in collaboration with WESTAR and WARP

Can incorporation of proxy data improve PM2.5 and O3 precursor emission estimates used in regional modeling analysis to support planning and decision making to protect both human health and visibility?

Early testing of data processing infrastructure and assimilation of proxy data in regional models will prepare state/federal agencies for use of TEMPO data quickly after launch

Western Class 1 area Environment



Map of western region showing whether PM2.5 and O3 standards were met from 2013-2015 in each county. Orange where PM2.5 standards not met, Yellow where O3 standards not met, and red where both standards not met

Pilot Project

How can TEMPO be used to assess the impact of air pollutant exposure on hospital readmission rates for cardiopulmonary disorders?

Collaboration with Alabama Department of Public Health and Alacare Home Health & Hospice

TEMPO proxy products will be used to build the readmission rate prediction model

The spatial/temporal resolution of air pollutants from TEMPO offer the capacity to assess environmental risk factors on health and provide critical time and space information to healthcare end users for mitigation actions

See S. Alexander/UAH talk – TEMPO Western U.S. Early Adopters Workshop

Application Activities

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Other Potential Activities

Additional funds could be requested to expand pre-launch activities to additional users and applications

- Other regional planning organizations
- EPA regions

Given the short mission life, real-time proxy products prior to launch could be used to maximize capabilities of the mission

- Capture more types of events
- Establish real-time data flow for Lance, RSIG prior to launch



Summary

SPoRT prepares the **community** of **end users and mission scientists** for next generation satellite missions and capabilities through an interactive R2O/O2R paradigm

SPoRT plans to:

- Partner with Western U.S. Air Quality end users to assess the utility of TEMPO proxy data and provide feedback to mission scientists
- Coordinate feedback between products developers, science team, and users for day-1 readiness
- Transition experimental products to end users via WMS/ArcGIS capabilities.
- Provide proxy products in WMS/GIS format but work with ARSET to train end users to use operational tools such as RSIG, Lance, Worldview after launch
- Provide training on obtaining and using products in collaboration with ARSET (pointing users to ARSIG/LANCE, Worldview, GIBS as resources for data after launch).
- Gather feedback from Pilot Projects pending ROSES funding decision

Other potential applications activities requiring additional funding for SPoRT (and others) include:

- Partnering with additional Regional Planning Organizations
- Coordinating distribution and assessment of real-time TEMPO proxy products

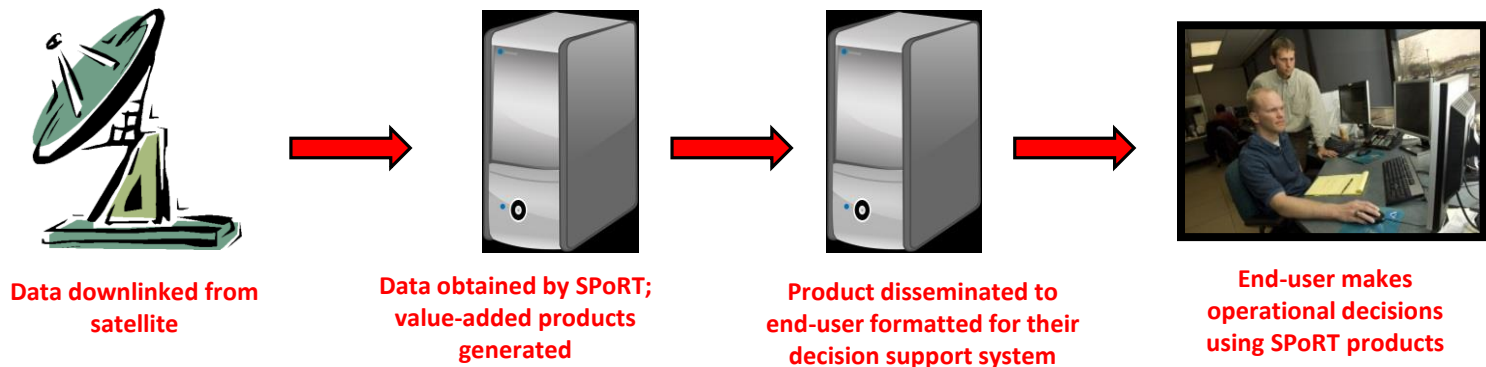
Backup

Data Approach

SPoRT provides experimental data to end users by LDM, FTP, and WMS depending on application

While NASA is not an “operational” data provider, team members strive to provide 24/7 data feeds, knowing that product reliability is key to use by operational forecasters and decision makers

Monitor our product ingest and status for all experimental products going to a customer



Training Approach

Targeted, applications based training

Multiple flavors of training are needed to reach all learning styles

- Site visits
- Microlessons
- User-based, interactive modules
- Quick Guides

SPoRT Applications Library

- 1-minute examples
- Short videos
- 21 total cases (and counting)

Collaborate with end users for operational/decision maker perspective

The collage illustrates the SPoRT training approach through various media:

- SPoRT Website Interface:** A screenshot of the SPoRT website showing a list of training modules under the heading "micro_lesson_RGB_Fog_20130823_NASA_SPoRT (01:30 / 08:20)". The list includes: 1. RGB Imagery for Aviation and Cloud Analysis, 2. Forecast Issue and Solution, 3. Night-time Microphysics RGB, 4. Fog vs Low Clouds Application, 5. Hybrid Conceptual Diagram, 6. Fog Case: Hybrid 11-3.9um loop, 7. VIIRS 11-3.9um vs NTmicro, 0621 UTC, 8. MODIS 11-3.9um vs NTmicro, 0746 UTC, 9. VIIRS 11-3.9um vs NTmicro, 0805 UTC, 10. VIIRS Day-Night Band RGB, 11. Summary / Resources.
- Night-time Microphysics RGB:** A detailed view of the "Night-time Microphysics RGB" application. It features a satellite image with various cloud and fog features labeled: "Low stratus (bluish green)", "Mid-level Cumulus, Cumulonimbus (tans, browns)", "Mid/Upper level stratus (purples)", "Fog in elevated valleys (grayish aqua)", "Fog in Squatchie and TN valleys (grayish aqua)", "Mid/Upper level stratocumulus (red tones)", and "Upper level cirrus (dark blue tones)". A text box on the left lists channel differences: "Utilizes MODIS & VIIRS channels/channel differences: - 12.0um-10.8um (optical depth), - 10.8um-3.9um (particle size & phase), - 10.8um (thermal), - Warmer = more blue, - Thicker = more red, - Small water droplets = more green".
- SPoRT Building:** A photograph of a person standing in front of a NASA building, likely a site visit.
- Application Library: Day Convective RGB:** A document titled "Application Library: Day Convective RGB" with a map and descriptive text. The text includes: "Contributed by: Eric W. ...", "Purpose: ...", "Office: ...", "Date: ...", "Product: ...", "Application Area: ...", "Features: ...", "Instruments: ...", "Related Links: ...", and "Figure 1: GOES-14 Day Convective RGB, valid 1512, April 1, 2013".

Assessment Approach

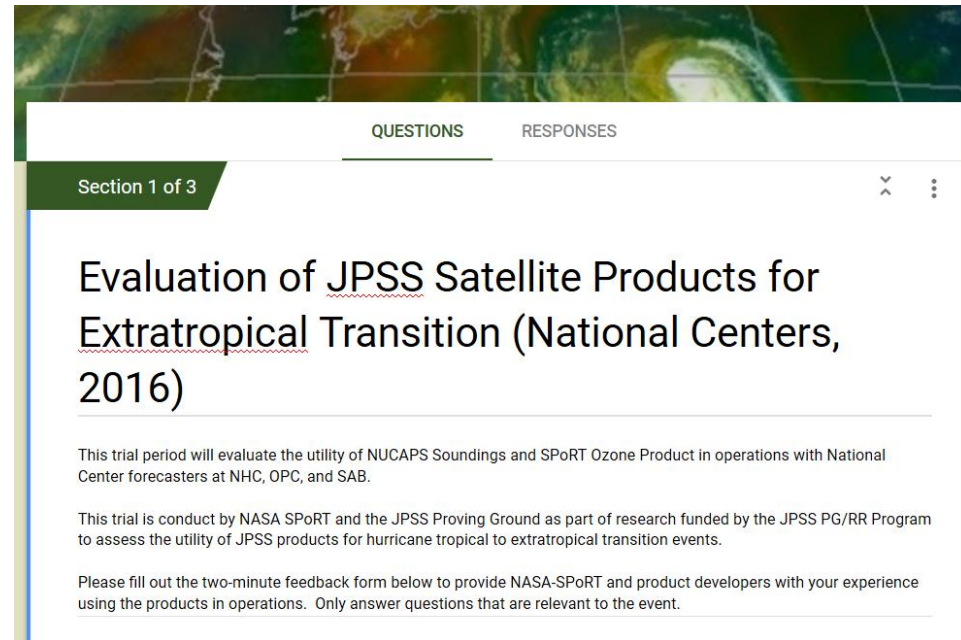
Targeted product assessments with the end user to evaluate utility of product and give feedback to developers

Methods for feedback

- Online form
- Email/phone calls
- Blog

Assessment follow-up

- Wrap-up telecon with participants
- Summarize results in a report for the developers



The screenshot shows a web form interface. At the top, there is a header with a satellite image of a hurricane. Below the header, there are two tabs: 'QUESTIONS' and 'RESPONSES'. The 'QUESTIONS' tab is active. Below the tabs, there is a green bar that says 'Section 1 of 3'. The main content area has the title 'Evaluation of JPSS Satellite Products for Extratropical Transition (National Centers, 2016)'. Below the title, there is a paragraph: 'This trial period will evaluate the utility of NUCAPS Soundings and SPoRT Ozone Product in operations with National Center forecasters at NHC, OPC, and SAB.' Another paragraph follows: 'This trial is conduct by NASA SPoRT and the JPSS Proving Ground as part of research funded by the JPSS PG/RR Program to assess the utility of JPSS products for hurricane tropical to extratropical transition events.' The final paragraph says: 'Please fill out the two-minute feedback form below to provide NASA-SPoRT and product developers with your experience using the products in operations. Only answer questions that are relevant to the event.'