National Aeronautics and Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

SWOT - Surface Water and Ocean Topography Mission

SWOT Applications Working Group SAWG meeting

7 July 2015, 5:45pm

M. Srinivasan (JPL), C. Peterson (Stennis)
A. Andral (CNES), M. Dejus (CNES),
Applications Leads

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ANDRAL; 11/04/2014

SWOT Applications Working Group (SAWG)

Leads	Team
1. SWOT Applications Leads, NASA – M. Srinivasan, C. Peterson, CNES – A. Andral, M. Dejus	1. Bob Arnone, USM at Stennis SC
5. Ocean Lead, NASA – Yi Chao, RSS	2. Sylvain Biancamaria, LEGOS
6. Hydrology Lead, NASA – Ed Beighley, Northeastern U.	3. Phil Callahan, Caltech JPL
7. Ocean Lead, CNES– Rosemary Morrow, LEGOS	4. Jessica Hausman, PODAAC JPL
8. Hydrology Lead, CNES– J-F. Cretaux, LEGOS	5. Faisal Hossain, U. Washington
	6. Laurence Houpert, CNES
	7. Gregg Jacobs, NRL
	8. Alexander Kurapov, U. Oregon
	9. Robert Leben, U. Colorado
	10. Pierre-Yves Le Traon, Ifremer-Mercator Ocean
	11. Dennis Lettenmaier, U. Washington
	12. Delwyn Moller, RSS
	13. Steve Nerem, U. Colorado
	14. Tamlin Pavelsky, U. North Carolina
	15. Robert Saint-Jean, CSA
	16. Guy Schumann, UCLA

SWOT Applications Products

SWOT mission is implementing an applications approach at the project level, supported by NASA HQ, by CNES and by the science leads.

- SWOT Applications Plan
- SWOT Early Adopter Program Guide
- "SWOT 101" presentation
- 1st User Workshop report online
- SWOT User Survey (in review)
- Applications Traceability Matrix (in development)
- Hydrology & ocean data latency graphics

Applications web pages;

NASA/JPL **http://swot.jpl.nasa.gov/applications,**

AVISO **http://www.aviso.altimetry.fr/swot**

SAWG Meeting Discussion Topics

- **User database** – SAWG & SDT inputs needed
- **User survey** – Finalize for online posting & distribution, format (Google doc? Survey Monkey? Other?)
- **Traceability Matrix**; comments, discussion, refinement
- **Early Adopter implementation**: proposed process, options/discussion, user database inputs
- **Data latency graphics**: hydrology, floods, ocean
- **NRT** data products – assessing user needs, useful feedback to Project
  - Pre-summing & OBP considerations (issues summary from SAWG-SDT members?)
  - Contributions from SAWG?

[Company Name]

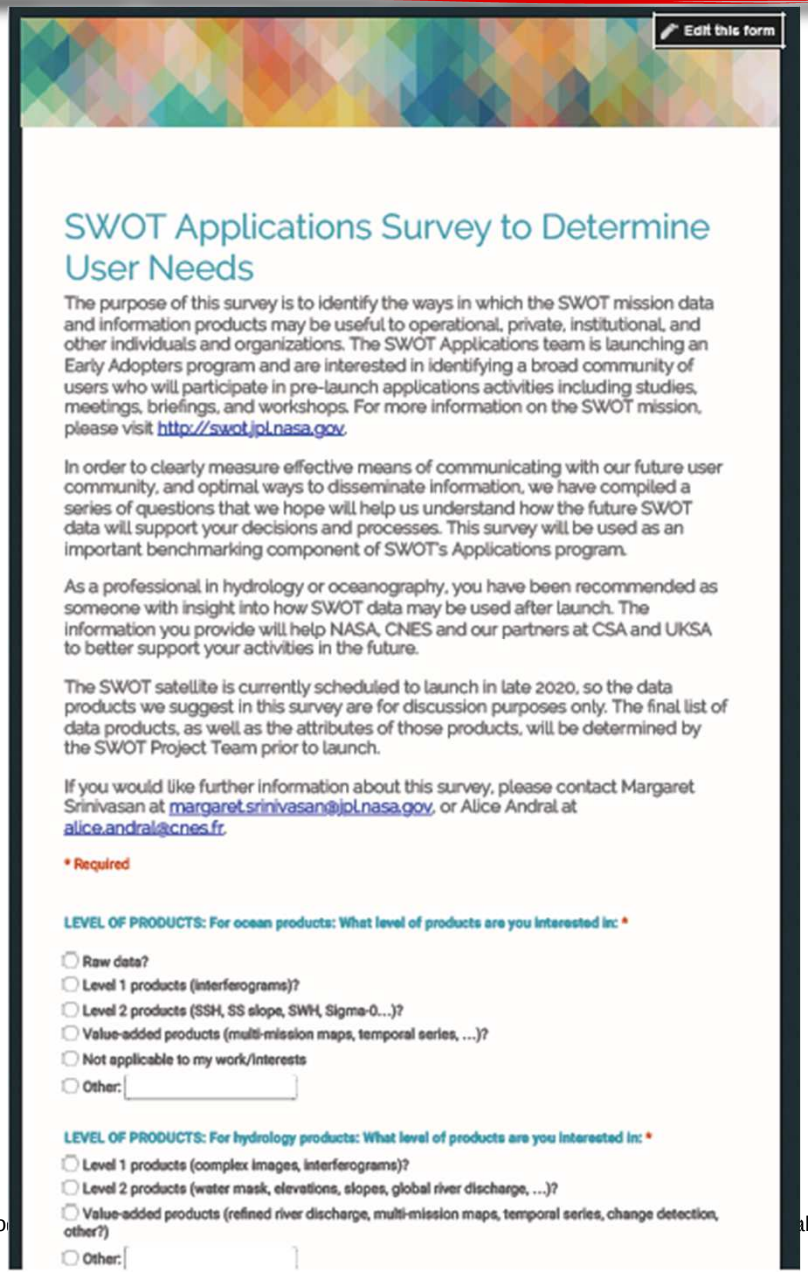
SWOT User Database

Country	Organization	Applications Area	Potential users	Early Adopter PI	SWOT Contact	Applied Research Topic	Relevant URL	E-Mail Address
HYDROLOGY: river discharge, reservoir storage, flooding, agricultural impacts,								
France	LEGOS	Lakes, rivers, wetland water levels, basin management			J.F. Cretaux		mip.fr/en/soa/hydrologie/hydrowe b/	
U.S.	USDA-FAS (Pecad), Dept. of Agriculture	Reservoir & lake monitoring, crop estimation			C. Birkett		http://www.pecad.fas.usda.gov/cr opexplorer/global_reservoir/	
U.S.	FMGlobal	Flooding, disasters			E. Beighley			
U.S.	USGS	agencies with interests around large river basins,						
Brazil	CPRM	Companhia de Pesquisa de Recursos Mineirais, Brazil. Geology, Geosciences, GIS		Daniel Medeiros Moreira	Stéphane Calmant			
Brazil	UEA, Universidade Estadual do Amazonas	Civil Engenieering, Water management, hydrology		Joecila Santos da Silva	Stéphane Calmant			
Brazil	ANA	Agência Nacional de Águas in Brazil		Rita de Casia Cerqueira Conde de Piscoya and Fabricio Viera Alvez	Stéphane Calmant			
U.S.	NASA/GSFC, NASA/USDA, UMD	G-REALM program i.e. the Lake Monitor, Reservoir & lake monitoring, crop estimation	Prime Stakeholder USDA/FAS, i) Intelligence groups (*.mil, NGA etc) for water resources/regional security, ii) climate change investigators, iii) ecology/conservation groups, iv)	NASA/GSFC (PI: Jim Tucker) with ESSIC/UMD (PI: C.Birkett)			http://www.pecad.fas.usda.gov/cr opexplorer/global_reservoir/	
OCEAN, COASTAL--								
Europe	Copernicus/MyOcean			Pierre-Yves Le Traon				
France	Mercator	ocean forecasting		Pierre-Yves Le Traon				
	LEGOS	ocean			R. Morrow			
U.S.	NOAA-STAR	applications for weather & climate (sea level rise, arctic sea ice, bathymetry					http://www.star.nesdis.noaa.gov/sod/lsa/	
U.S.	NOAA-NGDC						http://www.ngdc.noaa.gov/mgg/announcements/announ	
U.S.	NOAA, MMS, NMFS, NMML	MMS and NOAA National Marine Fisheries Service conducted studies on Sperm Whale and deepwater acoustics in the Gulf of Mexico; NMML tracks Stellar sea lions in the						
U.S.	Navy/NRL	coastal, estuarian, ocean conditions, polar research			Gregg Jacobs			
U.S.	OSCAR						http://www.oscar.noaa.gov	
U.S.	NGO/Environmental	**Seaturtle.org** researchers use NRT altimetry to study migratory routes of Hawksbill turtles in relation to surface eddy fields. **Monterey Bay Aquarium** researchers tag tuna using U.S. Navy MODAS model and TOPEX/Poseidon	Seaturtle.org, Monterey Bay Aquarium (also MBARI?)				http://seaturtle.org/stat/	
U.S.		Hudson Strait, Canada - tidal issues		G. Han, Env. Canada				
	New Zealand Ministry of Fishing	Aquaculture, Bluefin Tuna tagging	fisheries, marine researchers					
U.S.	Gulf of Mexico Coastal Ocean Observing System (GCOOS)						http://gcoos.org/products/index.php/model-resources/ss	
U.S.	BOEM	environmental activities and conducting studies associated with mineral extraction carried out in the GOM OCS	GOM Region's Office of Environment (OEnv)		Bob Leben		http://www.boem.gov/Lagrangian-Study/	
WEATHER, CLIMATE: drought								
	ECMWF							
	IRD (French research inst)	Research on needs/applications developing countries	local water, agriculture, community support agencies?					

SWOT User Database

	IRSTEA	Irrigation, flooding, river/reservoir		Pierre-Olivier Malaterre		
	Meteo-France			Eric Martin		
	Ifremer	Coastal-ocean, estuarian,				
	INRA	agriculture, forest,				
	Other intl agencies	New Zealand Ministry of Fishing Bluefin Tuna tagging				
	Universities					
	Industry partners,commercial operators		commerce/marine transporters, insurance, petroleum operators, recreational boaters. Statistical			
	Federal agencies		Forest service			
	State agencies		DWR,			
	Local civic agencies					
	Educational interests	GLOBE Program hydrology	educators, students			
	NOAA, NWS	Weather	agriculture, construction, insurance, tourism, energy, meteorology/weather forecasters, transportation			
	NOAA	Climate Variability & Change	agriculture, construction, insurance, tourism, energy, meteorology/weather forecasters, transportation. Long-term climate forecast utilize blended			
	Environment Canada				R. St Jean	
	EPA					
	US Forest Service					
	CESBIO	Carbon & water , drought and floods, water &	argiculture, hazards and risk assesment,	Ahmad Al Bitar		
	ECMWF	weather and rtisk prediction	NWP centers	Patricia de Rosnay		
	SCHAPI	flash floods	civil security			
	AER?					
OCEAN STATE						
	Edison Chouest Offshore		petroleum production operations in the Gulf of Mexico, Indian Ocean (Arabian Sea), Brazil, and Trinidad.			
	Insurance		validation of claims for lost cargo due to storms at sea			
	Private companies, individuals		Jenifer Clark's Gulfstream, Recreational boaters			
OTHER: human health, national security						
	Military					
	World Bank					
	USAID					
	WWF?					
	NSIDC	Sea Ice extent			Amanda Leon	
	NASA SERVIR Himalaya Hub	seasonal forecasts		Eric Anderson, NASA Marshall SFC		sa.gov
	Reinsurance					

SAWG User Survey



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SWOT Applications Survey to Determine User Needs

The purpose of this survey is to identify the ways in which the SWOT mission data and information products may be useful to operational, private, institutional, and other individuals and organizations. The SWOT Applications team is launching an Early Adopters program and are interested in identifying a broad community of users who will participate in pre-launch applications activities including studies, meetings, briefings, and workshops. For more information on the SWOT mission, please visit http://swot.jpl.nasa.gov.

In order to clearly measure effective means of communicating with our future user community, and optimal ways to disseminate information, we have compiled a series of questions that we hope will help us understand how the future SWOT data will support your decisions and processes. This survey will be used as an important benchmarking component of SWOT's Applications program.

As a professional in hydrology or oceanography, you have been recommended as someone with insight into how SWOT data may be used after launch. The information you provide will help NASA, CNES and our partners at CSA and UKSA to better support your activities in the future.

The SWOT satellite is currently scheduled to launch in late 2020, so the data products we suggest in this survey are for discussion purposes only. The final list of data products, as well as the attributes of those products, will be determined by the SWOT Project Team prior to launch.

If you would like further information about this survey, please contact Margaret Srinivasan at margaret.srinivasan@jpl.nasa.gov, or Alice Andral at alice.andral@cnes.fr.

* Required

LEVEL OF PRODUCTS: For ocean products: What level of products are you interested in: *

- ☐ Raw data?
- ☐ Level 1 products (interferograms)?
- ☐ Level 2 products (SSH, SS slope, SWH, Sigma-0…)?
- ☐ Value-added products (multi-mission maps, temporal series, …)?
- ☐ Not applicable to my work/interests
- ☐ Other:

LEVEL OF PRODUCTS: For hydrology products: What level of products are you interested in: *

- ☐ Level 1 products (complex images, interferograms)?
- ☐ Level 2 products (water mask, elevations, slopes, global river discharge, …)?
- ☐ Value-added products (refined river discharge, multi-mission maps, temporal series, change detection, other?)
- ☐ Other:

SWOT Traceability Matrix

Application Question	Application Concept	Application Measurement Requirements	Applied Sciences Category	Potential Host Agency	Mission Data Product	Projected Mission Performance	Application Readiness Level	Ancillary Measurements
How do we prepare for future surface water availability in downstream nations (of regulated upstream basins) at seasonal to annual timescales? Preparation needs to be in the form of policy, making decisions on shortage projections and conjunctive use of groundwater and surface water and annual water budget studies eventually guiding irrigation and drinking water supply decisions.	River basins are increasingly regulated and located in transboundary regions where information on storage change and outflow downstream are fundamentally unavailable (not shared or measured)	Storage change of reservoirs; discharge estimates upstream and downstream of reservoirs	Water Management; Agriculture; Drought Management; Resolving Transboundary Water Sharing Issues between nations	Water Resources and Planning (WRP) Division of Institute of Water Modeling (IWM) - Bangladesh; Pakistan Council for Research on Water Resources (PCRWR) and Indus River System Authority (IRSA) Email: smr@iwmbd.org (Mahbubur Rahman for IWM); Naveed Iqbal (naveed_spacian@yahoo.com for PCRWR)	Water Elevation; Water Mask (lake area); Discharge	Upto 45 day latency is tolerable for basins as large as Ganges, Brahmaputra and Indus; Up to 22 day repeat over a reservoir is acceptable; Spatial scale: < 500m; Key requirement is the ability to 'see' simultaneously a large number of reservoirs as a regulated system (which SWOT should be able to do with its wide swath capability)	7 for IWM (Bangladesh) 6 for PCRWR and IRSA	GPM IMERGE will be useful; Recommended but not necessary will be - LANDSAT/MODIS (Water area) and JASON-3/AltiKa/Sentinel for water heights (in order to cross-check and improve observational frequency)
For dynamically changing river regimes and cross sections in low-gradient and floodplain flow systems with soft river beds, how can flood management agencies 'update' and 'calibrate' their basin-wide river hydrodynamic models pre and post-flood season at ungauged locations?	Many river systems frequently undergo a change in course, bathymetry, experience scouring, become more fragmented and impounded. River models need to be frequently updated and calibrated accordingly so that the latest environmental boundary conditions are incorporated. At ungauged locations in most parts of large river basins that are flood prone (e.g. Ganges, Mekong, and Indus) this seasonally changing river morphology/network is mostly unavaible.	22 day repeat or less of the local river network - streamline (how river course may be changing during major flood events) as well as simultaneous width and height of river to build bathymetry above the baseflow (minimum) water level.	Flood Forecasting and Management	Flood Management Division (FMG) of Insitute of Water Modeling (Bangladesh); Flood Forecasting and Warning Center (FFWC) of Bangladesh; Asian Disaster Preparedness Center (ADPC)-Thailand/Mekong River Commission; Email: Arifuzzaman Bhuiyan of FFWC - arif81_bwdb@yahoo.com; David Ganz of ADPC david.ganz@adpc.net	River streamline (shapefile) from SWOT; River width and height for river reaches	For pre and post-flood season updating and calibration of flood models, latency is not an issue; However, for assimilation on the fly of changing river dynamics and SWOT river characteristics and for flood disaster response/preparedness, a latency of 3 days or less is required at < 1km spatial scale.	6	Additional observations from Nadir Altimeters, visible/near-infrared imagery (LANDSAT and MODIS) can provide a support role to address potential SWOT gaps in latency and sampling.
How best to schedule hydropower dam operations for a system of interconnected hydropower dams? (just a suggestion to get started on SWOT's value for hydropower management)			*Energy Management*	*USBR, USACE, TVA; Water and Power Development Board of developing nations*			*In my opinion this will probably be an ARL < 6 given that it's such a new concept that the community is grappling with*	
How do we identify fragmented and regulated freshwater systems to understand the current and projected impact on ecosystem services?			*Ecological Forecasting*	*The nature conservancy; WWF; US Wildlife and Fisheries; Mekong River commission*			*ARL< 5 (?) Such work is too new (?)*	
Diarrhoea and Malaria Monitoring			*Public Health and Air Quality*	*CDC, WHO*				
Flood Insurance and Re-insurance			*Disaster Management*					
Note: the entries that are italicized are suggestions to get discussion started								

Categories: **Disaster Mitigation, Ecological Forecasting, Water Management, Agriculture, Energy Management, Resource Management Climate, Energy, Oceans, and Weather**

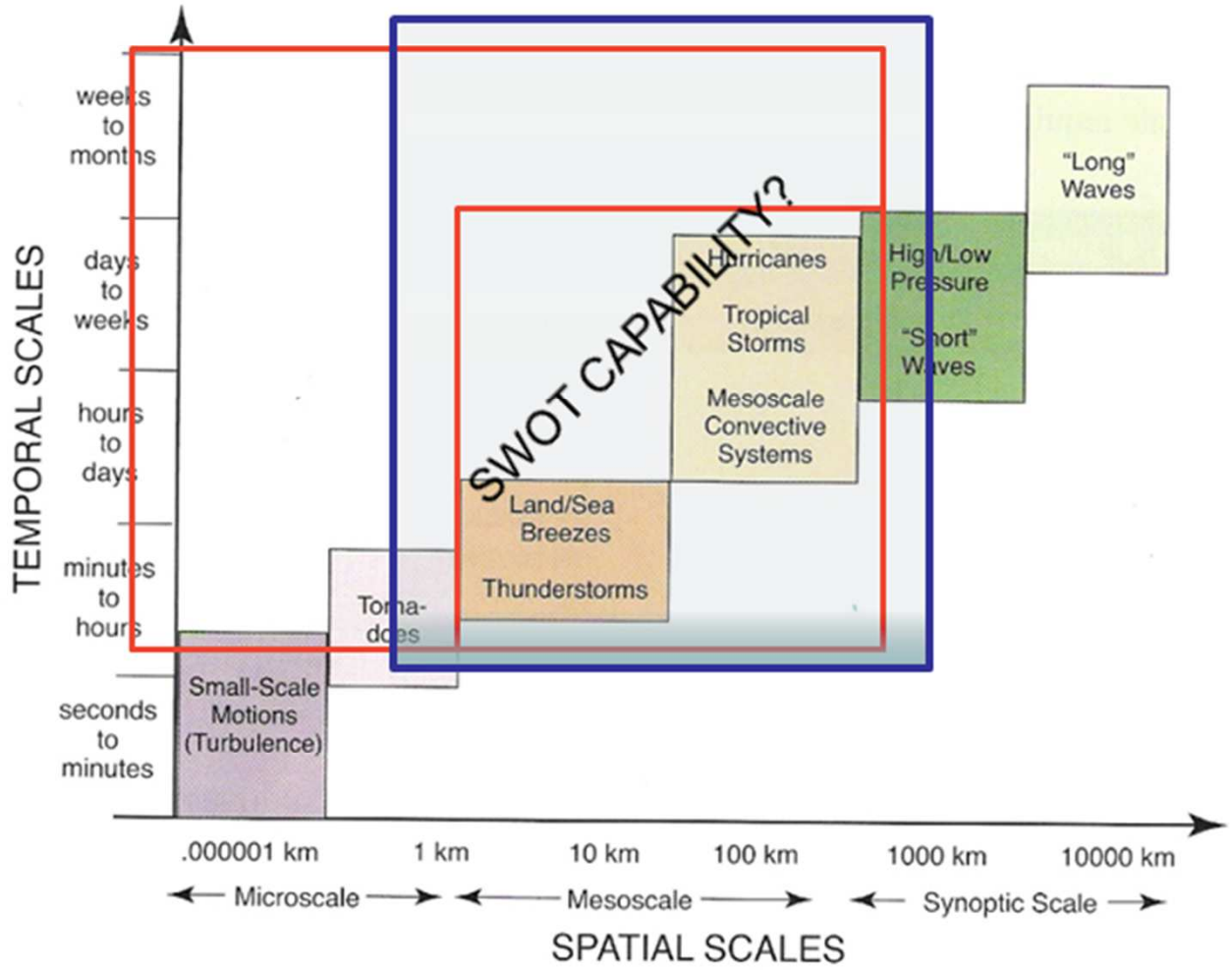
How will hypoxic coastal area forecasts be constructed using SWOT?	Integrate river runoff and with coastal models to predict stratification, ventilation and oxygenation.	Observed river water levels and hydrological model forecasts, existing nutrient load predictions, sea surface height for ocean forecasts.	Ecological Forecasting	NOAA	1-km or higher resolution sea surface height with less than 72 hour latency.	Emergency response will be more targeted, reducing resopnse coastlines and search areas.	TRL 5: Forecast systems exist, and application of observations must be extended to include SWOT.
How can ocean surface drift prediction be extended using SWOT?	Model forecasts initialized by SWOT observations in the ocean will be used during emergency response such as hazardous spills and search and rescue.	Sea Surface Height in coastal and open oceans.	Water management, Disaster mitigation	NOAA, Navy	1-km or higher resolution sea surface height with less than 72 hour latency.	Emergency response will be more targeted, reducing resopnse coastlines and search areas.	TRL 5: Forecast systems exist, and application of observations must be extended to include SWOT.
How will SWOT extend longer ocean predictions?	Operational 2 week ocean forecasts are presently constructed. With the emergence of Earth System Prediction Capability across agencies, longer term predictions will be implemented prior to SWOT launch. The ocean forecast skill is presently limited by density of sea surface height observations, which SWOT will address.	Sea Surface Height in coastal and open oceans.	Resource management	NOAA, Navy	1-km or higher resolution sea surface height with less than 72 hour latency.	Emergency response will be more targeted, reducing resopnse coastlines and search areas.	TRL 5: Forecast systems are being implemented, and application of observations must be extended to include SWOT.

SWOT Traceability Matrix

How will marine operators use SWOT data to improve their operations?	The high-resolution ocean circulation information can be highly beneficial to optimizing their operations in both coastal and open ocean environments. In particular, the SWOT data will lead to improved safety of navigations in Canadian northern waters, improved offshore operations (reducing downtimes, better iceberg management, and improved safety) off eastern Canada, and better emergency responses (e.g. search and rescue, responses to oil spills).	Sea Surface Height in coastal and open oceans.	Maritime operations	Transport Canada Canadian Coast Guard Canadian Ice Service Maritime Shipping Industry	10-km or higher resolution sea surface height with less than 72 hour latency.		ARL 6	RADARSAT
How will high-resolution SWOT data combine with other oceanographical data provide critical information for intergrated ecosystem management and for optimized and safe operations at sea?	Physical ocean conditions, as an integrated part of the marine ecosystem, can influence nutrient and plankton transport, survival and mortality of egg and larvae, fish habitats and migration. The higher resolution SWOT data can be combined with other oceanographic data (e.g. ocean color, ocean temperature, winds and waves) to provide critical information for integrated ecosystem management and for optimized and safe operations at sea, supporting for healthy and productive marine ecosystems and sustainable fisheries in Canadian waters.	Sea Surface Height in coastal and open oceans.	Ecosystems and fisheries	Environment Canada Department of fisheries and oceans	10-km or higher resolution sea surface height with less than 72 hour latency.		ARL 5	RADARSAT, Sentinel, MODIS, LANDSAT
How will SWOT data improve the monitoring and the understanding of global and regional sea level trends for coastal zone planning and management?	SWOT data will help us understand small-scale ocean processes critical for understanding global climate change, which will lead to improved coupled climate models for the prediction of climate variability and change and for climate change adaptation.	Sea Surface Height in coastal and open oceans.	Climate Change Adaptation	Environment Canada	10-km or higher resolution sea surface height	Data latency of up to several weeks /months is acceptable	ARL 5	RADARSAT, Sentinel, MODIS, LANDSAT
How will SWOT data improve weather and Marine forecasts?	The SWOT data can be assimilated into coupled atmosphere-ice-ocean models to improve weather and marine forecasts in coastal zones for better emergency preparedness (storm surge warning, flood warning, tsunami warming) and responses (e.g. search and rescue, responses to oil spills).	Sea Surface Height in coastal and open oceans.	Weather and Marine Forecasts	Environment Canada Department of fisheries and oceans	10-km or higher resolution sea surface height with less than 72 hour latency.		ARL 5	RADARSAT, Sentinel, MODIS, LANDSAT
How do we measure water elevation of large lakes and reservoirs or extent and volume estimation in small lakes, delta lakes and prairie potholes?	Canada-US Great Lakes and large Northern Lakes are so large that they can be considered as "Internal Oceans". Monitoring these lakes present a challenge due to their very large size. Prairie potholes are small temporary lakes which dry-up during summer time. A better understanding understanding of their dynamics would benefit agriculture.	Storage change of very large and very small reservoirs; discharge estimates upstream and downstream of reservoirs.	Hydrology	Environment Canada Agriculture and Agri-food Canada Agricultural Insurance companies	Water Elevation; Water Mask (lake area); Discharge	Upto 45 day latency is tolerable for large basins. Up to 22 day repeat over a reservoir is acceptable. Spatial scale: < 500m Key requirement is the ability to 'see' simultaneously a large number of reservoirs as a regulated system (which SWOT should be able to do with its wide swath capability)	ARL 5-6 (?)	RADARSAT, Sentinel, MODIS, LANDSAT
How do we estimate flow (change in elevation and local hydraulics) using SWOT data assimilation for braided rivers and larger delta environments?	Many Canadian rivers are characterized by complex braided channels, flow from the South to the North. This is a big problem during spring meltdown when snow is melted in the South and flows into frozen rivers in the North! Flood warning, flood prevention.	Storage change of reservoirs; discharge estimates upstream and downstream of reservoirs. Slope evaluation, flow measurement.	Hydrology Natural hazards	Environment Canada Public Safety Canada	River streamline (shapefile) from SWOT. River width and height for river reaches.	For pre and post-flood season updating and calibration of flood models, latency is not an issue; However, for assimilation on the fly of changing river dynamics and SWOT river characteristics and for flood disaster response/preparedness, a latency of 3 days or less is required at < 1km spatial scale.	ARL 5	RADARSAT, Sentinel, MODIS, LANDSAT
In large rivers, how do we measure point estimation of flow?	SWOT will provide ways to obtain slope measurements of large rivers. For validation purpose, how do we compare these measurements with data collected on-site (point estimation of flow)?	Discharge estimates upstream and downstream of reservoirs. Slope evaluation, flow measurement. Maybe more science then applications?	Hydrology	Environment Canada	River streamline (shapefile) from SWOT. River width and height for river reaches.	Latency is not an issue	ARL 3 ?	RADARSAT, Sentinel, MODIS, LANDSAT
How do we evaluate the changing topographical features like: Snow depth for large regions of Canada (particularly relevant in sparsely vegetated areas and over marine and freshwater ice), Changes in glacier height and, Arctic ice monitoring?	Although a secondary objective of the SWOT mission, the KaRIn sensor should provide an evaluation of ice freeboard (floating ice thickness). In some areas, measurements may provide an evaluation of wet-snow thickness.	Ice freeboard (floating ice thickness) Snowpack thickness	Climate changes Water volume estimation Permafrost melting	Environment Canada Public Safety Canada Hydro Power Industry Arctic regions civil engineering	Water Elevation	Latency of a few weeks is not an issue	ARL 3 ?	RADARSAT, Sentinel, MODIS, LANDSAT

SPATIAL VS TEMPORAL SCALES OF FLOODS

FIGURE 1.9 The spatial and temporal scales of various weather phenomena.

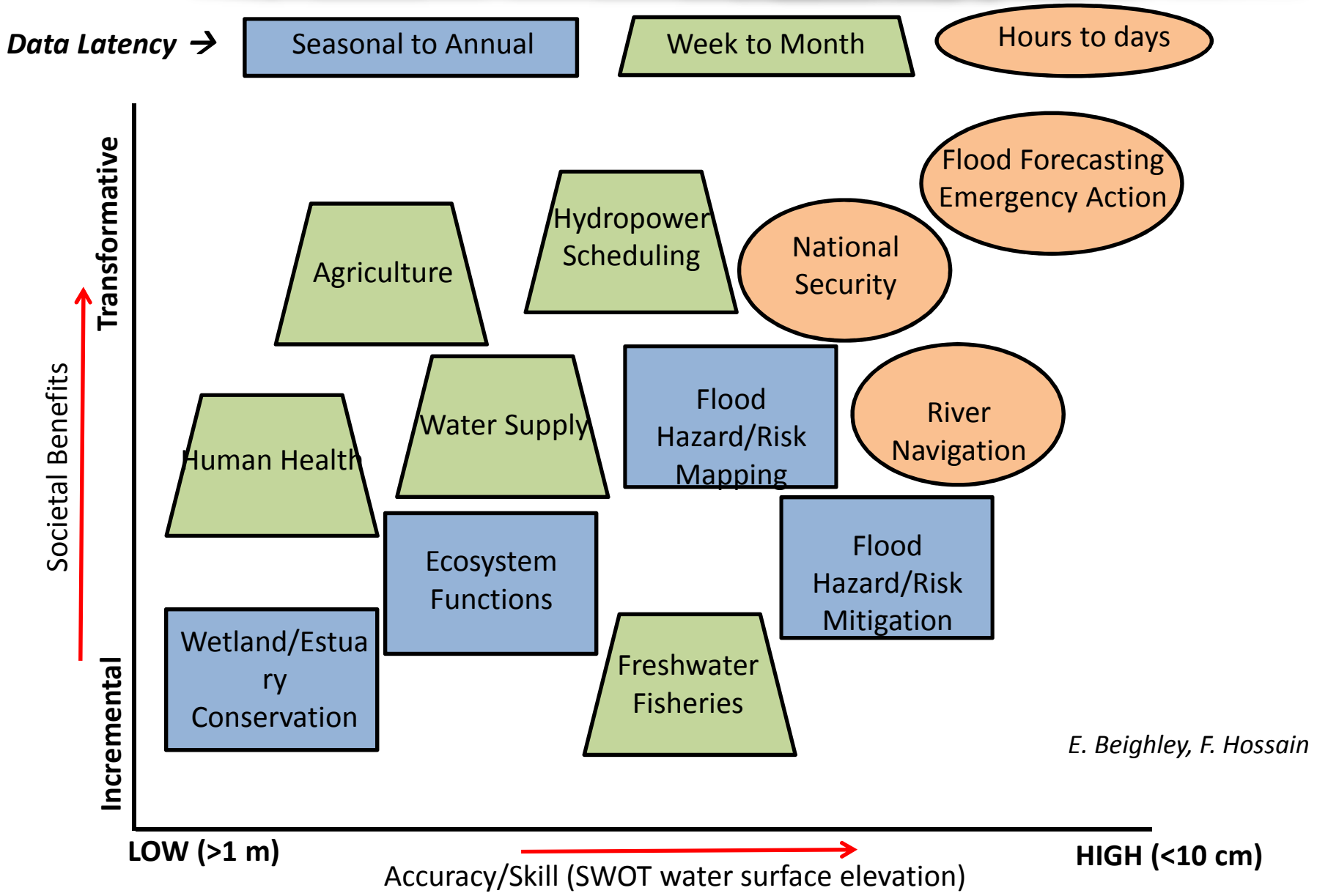


Can SWOT meet these latency requirements (several hours to a few days) in order to maximize SWOT applications?

NB: 2 day difference (e.g. 3 day vs 5 day latency) is significant, esp. for floods in medium-sized catchments such as many rivers in Europe!

G. Schumann

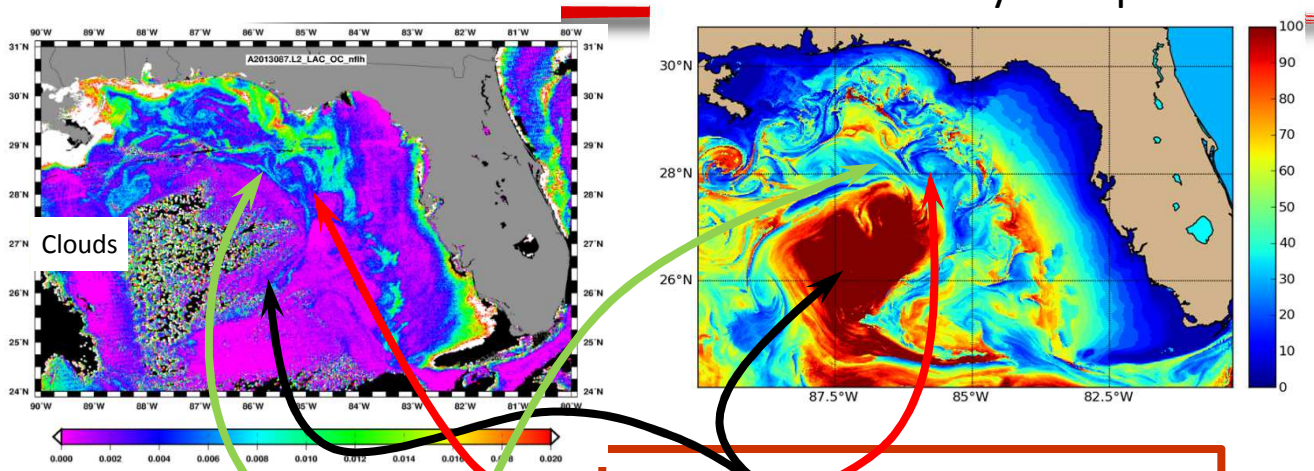
SWOT Hydrology Applications

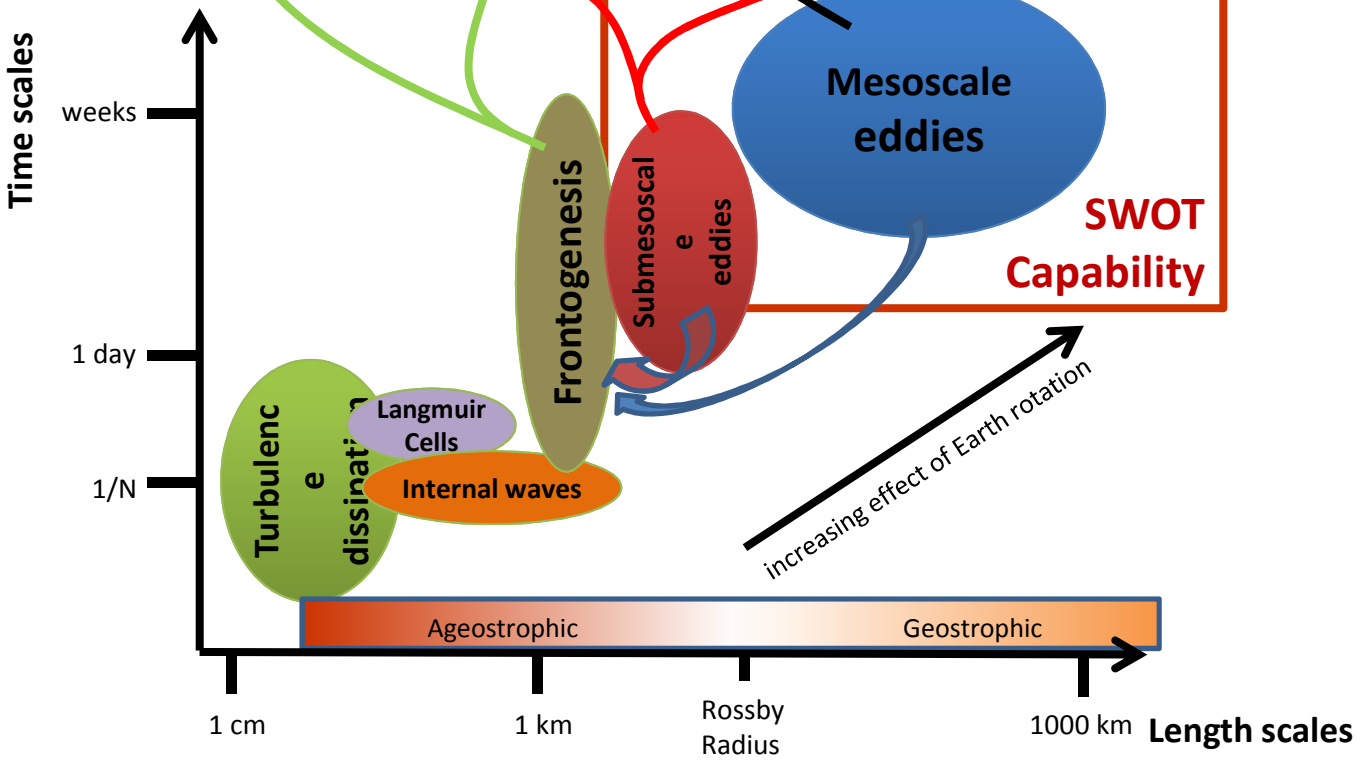


March 28, 2013

Satellite-observed seaweed

Model forecasted Mixed Layer Depth





Present altimeter capability allows us to forecast mesoscale eddies to a limited extent

SWOT will enable forecasts of submesoscale eddies

Forecasting mesoscale and submesoscale eddies will enable forecasting frontal effects

G. Jacobs

NRT Products Roadmap

Objectives:

- Connect user needs with Project objectives and mission capabilities
- *Optimize opportunities to consider mission design impacts, architecture, software systems to support applied uses of data, where possible and feasible**
- Develop and/or support tools (within mission objectives) that will
  - promote awareness of SWOT mission capabilities to the appropriate user communities
  - provide access to the information products resulting from SWOT mission data
  - feed back information to the Project from users for feasibility analysis

Considerations:

- Project: What are the mission system constraints & flexibilities (flight architecture, mission system design) that affect/support the development of NRT data products?
- What are the user constraints?
  - Latency = access to data + computing power
    - What processing schemes will support this?
    - What applications are is enabled with what latency (i.e., 72-hr vs 24-hr, etc).
  - Data extraction & manipulation – what are the system constraints & flexibilities?
  - What tools are required to achieve these objectives?
- What are the archiving options (PODAAC?)

**Timing may not support October timeframe*

NRT Products Roadmap

Methodology:

- Identify users:
  - Who are they?
  - What is their application?
  - What is their current data source & system?
  - What are latency requirements (desires)?

Tools:
User database
User survey
Traceability matrix

- Create graphics to illuminate: lists of applications vs latency requirements
- Identify potential processing schemes that will support this.
- Identify 1 or 2 feasible pathways to achieve NRT SWOT data for a given (or few) users
- What's useful for the applications community (taking the constraints on flight & mission systems into account)?

Other factors…

- Begin with Jason-type ocean products initially (for actual production)
- Flight & mission system architectures, and system designs that will impact NRT development.
- Identify a process/outline
- 'Solid pathway' by January 2016 PDR
- What do we know?
- Where are the gaps in our knowledge?

NRT Products Roadmap

Outline:

- Ocean—
  - Ocean circulation: factors =
  - Coastal region/impacts: factors =
- Hydrology—link science to developing world water problems
  - Drought factors: Regional? Format for GIS (to stack w other data)?
  - Groundwater factors:
  - Reservoir management factors:
  - River discharge factors:
- Identify who is doing what: user database
- Identify the need (application): traceability matrix
- Identify required data products that will address: what are modeling & prediction paradigms?
- *What are the project infrastructure elements (flight, design) that can be enhanced or manipulated to achieve this?**
- How do we get there and what is the Project role?
- Early Adopter role?

**Timing may not support October timeframe*

Additional information

SWOT* User Survey

Identify the ways the proposed SWOT mission may be useful to operational, private, institutional, and other individuals and organizations **.**

- **PRODUCTS**
  1. For ocean products: What level of products are you interested in?:
  2. For hydrology products: What level of products are you interested in?:
- **Temporal frequency**

  How often does the data need to be updated
- **Data latency**

  How timely must information be from data collection
- **Data format**

  What is the best data format for your application?

SWOT* User Survey (Continued)

- **DATA VOLUME**
- **DATA ACCESS**

  How would you prefer to get SWOT* products?
- **DOMAIN of INTEREST**

  What is your main domain of interest?

  Geographically, what is your region of interest?
- **USER INFORMATION**

  What your professional training expertise or experience
- **Miscellaneous**

  What are your priorities

  What information do you need to understand /use data?

Survey link: http://swot.jpl.nasa.gov/1stUserWorkshop2015/
Username/password (case sensitive): SWOT/SWOTUser15

SWOT* Applications – Focus

→International components and cooperation

→Applications life cycle in step with mission phases

→Early Adopter Program; user database, survey

→Focus pillars;

Hydrology: developing world water problems, food security (flooding & drought)
Oceanography: coastal applications (circulation, impacts), marine operations support/open ocean issues
Climate: regional capabilities, coastal and agricultural impacts

Key Messages

- SWOT is a research mission, not an applications mission
- The SWOT Project will not develop applications, it will develop the right data products that enable the use of SWOT observations/information (by users)
- Data availability and access are critical to success

Objectives

Outreach:

- Inform the stakeholders about SWOT capabilities (website, workshops, publications, meetings), develop communication strategies to target and support requirements of the user community

Improve existing applications

- Sea transport, shipping, fisheries, seasonal meteorology (i.e., ENSO), forecast extreme events (cyclones, storms), monitoring of climatic parameters

Coastal applications

- In particular for coastal management and offshore resource exploitation, mining, continental shelves

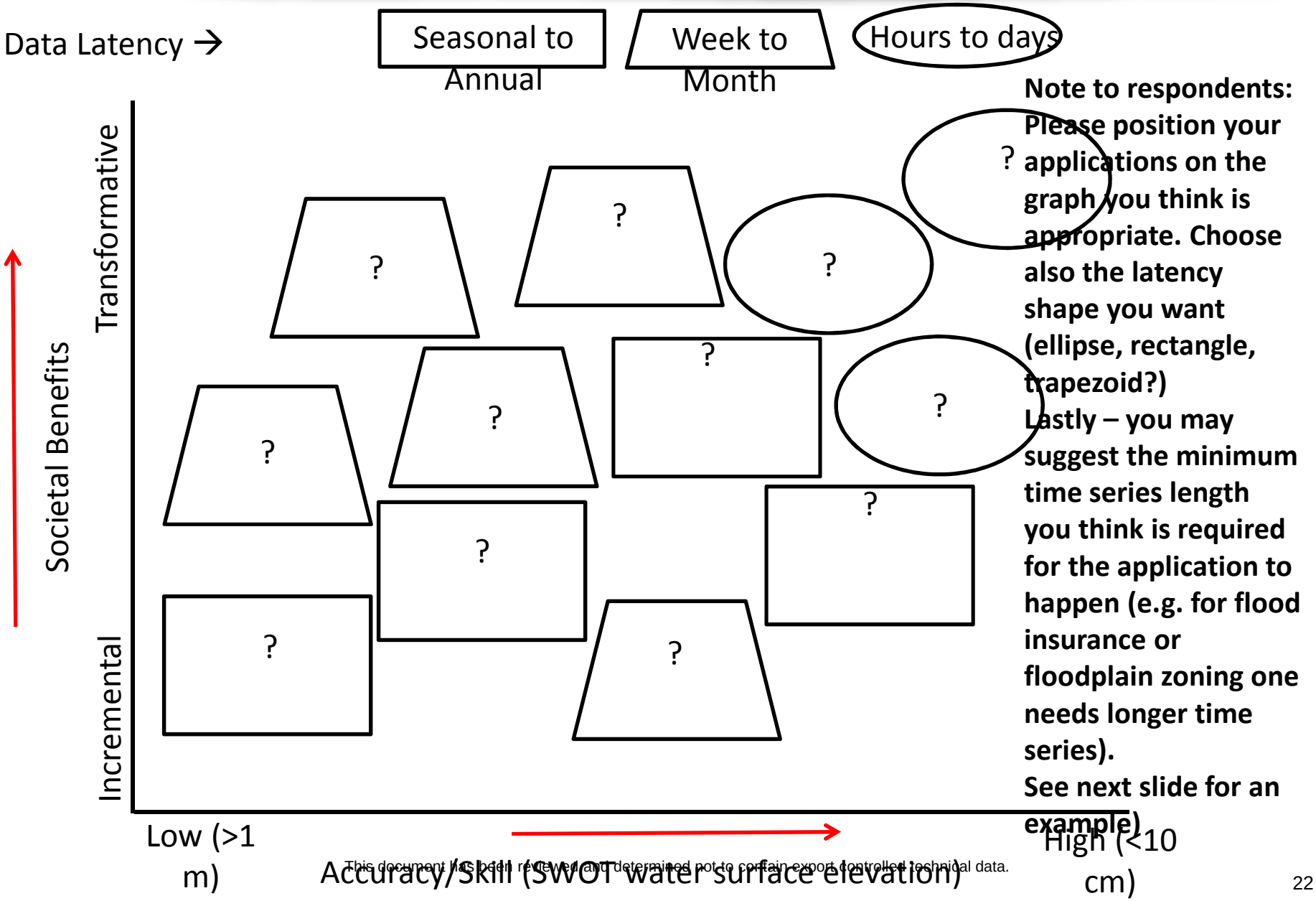
Create new environmental services

- Hydrology of inland waters (lakes, reservoirs, major rivers), offer opportunities for water resources management, estuaries, flood risk prevention/mitigation, propagation of disease, health impacts

Open data policy

- Strengthen services with added value in oceanography and create new services for water resources

SWOT (*Generic*) Applications



Note to respondents: Please position your applications on the graph you think is appropriate. Choose also the latency shape you want (ellipse, rectangle, trapezoid?)
Lastly – you may suggest the minimum time series length you think is required for the application to happen (e.g. for flood insurance or floodplain zoning one needs longer time series).
See next slide for an example)