Arctic Station White Paper

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Introduction

[make more formal, generic] In mid-November 2018 I went searching for a "master list" of balloon-based sounding reporting stations, so that I could match the coordinates and WMO number that someone emailed to me with a place name. I had no idea this was going to be as difficult and confusing as it has been, but once I could see that happening I decided to step back from my original plan and take a broader view. I figured I'd probably learn something that I, or some of my colleagues, could use down the road. I'm writing this to share some of the things I've learned. This[1] is meant to be readable and useful, but not publication quality.

In December 2018 Taneil Uttal asked me to start putting together a document of all the information I'd been gathering about stations and related matters. This is that document.

In my searching for station lists and station identifiers, I made use of my meteorological background knowledge and experience, and also of search engines such as Google and Yahoo, but I have not made use of personal contacts. Part of my interest is in what curious and knowledgeable people might be able to learn on their own, without having to rely on truly deep-insider information (e.g. from a person involved in numerical weather prediction or in data ingest).

Not exhaustive; balance overall mission with due diligence.

Station Identifier Systems

I've identified eight major station identifier systems, plus one internal identifier system used by a major data set. The *internal identifier* system is

- **IGRA2** (Integrated Global Radiosonde Archive Version 2) **Station Identifier**

  > "To accommodate stations other than those with world Meteorological Organization (WMO) station numbers, IGRA now uses 11-character station identifiers that consist of a two-character country code, a one-character station network code, and an eight-character station identifier. The station IDs for WMO stations, which account for approximately 80% of the IGRA 2 stations, contain a network code of "M" followed by "000" followed by the five-digit WMO identification number.... The remaining stations are identified by ship call signs (network code "V"), Weather Bureau, Army, Navy (WBAN) numbers ("W"), International Civil Aviation Organization call signs ("I"), and specially constructed identifiers ("X")."
  > (https://www1.ncdc.noaa.gov/pub/data/igra/igra2-readme.txt)

  More and related info at:

  > https://www1.ncdc.noaa.gov/pub/data/igra/igra2-list-format.txt
  >
  > Durre, I., R.S. Vose, and D.B. Wuertz, 2006: Overview of the Integrated Global Radiosonde Archive. J. Climate, 19, 53–68, https://doi.org/10.1175/JCLI3594.1

[1] This sentence is true for this document (name shown in footer). However, this paragraph was originally written for StationIdentifiers.Hartten_Nov2018.docx, dated 29 November 2018 at 12:07 MST.

Durre, I., X. Yin, R.S. Vose, S. Applequist, and J. Arnfield, 2018: Enhancing the Data Coverage in the Integrated Global Radiosonde Archive. J. Atmos. Oceanic Technol., 35, 1753–1770, https://doi.org/10.1175/JTECH-D-17-0223.1

Although this identifier appears to be intended for use internal to the IGRA2 data set, it will show up on at least some station listings obtained from web-based tools at NOAA/National Centers for Environmental Information (NCEI, formerly the National Climatic Data Center, the National Geophysical Data Center, and the National Oceanographic Data Center).

The *station identifier* systems are:

- **IATA** (International Air Transport Association)

  "a three-letter code designating many airports around the world, defined by the International Air Transport Association (IATA). The characters prominently displayed on baggage tags attached at airport check-in desks are an example of a way these codes are used. The assignment of these codes is governed by IATA Resolution 763, and it is administered by IATA headquarters in Montreal." (https://en.wikipedia.org/wiki/IATA_airport_code)

- **ICAO** (International Civil Aviation Organization)

  "The ICAO (/ˌaɪˌkeɪˈoʊ/, eye-KAY-oh) airport code or location indicator is a four-letter code designating aerodromes around the world. These codes, as defined by the International Civil Aviation Organization and published in ICAO Document 7910: Location Indicators, are used by air traffic control and airline operations such as flight planning. ICAO codes are also used to identify other aviation facilities such as weather stations, International Flight Service Stations or Area Control Centers, whether or not they are located at airports." (https://en.wikipedia.org/wiki/ICAO_airport_code)

  More and related info at:

  http://www.weathergraphics.com/identifiers/

- **IGRA2 Special UA**

  An 8-character station ID. "If none of the four standard station IDs was associated with the IGRA 2 station record, then a custom station ID was constructed from the source station ID. For example, ... chuan101 station 3671 was not associated with any of the four standard types of station identifiers; therefore, its IGRA 2 station ID was based on the chuan101 ID and took the form USXUAC03671." (Durre et al. 2018)

  More and related info at:

  https://www1.ncdc.noaa.gov/pub/data/igra/igra2-list-format.txt

  https://www1.ncdc.noaa.gov/pub/data/igra/igra2-readme.txt

- **MASLIB** (Master Station Library)

  "One system still used by both the Air Force and National Climatic Data Center is the Master Station Catalog or MASLIB code. This is a 6-digit numeric code that is essentially the same scheme as the WMO station identifier but adds an extra digit, allowing many more stations to be indexed. This extra digit is always "0" when

referencing an actual WMO station using the 5-digit identifier, but may be 1..9 to reference other stations that exist in the vicinity. The MASLIB identifiers are not generally recognized outside the United States."
(https://en.wikipedia.org/wiki/Location_identifier)

More and related info at:

http://www.weathergraphics.com/identifiers/

- **VOS** (Voluntary Observing Ship)

  "This is the international scheme, first developed almost 150 years ago, by which ships plying the various oceans and seas of the world are recruited for taking and transmitting meteorological observations."
  (https://www.wmo.int/pages/prog/amp/mmop/JCOMM/OPA/SOT/vos.html)

  More and related info at:

  http://sot.jcommops.org/vos/vos.html

  https://www.wmo.int/pages/prog/www/ois/pub47/pub47-home.htm

  http://sot.jcommops.org/vos/vosclim.html

  Fletcher, J., 2008: Meteorological observations from ships. Seaways, issue 4, p7-10. Published by The Nautical Institute, www.nautinst.org

- **WBAN** (Weather Bureau Army Navy)

  A 5-digit station ID.

  "WBAN numbers were the first major attempt at a coordinated station numbering scheme among several weather reporting authorities. Original participants in the WBAN number plans were the United States Weather Bureau, Air Force, Navy, and Army, and the Canadian Department of Transportation. Selected German and Korean stations in close cooperation with the US Weather Services are also included."
  (https://www.ncdc.noaa.gov/homr/reports/platforms)

  More and related info at:

  http://www.weathergraphics.com/identifiers/

- **WIGOS** (WMO Integrated Global Observing System)

  A four-part, hyphen-delimited, coded alphanumeric ID of the form

  n-nnnnn-nnnnn-x[xxxxxxxxxxxxxxx]

  where "n" is an integer, "x" is an alphanumeric character, and "[]" surround optional characters.

  "The only way to extend the number of and allow for the expected future growth in observing stations/networks [is] to terminate the use of 5-digit WMO station IDs and create a completely new methodology of assigning unique identifiers to observing platforms for international observational data exchange.... the WMO and its co-sponsored observing systems are transitioning to WIGOS [which] provides a common framework for all sources of observations (research, operational, public and private)

and provides: 1) a one-stop shop for all observing systems metadata (WIGOS Information Resource to include the OSCAR databases using the new system of identifiers), 2) identification of observing system gaps and/or observing system over-saturation due to overlapping observing systems operated by disparate entities within the same geographic location (WIGOS Rolling Review of Requirements (RRR)), and 3) better/known quality observations via the WIGOS Data Quality Monitoring System." (Reeves and Pauley 2019, https://ams.confex.com/ams/2019Annual/meetingapp.cgi/Paper/350539)

More and related info at:

https://wiswiki.wmo.int/tiki-print.php?page=WIGOS-Identifiers

- **WMO** (World Meteorological Organization)

  "The World Meteorological Organization uses a system of five-digit numeric station codes to represent synoptic weather stations. An example is 72295 for Los Angeles International Airport. The first number specifies the region: 0 to 1 for Europe, 2 to 3 for Russia, 4 for Asia, 5 for the Far East, 6 for Africa, 7 for North America, 8 for South America and Antarctica, and 9 for the Pacific. The remainder of the numbers are set at the regional and national level." (https://en.wikipedia.org/wiki/Location_identifier)

  More and related info at:

  http://www.wmo.int/pages/prog/www/ois/volume-a/StationIDs_Global_1509.pdf

  http://www.wmo.int/pages/prog/www/ois/volume-a/vola-home.htm

Country Codes

There are two different 2-letter country code systems being used by providers of station lists and data:

- **FIPS** (Federal Information Processing Standards) Country Codes

  Used by IGRA2, NOAA/Climate Prediction Center, and others.

  See

  https://en.wikipedia.org/wiki/List_of_FIPS_country_codes

- **ISO** (International Organization for Standardization) 3166 Country Codes

  Used by WMO and others.

  See

  https://www.iso.org/iso-3166-country-codes.html

Note that some of these codes are actually associated with islands rather than countries. I performed a quick analysis which showed that of the 326 two-letter combinations used by one or both systems, 60 (18%) are assigned to different countries by the two systems, while 183 (56%) are used by only one of the systems. There's a nice comparison chart at https://www.cia.gov/library/publications/the-world-factbook/appendix/print_appendixd.html TABLE 1 shows the FIPS and ISO codes for stations discussed later in this document.

TABLE 1. Country codes used in discussion of Year of Polar Prediction (YOPP) Arctic stations.

Code	FIPS Country	ISO Country
CA	Canada	Canada
FI	Finland	Finland
GL	Greenland	Greenland
IC	Iceland	n/a
IS	Israel	Iceland
NO	Norway	Norway
RS	Russia	Serbia
RU	n/a	Russian Federation (the)
SJ	n/a	Svalbard and Jan Mayen
SV	Svalbard	El Salvador
US	United States	United States of America (the)

Station Listings

I found several credible-seeming station listings, some of which include far more than upper-air sounding sites and one of which (OSCAR) can be restricted to specific upper-air sounding platforms (e.g. radiosonde vs. radiotheodolite vs. wind profiler):

- NOAA/NCEP/Climate Prediction Center's (**CPC**) Global Station Directory

  http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/prcp_temp_tables/library.txt

- NOAA/NCEI's Integrated Global Radiosonde Archive Version 2 (**IGRA2**) station list

  https://www1.ncdc.noaa.gov/pub/data/igra/igra2-station-list.txt

- WMO's searchable Observing Systems Capability Analysis & Review (**OSCAR**) Tool

  https://oscar.wmo.int/surface//index.html#/search/station

- Greg Thompson's surface station listing at UCAR/NCAR/Research Applications Laboratory (**RAP**)

  http://www.rap.ucar.edu/weather/surface/stations.txt

- Weather Graphics's (**WxGfx**) Master Location Identifier Database

http://www.weathergraphics.com/identifiers/

These employ a mix of station ID systems, country code systems, and country secondary (province/state/territory) systems, including no state/territory info at all. Initial spot checks indicated that if a station has a WMO number, all these listings include it, albeit sometimes in coded form or without the leading "0" used for many European stations. (The WxGfx listing in particular omits the leading "0".)

Stations in the Polar Regions

I have extracted all stations poleward of 60° (north and south latitudes) from the station lists above. For the OSCAR list, I searched only for 'Radiosonde'. I have put those listings into a set of Excel sheets using a common column layout (available upon request). I have done a station count (TABLE 2), but I have not tried to combine entries and I do not know how many unique stations are represented. **[note conversion to decimal degrees]**

TABLE 2. Stations poleward of 60°N and 60°S in various station listings.

Listing	# Stations	Notes
CPC	1704	probably includes surface sites
IGRA2	201	upper-air only, and long-term (not field campaigns) creation documented in Durre et al. (2006, 2018)
OSCAR	102	radiosonde only
RAP	523	surface sites, some of which launch balloons
WxGfx	3462	includes land surface, ships, buoys

Arctic Stations for the Year of Polar Prediction (YOPP): Identification

PSD's focus is on predominantly on Arctic rather than Antarctic science, and in particular the current focus is on activities connected to the Year of Polar Prediction (YOPP). TABLE 3 lists Arctic locations that are the focus of YOPPsiteMIP, the YOPP super-site Model Intercomparison Project. Many of these sites have been part of the International Arctic Systems for Observing the Atmosphere (IASOA), a multinational collaborative effort to collect and make available comprehensive high-quality Arctic observations. These observations typically include radiosonde data collection over a relatively long period of time. Sometimes the comprehensiveness of the observations has been accomplished through partnership with a nearby "supplemental" site. A map of the stations, using YOPP positions from TABLE 3, is shown in **Error! Reference source not found.**.

TABLE 3. Arctic locations for which YOPPsiteMIP is requesting model output and observations.

First three columns excerpted from Svensson et al. ("YOPP_Supersite_common_model_output_rev3.docx", January 2019 draft, Table 1). Fourth column is from the IASOA website (https://www.esrl.noaa.gov/psd/iasoa/obs_tour, accessed 4 Feb 2019). The distance between the YOPP and IASOA station longitudes is calculated at the nearest integer latitude using the WGS-84 geoid.

YOPP Super-site [supplemental site] *Filename*	**YOPP Latitude, Longitude**	**YOPP Elevation**	**IASOA Latitude, Longitude**	**|ΔLongitude|**
		Arctic Sites		
Utqiaġvik[2] (Alaska) *barrow*	71.32°N, 156.62°W	8–20 m	71.325°N, 156.625°W	0.18 km
Oliktok Point (Alaska) *oliktok*	70.50°N, 149.89°W	2–6 m	70.49525°N, 149.88688°W	0.11 km
White Horse (Canada) *whitehorse*	60.71°N, 135.07°W	682 m		
Eureka (Canada) *eureka*	80.08°N, 86.42°W	0–610 m	80.083°N, 86.417°W	0.06 km
Iqaluit (Canada) *iqaluit*	63.74°N, 68.51°W	5–11 m		
Alert (Canada) *alert*	82.49°N, 62.51°W	8–210 m	82.492°N, 62.508°W	0.03 km
Summit (Greenland) *summit*	72.58°N, 38.48°W	3210–3250 m	72.58°N, 38.48°W	0.00 km
Ny–Ålesund (Svalbard) [Zeppelin Mountain[3]] *nyalesund*	78.92°N, 11.53°E [78.9°N, 11.88°E]	0–30 m [473 m]	78.926°N, 11.53°E [78.9°N, 11.883°E]	0.00 km 0.06 km
Sodankylä (Finland) [Pallas] *sodankyla*	67.37°N, 26.63°E [67.97°N, 24.12°E]	198 m [305 m]	67.368°N, 26.633°E [67.967°N, 24.117°E]	0.29 km 0.13 km
Tiksi (Russia) *tiksi*	71.60°N, 128.89°E	1–30 m	71.596°N, 128.889°E	0.03 km
Cherskii (Russia) [Pleistocene Park[4]] *cherskii*	68.73°N, 161.38°E [68.51°N, 161.53°E]	8 m [16 m]	68.733°N, 161.383°E [68.51351°N, 161.53115°E]	0.12 km 0.05 km
Ice Base Cape Baranova (Russia) *baranova*	79.3°N, 101.7°E	24 m		

[2] Throughout the 20th century and until December 2016, the City of Utqiaġvik (pronounced xx) was called "Barrow" in government and meteorological records (see https://en.wikipedia.org/wiki/Utqiagvik,_Alaska

[3] Svensson et al. refers to this as "Zeppelin station"; "Zeppelin Mountain" is the location of what some sources refer to as "Zeppelin Observatory".

[4] Svensson et al. do not give this a name, but the IASOA page (https://www.esrl.noaa.gov/psd/iasoa/stations/cherskii) provides more information.

	Ocean Sites	
SHEBA[5] location *sheba*	76°N, 165°W	Sea level
Arctic Ocean *ao1*	85°N, 10°E	Sea level
Arctic Ocean *ao2*	90°N, 0°E	Sea level
Arctic Ocean *ao3*	81°N, 135°W	Sea level

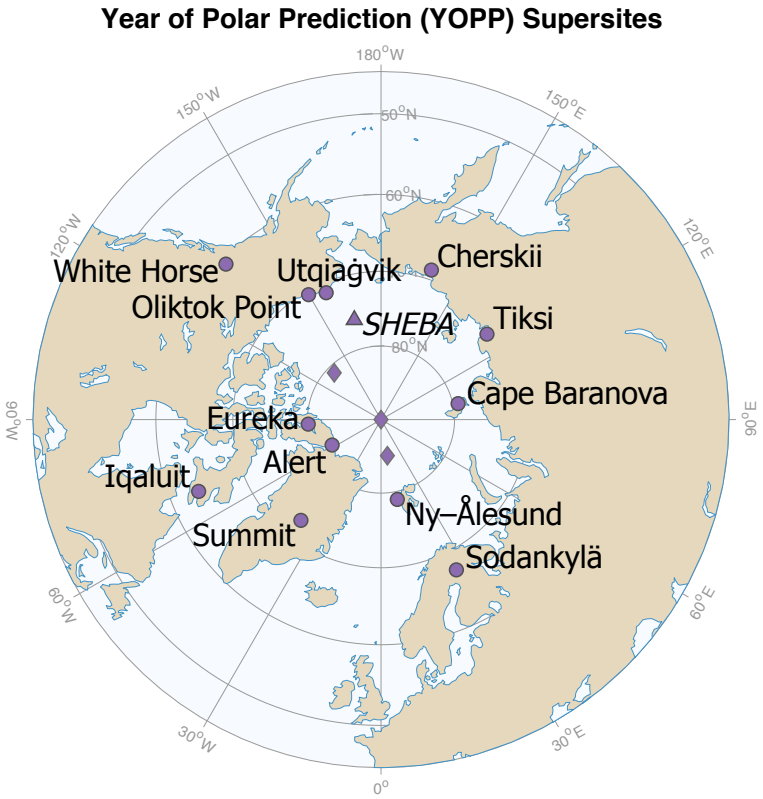

Figure 1. Primary Arctic YOPPsiteMIP locations.

Land stations are indicated by circles, ships by triangles, and other points of interest by unlabelled diamonds.

Geographical location would seem to be rather fundamental metadata, yet as TABLE 3 shows in early 2019 there were discrepancies between the information disseminated about these stations by YOPP and IASOA. While some users might find the differences in position to be insignificant for their work, the lack of consistency could be troubling to others. I have therefore searched "poleward of 60°" subsets from the five station listings identified above for entries related to the stations listed in TABLE 3. The process ended up being as follows,

[5] Surface HEat Budget of the Arctic Ocean; c.f. Uttal et al. (2002)

although the order sometimes varied after the first step and iteration was occasionally involved:

- Search all lists for the station name, or for a portion of it likely to turn up in files which did not have possibly variable spacing (e.g. “Horse” instead of “White Horse” or “Whitehorse”) or characters beyond the basic Latin alphabet (e.g. “lesund” instead of “Ny–Ålesund”).
- If multiple station identifiers appeared in one or more lists, and their location was near the locations in in TABLE 3, search all other lists for that station identifier.
- If the station was not located in one or more lists, search the list(s) using available alternate metadata: WMO number, WBAN number, ICAO identifier, latitude and longitude, etc. Searches based on latitude and longitude were done visually in a table sorted by those parameters.

Results are presented in the following subsections and tables. The tables do not include search steps which yielded null results. For ease of printing, the tables are all grouped together after the discussion. There are a few characteristics of the station lists to be aware of ahead of time:

- The original CPC listing gives longitudes as positive numbers; longitudes greater than 180° should have 360° subtracted to yield negative (i.e. “°W”) values.
- CPC and IGRA2 listings often put the code for the Canadian province/territory in the station name field, although they put U.S. state codes in a separate secondary country code field.
- All OSCAR entries have WIGOS IDs; only OSCAR entries have WIGOS IDs.
- The WxGfx listing is in the form of a *.csv file. The spreadsheet from which it was created appears to have treated WMO numbers as numbers rather than as text, since the leading “0” present in many WMO numbers from Europe is missing.

[check every original WxGfx listing; does another metadata field hold useful station info?]

Utqiaġvik (formerly Barrow)

Searching for “Barrow” (TABLE 4) yielded six results from the five listings, encompassing two WMO numbers. Subsequent searches on those two IDs completed the inventory. **[check by lat/lon - no others?]** All listings except WxGfx contain an explicitly labelled “Barrow” site that is presumably the United States’ National Weather Service (NWS) station (WMO number 70026), although none explicitly identify it as such. The WxGfx listing contains a 70026 site identified with the full airport name and no city. The RAP and WxGfx listings also have the Atmospheric Radiation Measurement (ARM) program’s North Slope of Alaska (NSA) Barrow station (WMO number 70027), each explicitly giving at least some of that textual information including “Barrow”, while IGRA2 associates that WMO number with the name of Sandia National Laboratory and no town. No listings included what has been the city’s name since December 2016, Utqiaġvik (English: /ˌʊtkiˈɑːvɪk/ UUT-kee-AH-vik). Some listings additional station identifier codes for the 70026 site. **[do searches on them turn up new info?]**

Position information is highly variable. Latitudes and longitudes for each station match one another to the nearest 0.1°. However, none of the longitudes listed for the Barrow NWS are within ±0.10° of the YOPP position (TABLE 3). Elevations for station 70026 vary from 4 to 14.9 m, and for 70027 from 7 to 11 m; both contain values lower than the YOPP range.

Oliktok Point

Only the RAP station list has an entry for "Oliktok" (TABLE 5); fortunately the entry includes a WMO number that matches records in two other lists. The CPC listing for WMO number 70063 is for a site named "Ouiktok". Internet searches for this name using Bing, Google, and Yahoo reveal no instances of this work outside a handful of station listings bearing a striking resemblance to the CPC listing, indicating that this was probably never actually the name of a place but is a typographic error that has propagated through portions of the weather and climate community (including NCAR's CISL Research Data Archive, the IRI/LDEO Climate Data Library, the Deutscher Wetterdienst, and a few university departments). The WxGfx listing for 70063 names the station "DEW" (a Distant Early Warning Line site), which is true but not helpful in isolation. **[how many others listed?]**. The WxGfx listing includes a WBAN listing, which could be helpful in some contexts, and the RAP listing includes both the ICAO and IATA listings. Unfortunately the RAP inclusion of OLI for this station is incorrect, as that IATA code is assigned to a different Arctic station: Rif Airport near Ólafsvík, Iceland (https://en.wikipedia.org/wiki/List_of_airports_by_IATA_code:_O#OL). WxGfx lists this station as "Airport", with its correct ICAO code; this entry is included in the table as an example of a reasonable search of polar stations that yields an incorrect result.

Regarding position information, the CPC longitude coding sytem fails, giving +149.88 (i.e. 149.88°E instead of 149.88°W). The longitudes listed by RAP and WxGfx, as well as all latitudes, are within ±0.10° of the YOPP Supersite values and the elevations are all within the specified range.

White Horse

TABLE 6 demonstrates why search terms must be carefully chosen; a search for "White Horse" would have come up empty, since all the listings which contained the station name had it as a single word. Again, the search for using the station name (or in this case only a portion of it) yielded two different WMI IDs associated with very similar locations: 71773 and 71964. The latter appears to be the main station; it appears in four lists associated with the name "Whitehorse", and in WxGfx as a WSO (which may indicate "Weather Service Office"). Note that the RAP station name is truncated, containing "AIRPO" instead of what is presumably "AIRPORT" since it also lists ICAO and IATA codes. Only CPC and WxGfx list the 71773 site.

CPC's longitude coding scheme failed again with this site, yielding a value in the eastern rather than western hemisphere. All other positions are within ±0.10° of the YOPP value, and neither CPC nor WxGfx give the same coordinates for the two different WMO numbers. The elevations for both WMO numbers are very similar, and more than 20 m higher than the YOPP Supersite elevation.

Eureka

Searching through lists for this station yields rather confusing results (TABLE 7). CPC lists two different WMO numbers from Canada, 71917 associated with "Eureka" and 71613

associated with “Eureka Climate”. IGRA2 and OSCAR also list the 71917 WMO number; RAP does too, and associates it with ICAO code CWEU. However, RAP also lists a second station with no WMO number and ICAO code CYEU, as well as a third Eureka in Alaska with no WMO number. WxGfx has two station listings associated with WCEU, one of which has a MASLAB number which when decoded corresponds to WMO number 71917. It also lists a third station in the same area with ICAO call letters CYEU. Why there are two ICAO listings so close together is unclear from the information in the listings **[check WxGfx]**. In addition, the only “C” codes in the ICAO system start with “CY” or “CZ”! (https://en.wikipedia.org/wiki/List_of_airports_by_ICAO_code:_C#CY_CZ_-_Canada)

Eureka is another site for which CPC longitude coding fails. All other longitudes from the listings are outside ±0.10° of the YOPP Supersite value, although all latitudes are within that envelope. Interestingly enough, the two listings for CYEU have altitudes of ~80 m, while all the other listings are at ~10 m. Both values are within the more than 600 m range in the YOPP Supersite table.

Iqaluit

A search for Iqaluit (/iˈkæluɪt/ ee-KAL-oo-it; https://en.wikipedia.org/wiki/Iqaluit, accessed 7 February 2019) returns results from all but WxGfx. As at Eureka there are two WMO numbers (TABLE 8), one designated “Climate”, as well as confusion. CPC has one record for each; it associates 71909 with ICAO code CYFB and 71321 with the “Climate” label. (The 71909 entry also indicates Iqualuit is in Canda’s Northwest Territories, while the 71321 entry correctly reflects the fact that since 1999 it has been within Nunavut Territory.) RAP also has two entries; that for 71321 puts “(CYFB)” in the station name, while the “Iqaluit Climate” entry has no WMO number and ICAO code CXFB, which as noted early starts with the non-existent “CX”. Searching for 71909 yields another RAP entry as well as four in WxGfx. The station name in the RAP entry, which is associated with both 71909 and CYFB, combines a truncated form of both the pre-1987 location name (Frobisher Bay) and the current name. The WxGfx entries are all for 71909 and CYFB, but include two different WBAN numbers and generally unhelpful station names, one of which is “Climate”.

CPC longitude coding again fails to put the station in the western hemisphere. Otherwise, all latitudes and longitudes are within a ±0.10° envelope of the YOPP Supersite values. However, all elevations are well outside the YOPP Supersite listing’s.

Alert

As seen in TABLE 9, searching for “Alert” brings up two WMO numbers which are inconsistently associated with an airport (identified by 3 different ICAO codes) and a climate site. Again the CPC entry for an apparent airport site (71082, with impossible ICAO code CWLT) puts the former territory in the station name field while the climate site (71355) uses an abbreviation for Nunavut. IGRA2 and OSCAR have just one entry each, for 71082, while RAP has 3: for 71082, like CPC’s entry associated with CWLT; for 71355, associated with ICAO code CZLT; and a station identified as the Alert airport with ICAO code CYLT. Searching for 71082 brings up six entries in WxGfx, all associated with CYLT as well as WBAN number 18601. The given station names are generic; interestingly enough, one is “Climate Site”.

Here, too, CPC longitude coding has failed. All latitudes are within ±0.10° of the YOPP Supersite table, and all longitudes outside that envelope. Elevations are generally ~30, ~65, or ~90 m; the YOPP table gives a range of 8–210 m.

Summit

TABLE 10 shows the results of searching for "Summit" among polar stations. If we recall that the WxGfx listing incorrectly drops the leading "0" on some European WMO numbers, we see that four distinct WMO numbers were found across three lists. An Alaska station is in the CPC (WMO 70264) and IGRA2 (WBAN 26414) lists; with the prior knowledge that YOPP is interested in Summit site in Greenland, this can be discounted. CPC has "Summit" with WMO 04416; IGRA2 and WxGfx have "Geosummit" with WMO 04417, and WxGfx also has "Summit-us" with WMO 04418. Further searching finds an unnamed site in WxGfx with the equivalent of WMO 04416.

In terms of position, CPC's incorrect longitude coding puts the station in the Barents Sea. Apart from that, the listed latitudes and longitudes are similar to each other and within a ±0.10° envelope of the YOPP list. None of the elevations is within the range from the YOPP table, but the differences are no more than 12 m.

Ny–Ålesund and the Zeppelin Station

Since many of these listings appear to have roots in flat ASCII text files, the initial search for this station is used "lesund". This yielded three different WMO numbers across four of the lists (TABLE 11). CPC and RAP both have a Norwegian site called "Alesund/Vigra" (WMO number 01210, ICAO code ENAL) which is about 15° south and 6° west of the YOPP listing. In the light of that prior knowledge this can be ruled out. All the listings except WxGfx have a station "Ny-Alesund II" (WMO 01004 and, according to RAP, ICAO code ENAS); IGRA2 lists this under the Svalbard "country code" rather than under Norway. CPC also lists "Ny_Alesund" (WMO 01007). Searching on WMO numbers finds a WxGfx record for a lighthouse with WMO number [0]1004 and ICAO code ENAS, while a manual search near the YOPP table's latitude and longitude reveals an unnamed station in WxGfx with WMO number [0]1007. **[need to understand N-A vs. N-A II]**

The locations for the 01004 and 01007 stations are quite similar to each other. The latitudes are well within a ±0.10° envelope of the YOPP table values, but the longitudes are all about 0.4° further east. **[awaiting Braathen 1990 for good info on Zeppelin Mountain station, then compare w/ tables] [need to check OSCAR for non-sonde sites near here]**

Sodankylä and Pallas

The search for the primary site was again conducted by restricting the search term to the basic Latin alphabet. That initial search returned three different WMO numbers from the CPC listing (TABLE 12), one of which (02836) was also found in IGRA2, OSCAR, and RAP. In the IGRA2 and OSCAR listings, the station name for 02836 included text referring to an arctic research center; in the others, the station was associated with ICAO code EFSO. A search for this WMO number in WxGfx found an unnamed station associated with ICAO code EFSO and IATA code SOT. The other two WMO numbers that arose during the search of the CPC list, 02719 (Sodankyla Lokka) and 02816 (Sodankyla Vuotso) also appear in the WxGfx listing as unnamed stations. The positions of these two sites are similar in the two listings, both northeast of 02836 by 0.4°–0.7° latitude and 0.6°–1.1° longitude. The latitudes

and longitudes listed for station 02836 are variable, but all are within ±0.10° of the YOPP table. Elevations are relatively consistent within the listings for each WMO number, with the elevations for 02836 about 20 m lower than the value in the YOPP table. **[good to understand other 2 WMO #s]**

There is no "Pallas" in any of the station listings, but a manual search for stations near the location listed in the YOPP table yields two unnamed Finnish stations with WMO numbers in the WxGfx list (TABLE 13). The WMO numbers can, in turn, be located in the CPC listing. The latitudes for both sites are within ±0.10° of the YOPP table, while the longitudes are within that envelope for one site and outside it for the other. The listed elevations are 250 m higher than the YOPP table for the former site, and about 45 m higher than the YOPP table for the latter. **[follow up on station names + extra Pallas info]**

Tiksi

This station shows up by name in all listings (TABLE 14), always associated with either WMO number 21824 or ICAO code UEST. The station names in the WxGfx listing include additional information ("Airport" or "Polyarka Weather Station"). All lists have station locations within ≠0.10° of the YOPP table and elevations within a small portion of the 1–30 m range given in that table. **[follow-up on Polyarka vs. Tiksi]**

Cherskii and Pleistocene Park

Searching for records regarding this station highlights the difficulties in working with place names originally written in non-Latin alphabets. As TABLE 15 shows, searching for "Cherskii" or even "Chersky"[6] (the spelling used at Wikipedia) is futile. This station, with WMO number 25123, appears as "Cherskij"[6] in IGRA2 and OSCAR, as "Cerskij"[6] in the CPC listing, and without a name in WxGfx; the latter associates it with ICAO code UESS and IATA code CYX. The given locations are within ±0.10° of the YOPP table values. The elevation in the WxGfx record is a few meters lower than that in the YOPP table, while those in the other listings are 24 m higher.

Searches for "Pleistocene", "Park", and locations near 68.5°N, 161.5°N did not find any stations that could have been Pleistocene Park within these lists. **[need to check OSCAR for non-sonde sites near here]**

Ice Base Cape Baranova

A search for "Baranova" among the polar station listings yields nearly identical results, but only from CPC and WxGfx (TABLE 16). The positions, which differ slightly, are within ±0.10° of the YOPP table and the elevations within a meter of the table value.

Summary of Issues Related to Identifying Station Records

The implications of these results are that (1) searching for a station by only a city name may not yield the station(s) near that city, (2) searching for stations by state or territory may or may not be fruitful, depending on the listing, (3) station listings cannot necessarily be relied upon to have correct station position information, and (4) YOPPsiteMIP will have to make

[6] There are multiple reasonable ways to Romanize the name of this location (V. Zavorotny, 8 February 2019, personal communication).

decisions about what station name(s) to use and what station identifier(s) to associate with each station, and will have to carefully document the source of position information.

[what follows are specific notes to be organized topically and used to improve above paragraph]

- full airport name
- Ouiktok
- reasonable search of polar stations that yields an incorrect result
- search for “White Horse” would have come up empty
- “AIRPO” instead of what is presumably “AIRPORT” since it also lists ICAO and IATA codes
- MASLAB number which when decoded corresponds to WMO number 71917
- truncated form pre-1987 location name (Frobisher Bay)
- In the light of that prior knowledge this can be ruled out.
- Ny-Alesund, Ny_Alesund
- Svalbard “country code” rather than under Norway
- 02719 (Sodankyla Lokka) and 02816 (Sodankyla Vuotso)
- Polyarka (neighborhood?)
- working with place names originally written in non-Latin alphabets
- “Chersky” “Cherskij” “Cerskij”

TABLE 4. Utqiaġvik (formerly Barrow) station identifiers and metadata.

Station names are reproduced exactly as listed. "CC" is the country code reported or the ISO 3166 country code matching the reported country, and "CD" is the province/state/territory code reported when available. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Utqiaġvik at (71.32°N, 156.62°W) with elevation of 8–20 m.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Barrow"							
CPC	US		BARROW/POST-ROGERS	70026		PABR			71.3	-156.78	4
IGRA2	US	AK	BARROW/W. POST W. ROGERS	70026					71.2889	-156.7833	11.9
OSCAR	US		BARROW/W. POST W. ROGERS	70026				0-20000-0-70026	71.2889	-156.7833	12
RAP	US	AK	BARROW	70026		PABR	BRW		71.2833	-156.8	7
RAP	US	AK	[7]BARROW ARM-NSA	70027					71.3167	-156.6167	7
WxGfx	US		[7]Nsa Barrow Facility Barrow, Ak	70027					71.3233	-156.6158	8
				Search for "70026"							
WxGfx	US		Wiley Post-Will Rogers Memorial Airport	70026	27502	PABR	BRW		71.2849	-156.7686	14.9
				Search for "70027"							
IGRA2	US	AK	[7]SANDIA LAB. D	70027					71.317	-156.617	11

[7] The U.S. Department of Energy's Atmospheric Radiation Measurement (ARM) site in Utqiaġvik.

TABLE 5. Oliktok Point station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Oliktok Point at (70.50°N, 149.89°W) with elevation of 2–6 m. Rows with clearly irrelevant station results are lightly shaded; listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Oliktok"							
RAP	US	AK	OLIKTOK POINT	70063		POLI	OLI		70.5	-149.8833	5
				Search for "70063"							
CPC	US		OUIKTOK	70063					70.5	149.88	5
WxGfx	US		DEW[8]	70063	27403				70.5	-149.883	5
				Search for "OLI"							
WxGfx	IS		Airport			BIRF	OLI		64.9114	-23.8231	7.6

[8] A Distant Early Warning (DEW) Line site, ID = POW-2. **[need better reference(s) than https://en.wikipedia.org/wiki/List_of_DEW_Line_Sites & https://en.wikipedia.org/wiki/Distant_Early_Warning_Line & https://en.wikipedia.org/wiki/North_Warning_System#Oliktok]**

TABLE 6. White Horse station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has White Horse at (60.71°N, 135.07°W) with elevation of 682 m. Listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Horse"							
CPC	CA		WHITEHORSE AUTO, YT	71773					60.72	135.09	707
CPC	CA		WHITEHORSE A, YT	71964		CYXY			60.7	135.07	706
IGRA2	CA		WHITEHORSE UA	71964					60.7328	-135.0969	707
OSCAR	CA		WHITEHORSE UA, YT	71964				0-20001-0-71964	60.7328	-135.0969	707
RAP	CA	YT	WHITEHORSE AIRPO	71964		CYXY	YXY		60.7167	-135.0667	703
				Search for "71773"							
WxGfx	CA		<none>	71773					60.7331	-135.0978	707
				Search for "71964"							
WxGfx	CA		WSO	71964	26316	CYXY	YXY		60.7333	-135.0833	707

TABLE 7. Eureka station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Eureka at (80.08°N, 86.42°W) with elevation of 0–610 m. Rows with clearly irrelevant station results are lightly shaded; listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Eureka"							
CPC	CA		EUREKA CLIMATE	71613					79.98	85.94	10
CPC	CA		EUREKA, NU	71917		CWEU			79.98	85.93	10
IGRA2	CA		EUREKA UA	71917					79.9833	-85.9333	10.4
OSCAR	CA		EUREKA UA, NU	71917				0-20001-0-71917	79.9833	-85.9333	10
RAP	CA	NU	EUREKA	71917		CWEU			80.0	-85.9167	10
RAP	CA	NU	EUREKA			CYEU			80.0	-85.8167	78
RAP	US	AK	[9]EUREKA			PAZK	AZK		61.9333	-147.1667	1003
				Search for "CWEU"							
WxGfx	CA		Base		18801	CWEU			79.9833	-85.9333	10
WxGfx	CA		Base/Upper Air	[10]	18801	CWEU			79.9833	-85.9333	10
				Search for "CYEU"							
WxGfx	CA		Airport			CYEU	YEU		79.9945	-85.8119	82.9

[9] Appears to be Eureka Roadhouse, a census-designated place in the Matanuska-Susitna Borough (en.wikipedia.org/wiki/Eureka_Roadhouse,_Alaska)
[10] Included a MASLIB # = 719170, which would correspond to WMO number 71917

TABLE 8. Iqaluit station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Iqaluit at (63.74°N, 68.51°W) with elevation of 5–11 m. Listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Iqaluit"							
CPC	CA		IQALUIT CLIMATE, NU	71321					63.75	68.55	34
CPC	CA		IQALUIT N.W.T. (AU	71909		CYFB			63.75	68.55	34
IGRA2	CA		IQALUIT UA	71909					63.75	-68.55	21.9
OSCAR	CA		IQALUIT UA, NU	71909				0-20001-0-71909	63.75	-68.55	22
RAP	CA	NU	IQALUIT (CYFB)	71321					63.75	-68.55	34
RAP	CA	NU	IQALUIT CLIMATE			CXFB			63.75	-68.55	34
				Search for "71909"							
RAP	CA	NU	FROBISHER/IQALUI	71909		CYFB	YFB		63.75	-68.55	34
WxGfx	CA		Airport	71909	16617	CYFB	YFB		63.7566	-68.5561	33.5
WxGfx	CA		<none>	71909	16603	CYFB			63.75	-68.55	2
WxGfx	CA		Old Synoptic	71909	16617	CYFB	YFB		63.75	-68.55	34
WxGfx	CA		Climate	71909	16617	CYFB	YFB		63.7472	-68.5444	34

TABLE 9. Alert station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Alert at (82.49°N, 62.51°W) with elevation of 8–210 m. Listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Alert"							
CPC	CA		ALERT,N.W.T.	71082		CWLT			82.49	62.33	65
CPC	CA		ALERT CLIMATE, NU	71355					82.5	62.33	65
IGRA2	CA		ALERT UA	71082					82.5	-62.3333	65.4
OSCAR	CA		ALERT UA, NU	71082				0-20001-0-71082	82.5	-62.3333	65
RAP	CA	NU	ALERT	71082		CWLT	WLT		82.5	-62.3167	63
RAP	CA	NU	ALERT	71355		CZLT			82.5	-62.3333	65
RAP	CA	NU	ALERT AIRPORT			CYLT	YLT		82.5167	-62.2667	31
				Search for "71082"							
WxGfx	CA		Airfield	71082	18601	CYLT	YLT		82.5178	-62.2806	30
WxGfx	CA		Airfield/READAC	71082	18601	CYLT	YLT		82.5178	-62.2806	30
WxGfx	CA		Airfield|Proxy WMO	71082	18601	CYLT	YLT		82.5178	-62.2806	30
WxGfx	CA		Airfield	71082	18601	CYLT	YLT		82.5178	-62.2806	30.5
WxGfx	CA		Base	71082	18601	CYLT	YLT		82.5	-62.3667	92
WxGfx	CA		Climate Site	71082	18601	CYLT	YLT		82.5	-62.3333	65

TABLE 10. Summit station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Summit at (72.58°N, 38.48°W) with elevation of 3210–3250 m. Rows with clearly irrelevant station results are lightly shaded; listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Summit"							
CPC	GL		SUMMIT	04416					72.58	38.45	3202
CPC	US		SUMMIT (AMOS)	70264					63.33	149.13	734
IGRA2	GL		GEOSUMMIT	04417					72.5803	-38.4586	3255
IGRA2	US	AK	SUMMIT		26414				63.3333	-149.15	734
WxGfx	GL		Geosummit	4417					72.5803	-38.4586	3255
WxGfx	GL		Summit-us	4418					72.5794	-38.5053	3198
				Search for "04416" or "4416"							
WxGfx	GL		<none>	4416					72.5833	-38.4500	3202

TABLE 11. Ny–Ålesund station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Ny–Ålesund at (78.92°N, 11.53°E) with elevation of 0–30 m. Rows with clearly irrelevant station results are lightly shaded; listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "lesund"							
CPC	NO		NY_ALESUND	01007					78.92	11.93	8
CPC	NO		NY-ALESUND II	01004					78.92	11.93	8
CPC	NO		ALESUND/VIGRA	01210		ENAL			62.57	6.12	22
IGRA2	SV		NY-ALESUND II	01004					78.9233	11.9222	15.5
OSCAR	NO		NY-ALESUND II	01004				0-20001-0-01004	78.9233	11.9222	16
RAP	NO		NY-ALESUND II	01004		ENAS			78.9167	11.9167	8
RAP	NO		ALESUND/VIGRA	01210		ENAL			62.5667	6.1167	22
				Search for "01004" or "1004"							
WxGfx	SJ		Lighthouse	1004		ENAS			78.9278	11.8747	39.9
				Search for "~78.92°N, ~11.53°E"							
WxGfx	SJ		<none>	1007					78.9228	11.9331	8

TABLE 12. Sodankylä station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Sodankylä at (67.37°N, 26.63°E) with elevation of 198 m. Listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Sodankyl"							
CPC	FI		SODANKYLA LOKKA	02719					67.8	27.74	240
CPC	FI		SODANKYLA VUOTSO	02816					68.08	27.18	249
CPC	FI		SODANKYLA	02836		EFSO			67.37	26.65	179
IGRA2	FI		SODANKYLA ARCTIC RESEARCH CENT	02836					67.3667	26.6289	179
OSCAR	FI		SODANKYLA ARCTIC RESEARCH CENTRE	02836				0-20000-0-02836	67.3667	26.6289	179
RAP	FI		SODANKYLA	02836		EFSO			67.3667	26.6333	179
				Search for "02836" or "2836"							
WxGfx	FI		<none>	2836		EFSO	SOT		67.3967	26.6181	183.5
				Search for "02719" or "2719"							
WxGfx	FI		<none>	2719					67.8214	27.7464	240
				Search for "02816" or "2816"							
WxGfx	FI		<none>	2816					68.0842	27.1850	248

TABLE 13. Pallas station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Pallas at (67.97°N, 24.12°E) with elevation of 305 m. Listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "~67.97°N, ~24.12°E"							
WxGfx	FI		<none>	2821					67.9733	24.1158	565
WxGfx	FI		<none>	2824					67.9872	24.2428	347
				Search for "02821"							
CPC	FI		MUONIO SAMMALTUNTURI	02821					68.03	24.11	565
				Search for "02824"							
CPC	FI		KITTILA KENTTAROVA	02824					67.98	24.25	350

TABLE 14. Tiksi station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Tiksi at (71.60°N, 128.89°E) with elevation of 1–30 m. Listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Tiksi"							
CPC	RU		TIKSI	21824					71.58	128.91	8
IGRA2	RS		TIKSI	21824					71.5833	128.9167	6
OSCAR	RU		TIKSI	21824				0-20000-0-21824	71.5833	128.9167	6
RAP	RU		TIKSI			UEST			71.7	128.9	7
WxGfx	RU		Tiksi Airport			UEST	IKS		71.6956	128.9006	9.1
WxGfx	RU		Tiksi Airport			UEST	IKS		71.6833	128.9	11
WxGfx	RU		Tiksi Polyarka Weather Station	21824					71.5833	128.9167	6

TABLE 15. Cherskii station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Cherskii at (68.73°N, 161.38°E) with elevation of 8 m. Listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
				Search for "Cherski"							
IGRA2	RS		CHERSKIJ	25123					68.75	161.2833	32
OSCAR	RU		CHERSKIJ	25123				0-20000-0-25123	68.75	161.2833	32
				Search for "25123"							
CPC	RU		CERSKIJ	25123					68.8	161.28	32
WxGfx	RU		<none>	25123		UESS	CYX		68.7414	161.3397	4.6

TABLE 16. Ice Base Cape Baranova station identifiers and metadata.

Station names are reproduced exactly as listed. Underlined positions are, after rounding to the nearest 0.01°, outside ±0.10° of the YOPP Supersite listing (TABLE 3), which has Ice Base Cape Baranova at (79.3°N, 101.7°E) with elevation of 24 m. Listing errors that are likely to stymie typical searches are highlighted.

Listing	CC	CD	Station name	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)
			Search for "Baranova"								
CPC	RU		MYS[11] BARANOVA	20094					79.2800	101.6200	25
WxGfx	RU		Mys[11] Baranova	20094					79.2800	101.6219	24.2

[11] "Mys" is the Russian word for "Cape" (V. Zavorotny, 8 February 2019, personal communication).

The Arctic YOPP Supersites

A summary of the Arctic YOPP Supersites is shown in TABLE 17. yada yda yad

TABLE 17. Land- and ship-based YOPP Supersites and supplemental sites.

Green highlighting is used to mark conflicting or otherwise suspect information. Geospatial position are not included due to differences documented in Tables 3-16 and accompanying text.

YOPP Super-site [supplemental site]	WMO	WBAN	ICAO	IATA	WIGOS ID	Lat (deg)	Lon (deg)	Elev (m)	Data Source Notes
Utqiaġvik (Alaska)	70026	27502	PABR	BRW	0-20000-0-70026				in IGRA2 (ccyy–ccyy)
[ARM/NSA Barrow Facility]	[70027]				0-20000-0-70027				[not in IGRA2!]
Oliktok Point (Alaska)	70063		POLI		n/a, 23 Apr 2019				not in IGRA2!
White Horse (Canada)	71964	26316	CYXY	YXY	0-20001-0-71964				in IGRA2 (ccyy–ccyy)
Eureka (Canada)	71917	18801	CWEU /CYEU	YEU?	0-20001-0-71917				in IGRA2 (ccyy–ccyy)
Iqaluit (Canada)	71909	16617 /16603	CYFB	YFB	0-20001-0-71909				in IGRA2 (ccyy–ccyy)
Alert (Canada)	71082	18601	CYLT /CWLT	YLT /WLT	0-20001-0-71082				in IGRA2 (ccyy–ccyy)
Summit (Greenland)	04417 /04416				0-20001-0-04417 /0-20000-0-04416				in IGRA2 as 04417 (ccyy–ccyy)
Ny–Ålesund (Svalbard)	01004 /01007		ENAS		0-20001-0-01004 /0-20000-0-01007				in IGRA2 as 01004 (ccyy–ccyy)
[Zeppelin Mountain]					0-20008-0-ZEP				[not in IGRA2, but not expected]
Sodankylä (Finland)	02836		EFSO	SOT	0-20000-0-02836				in IGRA2 (ccyy–ccyy)
[Pallas]	[02821]				n/a, 23 Apr 2019				[not in IGRA2, but not expected]
Tiksi (Russia)	21824		UEST	IKS	0-20000-0-21824				in IGRA2 (ccyy–ccyy)

Cherskii (Russia)	25123		UESS	CYX	0-20000-0-25123				in IGRA2 (ccyy–ccyy)
[Pleistocene Park]					n/a, 23 Apr 2019				[not in IGRA2, but not expected]
Ice Base Cape Baranova (Russia)	20094				0-20000-0-20094				not in IGRA2!
Ice Station SHEBA, aka CCGS Des Groseilliers					n/a, 23 Apr 2019				not in IGRA2!

Key Takeaway Points

[just notes right now]

- station lists are hard to come by
- there are multiple station coding systems and country coding systems
- station lists are subject to typos (errors) as well as transliteration issues
- lat/lon/elev errors could be caused by
    - original measurements vs. current techniques
    - conversions between DDMMSS & decimal degrees
    - human error
    - instrument/building specific vs. site as a whole
    - true station changes

References

currently in-text