The Satellite Snow Product Intercomparison and Evaluation Exercise

snowpex

REPORT ON

1st International Satellite Snow Products Intercomparison workshop (ISSPI-1)

Monday, 21 July 2014 to Wednesday, 23 July 2014

NOAA Center for Weather & Climate Prediction (NCWCP)
5830 University Research Court, College Park, Maryland, USA

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The ISSPI-1 Workshop took place at NOAA, College Park, MA, US, from 21-23 July 2014. Overall 42 scientists from institutions working in seasonal snow pack monitoring met to discuss plans to assess the quality of current satellite-based snow products and work out guidelines for improvements.

The Workshop was organized in 3 parts. Part 1 and Part 2 were sessions on Monday and Tuesday morning. Part 1 provided the motivation for performing this exercise, an overview of the SnowPEx project and proposed protocols and methods for validation and intercomparison of global/hemispheric snow extent (SE) and snow water equivalent (SWE) products. Part 2 included presentations on available EO based snow products from optical and microwave satellite data, and the product characteristics including period of availability, sensors used, current status of validation, etc. These presentations were given by the scientists responsible for each product. Additionally, validation sites and data sets where product evaluation has been performed, or are candidate site for validation, were presented.

On Tuesday afternoon and Wednesday morning, Splinter Sessions (Part 3) on Snow Extent and Snow Water Equivalent were carried out, discussing methods, protocols and selecting reference data sets for validating SE and SWE products. The overall design of the validation and intercomparison exercise was also discussed.

On Tuesday afternoon, products, protocols, methods and design of the snow product intercomparison were openly discussed. The discussions were summarized by the Splinter Session Chairs in the second part of the splinter sessions on Wednesday morning.

The summary and outcome Splinter Sessions were presented by the SE and SWE Splinter Session chairs Thomas Nagler (SE) and Chris Derksen (SWE) and the actions were defined. The result of the splinter sessions is the main outcome of the WS and is described in detail in the following sections.

1. SUMMARY AND OUTCOME OF SNOW EXTENT SPLINTER SESSION

The chair and rapporteur of the splinter session for SE were T. Nagler and R. Fernandes. The following items were discussed in the splinter session:

- Products participating in the SnowPEx Intercomparison
- Protocols and methods for validation of global /hemispheric SE data
    - SE reference data set
        - reference SE data from Landsat data
        - In-situ snow data for key regions
- Intercomparison of global / hemispheric / continental SE products
        - Protocols Methods (Spatial and temporal differences)
        - Selection of periods

1.1. Participating SE Products

The characteristics and details of the products were shown during the SE sessions on Monday. All presenting organisations confirmed to participate in SnowPEx. The following table summarizes the products participating in SnowPEx.

Table 1.1:
Overview of SE products participating in the intercomparison (FSC – Fractional Snow Extent; SEB – Binary Snow Extent; VALEXE – product participating in Validation Exercise; INTEXE – SE Product intercomparison Exercise)

Name	Product	Pixel Size	Frequency	Period	Main Sensor	Organisation	Excercise
MOD10_C6	FSC Global	0.5 km	Daily	2000 (Terra)	MODIS	NASA (D. Hall et al.)	VALEXE INTEXE
SCAG	FSC NH	0.5 km	daily	2000 - 2013	MODIS, VIIRS	JPL, NSIDC (T. Painter et al.)	VALEXE INTEXE
GlobSnow v2.1	FSC NH	1 km	daily - monthly	1996 - 2012	ATSR-2 AATSR	SYKE (S. Metsämäki)	VALEXE INTEXE
Autosnow	FSC NH	4 km	daily	2006 - present	METOP-A[B] AVHRR, DMSP, SSMIS, MSG SEVIRI, GOES- E & W	NESDIS (P. Romanov)	VALEXE INTEXE

Name	Product	Pixel Size	Frequency	Period	Main Sensor	Organisation	Excercise
NOAA IMS	SEB Global	1 km	daily	2014 (TBC)	GOES (E & W), MeteoSat, MTSAT, NOAA, AVHRR, MODIS, ASCAT, AMSU	NOAA (Helfrich et al.)	VALEXE INTEXE
NOAA IMS	SEB Global	4 km	daily	2004 – present	GOES (E & W), MeteoSat, MTSAT, NOAA, AVHRR, MODIS, ASCAT, AMSU	NOAA (Helfrich et al.)	VALEXE INTEXE
CryoClim	SEB Global	5km	daily	1982 – present	AVHRR, SMMR/SSMI	NR,METNO (Solberg et al.)	VALEXE INTEXE
MDS10C GHRM5C	SEB NH	5 km	daily	2000 – 2013 1979 – 2013	MODIS AVHRR	JAXA (M. Hori et al)	VALEXE INTEXE
AVHRR Pathfinder	SEB NH	5 km	daily	1985 - 2004	AVHRR	CCRS (R. Fernandes, Zhao et al)	VALEXE INTEXE
NOAA IMS	SEB Global	24 km	daily	1997 - 2004	GOES (E & W), MeteoSat, MTSAT, NOAA, AVHRR, MODIS, ASCAT, AMSU	NOAA (S. Helfrich et al.)	INTEXE
MEaSUREs	SEB Global	25 km	daily	1999 - 2012	MODIS, AMSR-E, AVHRR, VIIRS, SSMI, SSMIS, VISSR, AMSU-B and VAS	NASA (D. Hall et al.)	INTEXE
CryoLand	FSC (PanEur)	0.5 km	daily	2000 - present	MODIS	ENVEO / SYKE (Nagler et al.)	VALEXE INTEXE
HSAF H10	SEB (PanEur)	5 km	daily	2009- present	MSG / Seviri	FMI / EUMETSAT M. Takala	VALEXE INTEXE
EURACSnow	SEB (Alps)	0.25 km	daily	2002 - present	MODIS	EURAC (C. Notarnicola)	VALEXE INTEXE

1.2. Design of Validation Exercise

As validation we understand the comparison of the global / hemispheric SE products with reference data. Reference data include

(i) networks of in-situ snow measurements
(ii) high resolution snow cover maps of high quality and preferably with attached uncertainty information

1.2.1. In-situ reference data

Validation with in-situ measurements will be carried out in key regions. Table 1.2 summarizes the identified key regions, persons responsible for checking the availability of in-situ data and providing in-situ data, and the existence of any reference images. The list might be updated during the project.

Table 1.2:
Key regions for In-situ data, responsible person for providing in-situ data, and overview of additional reference images (Landsat Type).

Regions	Environment	Responsible	Existing reference Imagery
Quebec/Northern US	Agricultural, forest	Ross Brown , Dave Robinson	?
Finland	Boreal	Sari Metsämäki / SYKE	Yes, at SYKE
Alps	Mountains	T. Nagler check with: ZAMG (W. Schöner / M. Olefs) Switzerland: S. Wunderle / UBE TBC	YES, at ENVEO
Alaska	Tundra	Mathew Sturm / contacted by D. Robinson	
Sierra Nevada	Mountains	Karl Rittger / NSIDC	Some Worldview Scenes
Russia test Site / TBD	Boreal	Sari Metsämäki 7 SYKE	
Chinese Test site / TBD	???	?	?
Montana	Mountains, Prairie	Chris Crawford / NASA	?

Further requirements for in-situ data:

- In-situ Snow Depth and Snow Fraction data provided by participants: Format of data sets to be defined (probably CSV text files; TBD)
- Data shall be quality checked by participants
- Time series of in-situ data for snow seasons (full winter period) should be provided.

1.2.2. Reference Snow Maps from Landsat data

The SE product validation with snow products from high resolution sensors (e.g. Landsat) will focus on the snow detection and the evaluation of the fractional snow extent. The cloud / snow discrimination is not evaluated in this exercise, therefore primarily cloudfree scenes or scenes with minor cloud cover are selected. Cloud screening will be checked and if needed manually corrected. One important point discussed at the WS is the quality of the Landsat based snow maps. It was decided that the products from Landsat data are generated within the SnowPEx project in order to have control the quality of these products. As no algorithm could be identified to be the "best" one, it was decided to generate an ensemble of snow maps for each Landsat scene applying selected available algorithms. This should enable the estimation of the quality (uncertainty) of the Landsat snow map.

The following items were further discussed:

- Requirements for selecting Landsat scenes for validation of SE products:
    - Time: Acquisition date of Landsat-type scenes (1999-2012), LS8: 2013/2014, different seasons (transition period)
    - Region: globally, where suitable Landsat images are available
    - Further requirement: focus on cloud free scenes
- Production of Landsat Snow Maps: This is an important issue, as different algorithms will provide different results. It was agreed that the Landsat SE maps are generated using available algorithms in order to study the uncertainty in LS based snow mapping. By now the following algorithms are identified:
    - SEB: Dozier, Klein; (further algorithms to be added)
    - FSC: TMSCAG, Multi-spectral Unmixing (ENVEO), Salomonson & Appel; (further algorithms to be added)
- Schedule for generating Landsat Reference data set:
    - Selection of scenes will be done in 2 tranches:
        - 1st Part of scenes: List of Landsat scenes (ca 300 scenes) prepared by ENVEO with contributions by others. Generation of image data stack will be done by ENVEO in cooperation with USGS.
        - 2nd Part of scenes: Complement list of LS images with new images, identified by ALL. Additional images will be provided by USGS, or downloaded from ISGS GLOVS server.

1.2.3. Validation Protocol

The protocol for validation with in-situ data and Landsat Snow Maps was discussed:

- Products participating in the Validation Exercise are labelled by VALID(ADION) in Table (e.g. he organisation commits to participate in the intercomparison).
- Input Global / Hem SE Products provided by organisations should:
    - apply Digital Coding Standards of SnowPEx. A document of Digital Coding Standards was compiled and provided by ENVEO.
    - be quality checked before submitted for intercomparison and validation
    - be daily products (preferred)

- be provided in original map projection (optional EASE-2, geographic coordinates / WGS84)
- Note: For validation, binary SE products will be converted to FSC, assuming 0% FSC for snow free areas, and 100% FSC for snow covered pixels

- Validation with in-situ measurements:
  - Pixels with in-situ measurements
- Validation methods for Landsat Snow Maps;
  - 2 Validation methods available :
    - Pixel-by-Pixel moving Window (similar as in CryoLand / GlobSnow)
    - Comparing PDFs of FSC (Fernandes)
  - Metrics
    - CryoLand / GlobSnow statistics
    - Reports by test area / season

1.3. Design of Global / Hemispheric SE Products Intercomparison Exercise

This exercise includes the intercomparison of snow extent product. All products (independent of resolution, binary or fractional snow extent) can participate in the intercomparison. The products participating in this exercise are indicated as INTEXE in Table 1.1.

1.3.1. Requirements for SE products participating in the Intercomparison Exercise

The following requirements for SE product format, digital coding etc. are specified

- All products must follow the Digital Coding Standards of SnowPEx. A Technical Report will be compiled by the SnowPEx Team. A draft will be send out by September for comments. The document will cover:
  - Digital re-coding of products into SnowPEx Specifications. This has to be done by the product producer.
  - Intercomparison is done in a common map projection. At the WS the proposed Map projection is EASE-2 Grid (because of Equal Area, supports trend analysis later).
  - Transformation from original product map projection into EASE-2 grid (if needed) will be done by SnowPEx Team (TBC).

- Valid Area Mask for each product to be provided by product generator (explained in digital coding document)
- Uncertainty map (if available)

- Time periods for SE product intercomparison. Overview of periods covered by products is shown in Figure 1.1. It was decided to provide products in two parts:
  - Part 1 of Products: includes 2 years of products, provided by 30 November 2014.
    - Period 1: 1.10.2003 – 30.9.2004
    - Period 2: 1.10.2011 – 30.9.2012
  - Part 2 of Products: includes 3 years of products, provided by 31 January 2014.
    - Period 3: 1.10.2000 – 30.9.2001
    - Period 4: 1.10.2005 – 30.9.2006
    - Period 5: 1.10.2007 – 30.9.2008

For uploading SE products ENVEO will setup an FTP-site. Naming convention of the products should follow the Digital Coding Report of SnowPEx.

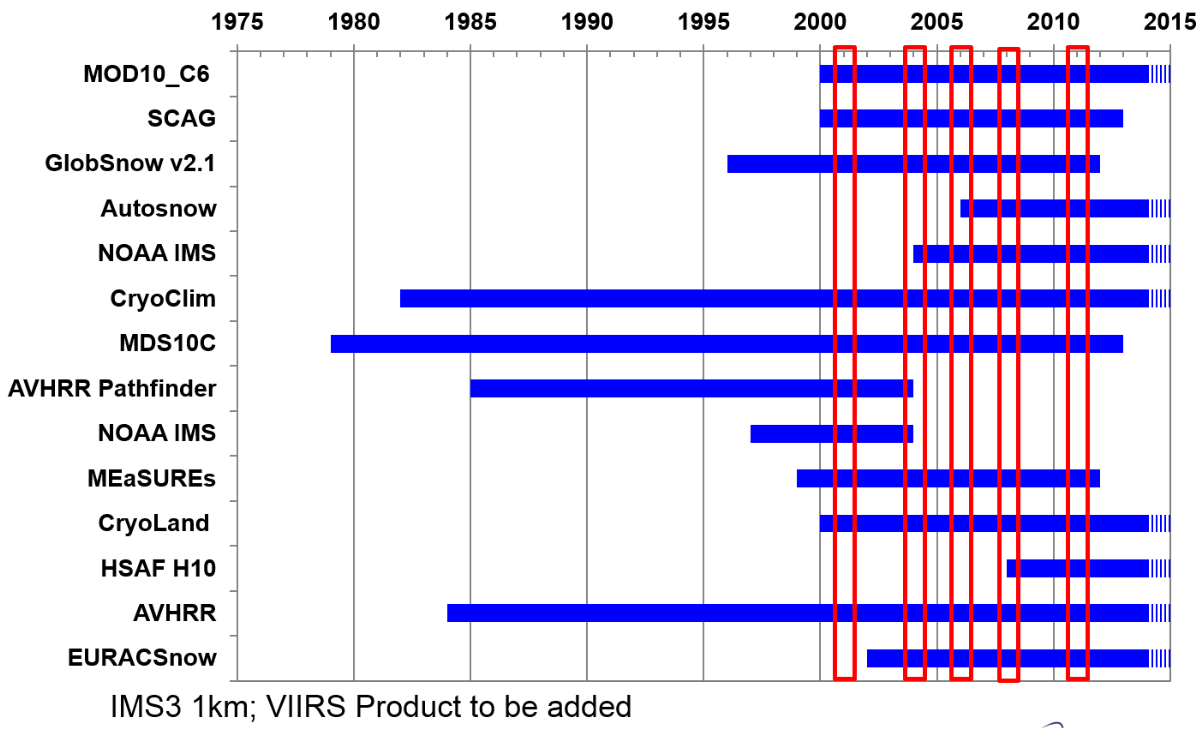

Figure 1.1: Periods for SE products participating in intercomparison exercise, according to information available at WS (to be checked by corresponding organisation).

1.3.2. *Protocol for SE product intercomparison*

The intercomparison of products will include 2 major steps, pre-processing and evaluation.

- Pre-processing of products:
    - Intersection of valid area mask for all products
    - Translation of Binary to FSC
    - Aggregating to common Equal Area Grid: this step needs some testing by SnowPEx Team:
        - ~25 km pixel size ; ~ 1km pixel (for applicable products)
        - Cloud area fraction included
- Comparison of Products will be performed using 2 methods:
    - Methods:
        - Pixel-by-Pixel moving Window (similar as in CryoLand / GlobSnow)
        - Comparing PDFs of FSC (after Fernandes; described in Deliverable 4 of SnowPEx)
    - The metrics of the Intercomparison is:
        - CryoLand/GlobSnow Statistics
        - Reports by test area / season
- Auxiliary Mask: land cover masks (open water, sea, etc) will be generated by the SnowPEX team using public data sets.

1.4. Design of SE Trend Analysis Exercise

The aim of this exercise is to study the difference of the trends in snow cover revealed by different products. In the WS this exercise was shortly discussed, as it will be the main topic of ISSPI-2.

It was agreed that products with continuous and long term time series (as long as possible), and continental-hemispheric and global coverage are preferred. The preliminary selected products to be used for trend analyses and their temporal availability are shown in Figure 1.2.

The same specifications and procedures for digital coding and reprojection of SE products as for SE product intercomparison are applied.

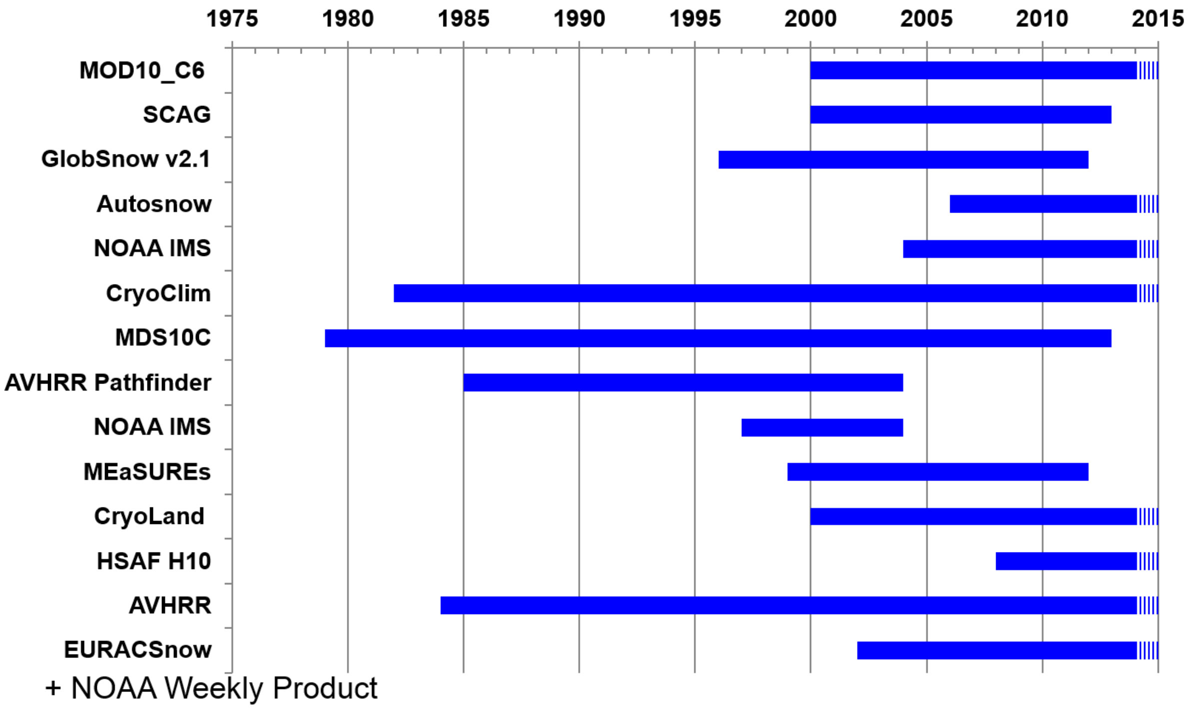

Figure 1.2: Preliminary list of SE products and periods used for snow cover trend analysis. This list will be consolidated at ISSPI-2.

2. SNOW WATER EQUIVALENT

The chair and rapporteur of the splinter session for SWE were C. Derksen and K. Luojus, respectively. The following issues were discussed in the splinter session, and will be described in more detail in the following sections:

- Products participating in the SnowPEx SWE intercomparison
- Reference SWE datasets
- Protocols for evaluation of SWE products using reference datasets
- Protocols for intercomparison of continental-scale SWE products and trend analysis

It was clarified that the target user community for the SnowPEx SWE intercomparison is the climate community, which is appropriate given the relatively coarse spatial resolution (25 km) but long available time series (1979-present) of the SWE products. Examples of the climate user community include the upcoming IPCC 6th Assessment Report, and the recently initiated Earth System Model – Snow Model Intercomparison Project (ESM-SnowMIP). Both of these activities require observational SWE time series with quantified uncertainty estimates, which will be delivered by the SnowPEx effort. Other potential user communities, such as the hydrological community, require SWE information at spatial resolutions not available from current satellite products. Focusing on these communities could be the focus of future phases of SnowPEx.

2.1. SnowPEx SWE Products

An overview of the participating earth observation derived SWE products is provided in Table 2.1. These products cover a range of algorithmic approaches: retrievals based on standalone satellite microwave measurements (NASA AMSR-E standard; JAXA AMSR-2); passive microwave combined with climatological snow information (AMSR-E prototype) and fully synergistic use of passive microwave and weather station snow depth observations (GlobSnow). The consensus of the SWE splinter group was:

- While some of the products include additional data layers, the focus of SnowPEx will be solely on the SWE retrievals during this phase. Evaluation of the additional parameters (i.e. melt onset; snow grain size) may follow later in later projects.
- All the products in Table 2.1 are currently available in the Northern Hemisphere EASE-Grid version 1. To update these products and facilitate synergistic analysis with the SE products, all SWE datasets will be converted to EASE-Grid version 2.

Table 2.1:
Summary of SnowPEx SWE products.

Dataset	Method	Contact	Reference	Status
ESA GlobSnow	Microwave + ground stations 1979-2014	K. Luojus	Takala et al., 2011	Requires conversion to EASE2
NASA AMSR-E (standard)	Standalone microwave 2002-2011	M. Tedesco	Kelly 2009	Requires conversion to EASE2
NASA AMSR-E (prototype)	Microwave + ground station climatology 2002-2011	M. Tedesco	TBD	Product processing currently in progress
JAXA AMSR-2	Standalone microwave Aug 2012-2014	R. Kelly	Kelly 2009	Requires processing update in fall 2014
HSAF SWE	Microwave + ground stations (similar to GlobSnow Methods)	M. Takala	M. Takala	Available at EUMETSAT / HSAGF

In addition to the earth observation derived SnowPEx products listed in Table 2.2 it was decided to also consider a set of independent gridded products derived from various combinations of atmospheric reanalysis and land surface models, summarized in Table 2.4.

Table 2.2:
Summary of independent gridded SWE products.

Dataset	Method	Time Period	Res.	Comments	Reference
MERRA-Catchment (MERRA-standard)	Catchment land surface model driven by MERRA's AGCM (3DVAR assimilation)	1979-2013	0.5 x 0.67 deg	MERRA-land contains a discontinuity	Rienecker et al., 2011
GLDAS-Noah	Noah land surface model driven by GLDAS2.0	1948-2010	0.25 x 0.25 deg		Rodell et al., 2004
ERA-interim-HTESSEL (ERA-land)	HTESSEL land surface model driven by ERA-Interim + GPCP v2.1 adjustments	1979-2010	80 km		Balsamo et al., 2013
ERA-interim-CROCUS/ISBA	CROCUS snow model in ISBA forced by ERA-interim; no precip corrections/adjustments	1979-2013	1 x 1 deg	Only recently applied to entire NH, north of 25N	Brun et al., 2013

2.2. Reference SWE Datasets

The following decisions were made with respect to reference SWE datasets for validation of the SnowPEx products:

- Only dense network reference measurements (more than a single measurement within a SWE product grid cell) will be used for evaluation; sparse network measurements (one measurement site within each grid cell), although containing a large sample size, will not be used in this phase of SnowPEx because of concerns with measurement representativeness.
- Project partners responsible for each reference dataset will contribute data to a central repository for consistent derivation of the matchups and statistics.
- The focus will be on non-alpine regions given the scaling challenges of validating 25 km SWE products in complex terrain with in situ measurements. Where and when appropriate reference measurements are available, however, comparisons in alpine regions will be performed.
- The best available reference measurements from the years 2002-2011 will be utilized. These years will vary by availability for each reference dataset.
- Reference measurements selected for use in SnowPEx are summarized in Table 2.3. A summary figure was produced to summarize the spatial and temporal sampling characteristics of the selected datasets (Figure 2.1). The measurements cover all relevant snow-climate classes. While some datasets provide fine temporal resolution measurements (i.e. daily) for a very limited number of grid cells, others cover a large spatial domain but with reduced sampling frequency.

Table 2.3:
Summary of SWE reference datasets.

Dataset	Region	Snow Class	Method	Time Period	Temporal Resolution	Contact
Boreal Ecosystem Research and Monitoring Sites	Saskatchewan	Taiga	Sonic snow depth	1997-2014	Daily	H Wheater, U. Saskatchewan
Environment Canada – Bratt's Lake	Saskatchewan	Prairie	Sonic snow depth; manual surveys	2011-	Daily	C Smith, Environment Canada
FMI – Sodankyla	Finland	Taiga	Sonic snow depth; cosmic	19xx-2014	Daily	J. Pulliainen, FMI
Trail Valley Creek	Northwest Territories	Tundra	Sonic snow depth	2002-2014	Daily (with gaps)	P. Marsh, WLU
Fraser Forest and CLPX snow data	Colorado	Alpine	TBD	19xx-2014	Daily	K. Elder, USFS

Dataset	Region	Snow Class	Method	Time Period	Temporal Resolution	Contact
Finnish Environment Institute Snow Surveys	Finland	Taiga	Manual snow course	19xx-2014	Monthly	S. Metsämäki, SYKE
RusHydroMet Snow Surveys	Russia	Prairie; Taiga; Tundra	Manual snow course	1966-2009	Bi-weekly	O. Bulygina, RIHMI-WDC)
Hydro-Quebec Snow Survey Network	Quebec	Taiga	Kriged snow course	1970-2013	SWEmax	D. Tapsoba (IREQ)
ASO	Sierra Nevada; Upper Colorado	Alpine	LiDAR	2013-	Weekly during melt season	T. Painter (JPL)
Imnavait	North Slope	Tundra	Manual	1990-		M. Sturm (UAF)

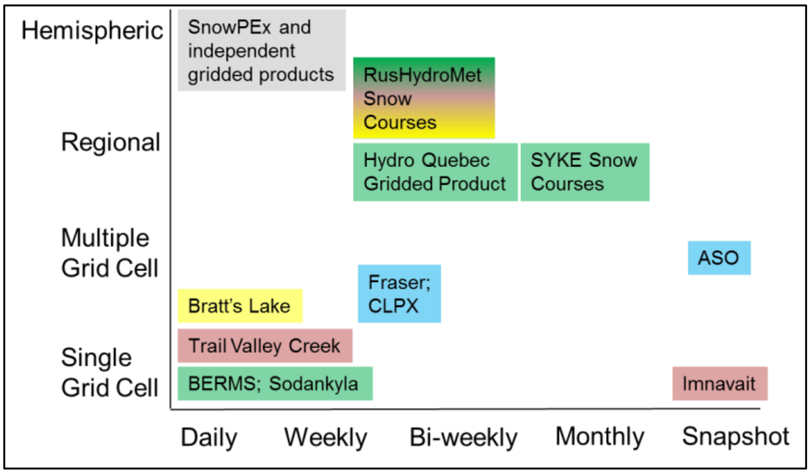

Figure 2.1: Spatial and temporal sampling characteristics of SWE reference datasets. Colours indicated snow-climate class: green = taiga; blue = alpine; yellow = prairie; purple = tundra.

2.3. Protocols for the Evaluation and Comparison of SWE Products

An extensive discussion was held on the protocols to be employed to evaluate the SnowPEx SWE products. The following methodological issues were resolved:

- Only matching samples (found in each and every product) will be evaluated.
- The initial target period is all available data since 2002 but this may be refined in order to ensure an equal balance between time, number of samples, and snow class (as outlined in Figure 2.1) to minimize effects of sampling bias.
- Because of the nature of passive microwave derived products, wet snow detection needs to be accounted for (dry snow only cases to be considered) and a shallow snow threshold of 2 cm will be employed.

- The independent gridded SWE products will also be evaluated with the reference SWE datasets, although uncertainty may be higher as these are coarser resolution products so the evaluation will be performed at a 1 degree grid resolution.
- Detailed documentation is needed for all stages of the evaluation procedure. In addition to the intercomparison results, we aim to produce a template of reference data and validation practices as a baseline for future studies.
- The Finnish Meteorological Institute (FMI) will host the SnowPEx SWE data repository

The product evaluation will proceed through the workflow illustrated in Figure 2.2. The general steps are:

1. Take daily SWE products and derive additional fields: 5 day average SWE using +/- 2 day sliding window; SWEmax, date of SWEmax.
2. Derive landscape weighted mean for the dense network measurements at the scale of the 25 km EASE2 projection used for the satellite products.
3. Calculate grid to grid cell statistics for daily SWE and SWEmax (bias, RMSE, correlation, coefficient of variation) and date of SWEmax (bias, correlation) using dense network and regional gridded datasets.
4. Derive distributions of SWE from dense networks and SWE products over fixed time windows and compare using the Kolmogorov-Smirnov test.
5. Perform spatial comparison of SnowPEx SWE products with independent gridded SWE products (bias, RMSE, correlation, coefficient of variation)
6. Perform Nash-Sutcliff test hemispherically for all pairs of datasets and for the SnowPEx versus independent gridded SWE products.

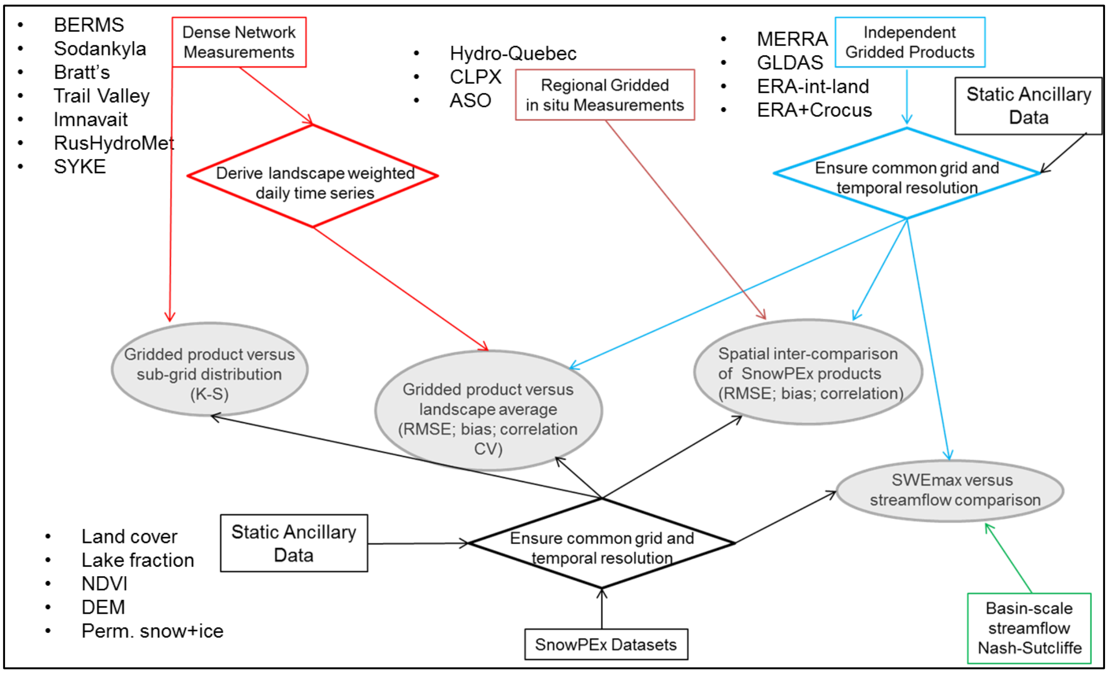

Figure 2.2: Workflow for SnowPEx SWE evaluation.

2.3.1. Protocols for the Trend Analysis

Following the completion of the SWE evaluation exercise, trend analysis will be performed on the multi-dataset SWE time series (SnowPEx products and independent gridded products). The following protocol was established:

1. Compile SWE datasets for trend analysis in a common grid.
2. Derive SE data from SWE using a fixed threshold (i.e. SWE>0).
3. Calculate SWE and SE trends using Mann-Kendall with pre-whitening, perform separately for EO products and reference gridded datasets.
4. Produce spatial trend maps and trend time series for continents/regions (i.e. the Arctic) including measures of uncertainty.

An overview of the available time series is shown in Table 2.4. Discussion focussed on how to merge the trend analysis from the multiple datasets. Ideally, a scheme should be applied whereby the datasets that performed most strongly in comparison to the reference measurements are given more weight than datasets which performed poorly in the comparison. Details of this approach remain to be finalized.

Table 2.4:
Available SWE time series for trend analysis. Green = datasets with potential to be updated; Red = datasets with fixed time series.

Dataset	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
GlobSnow																																			
NASA AMSR-E standard																																			
NASA AMSR-E prototype																																			
JAXA AMSR-2																																			
MERRA-Catchment																																			
GLDAS-Noah																																			
ERA-interim-HTESSEL																																			
ERA-interim-CROCUS/ISBA																																			

3. ACTIONS AND SCHEDULE

ID	Item	Responsibility	Date	Status
ACTION 01	Digital Coding and Product Specs	ENVEO, CCRS, SYKE, EC, NR, FMI	1 Sep 2014Draft 1 Oct 2014 Final	This Document
ACTION 02	Protocols	ENVEO, CCRS, SYKE, EC, NR, FMI	1 Sep 2014Draft 1 Oct 2014 Final	
ACTION 03	Description of Products and Algorithms	SE ALL SWE	1 November 2014	
ACTION 04	Provision of Insitu Data	All Part. Products	15 Oct 2014	
ACTION 05	Landsat Scenes selected	USGS + SnowPEx Team	1 Oct 2014 (V1) 15 Dec 2014 (V2)	
ACTION 06	Products for Validation (dates with insitu / LS) submitted to SnowPEx	SE ALL SWE ALL	15 Dec 2014 (V1) 15 Jan2015 (V2)	
ACTION 07	Products for Intercomparison submitted to SnowPEx	SE ALL	15 Nov 2014 (P1) 15 Feb 2015 (P2)	
ACTION 07	Products for Trend Analysis Intercomparison First Examples / tests of aggregating	Participating Products	15 March 2015	
ACTION 08	Date and Venue for ISSPI-2 WS (probably in Europe)	SnowPEx Team – coordinated with ISSPI Participants	15 February 2015	

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