Report of the Task Team on the SOT Iridium Pilot Project

Chaired by:
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SOT-V Geneva, Switzerland
May 18-22, 2009

Tasks Assigned –

The Pilot Project was to evaluate the feasibility of Iridium technology on ships in terms of the following:

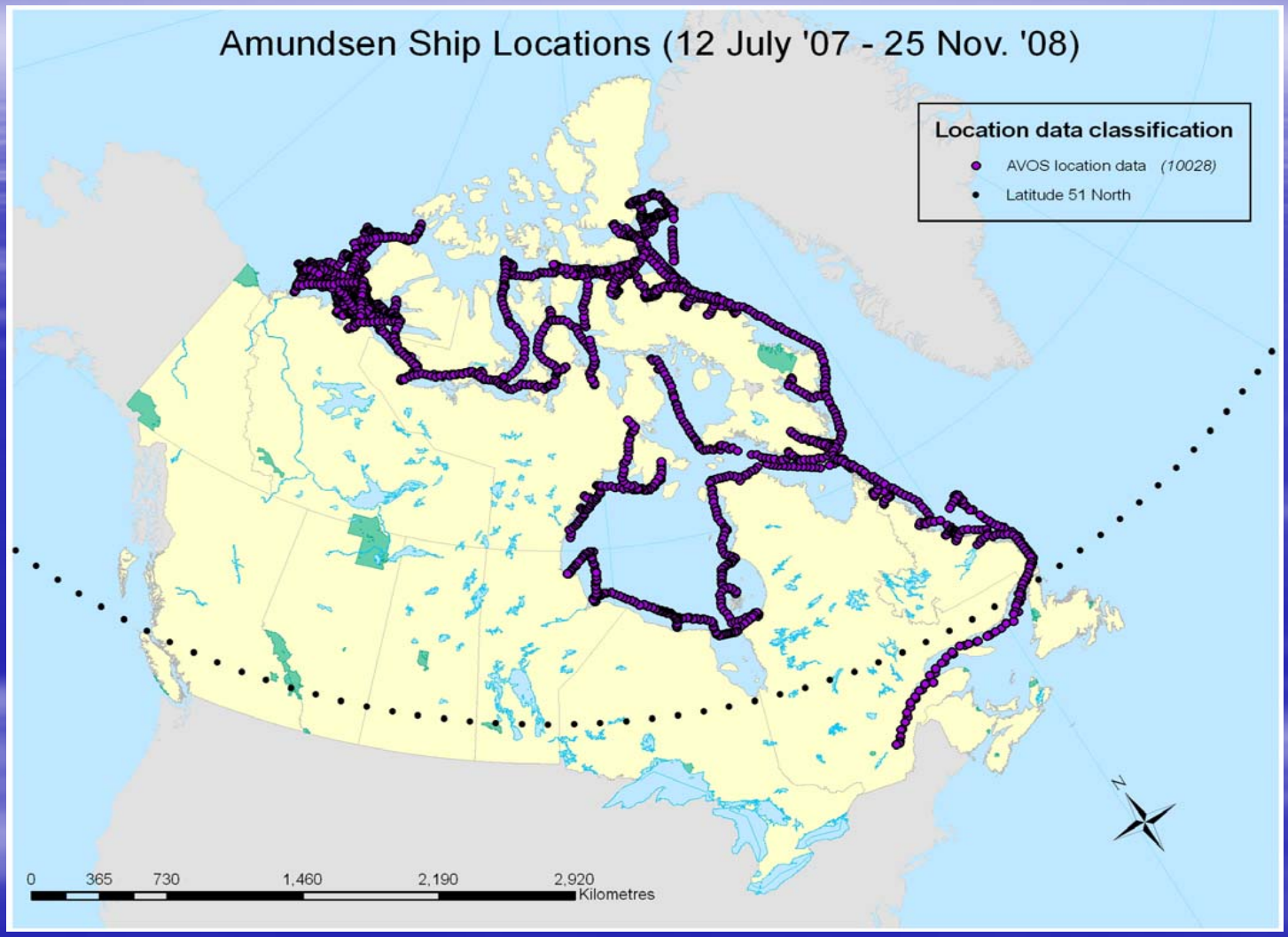
- Operating a global observing system
- Network reliability and survivability
- Data throughout in terms of quantity and timeliness
- Data management, especially data formatting and insertion on the GTS
- Collaboration with manufacturers to promote free availability of Iridium modems
- Overall cost effectiveness (manufacturing, transmission, data processing and life-time)

Background

- The Iridium Pilot Project was launched following SOT-IV meeting in Geneva in April 2007
- NMS' of Canada, France, and the United States have contributed to the pilot project
- Canadian contribution to the pilot project was to modify and implement an AVOS (automated ship observing system) using Iridium telemetry.

Summary of Environment Canada's Pilot Project

- There was significant interest in Canada in improving the communication from existing AVOS equipped ships operating in the Canadian Arctic.
- Existing INMARSAT system has operated very poorly in arctic waters.
- In the fall of 2007, a modified AVOS system using Iridium telemetry was installed on the Canadian Coast Guard (CCG) research vessel Amundsen.
- The Amundsen was selected as its intent was to travel to the Canadian arctic during the winter of 2007-2008 and remain frozen in the ice pack, gathering data in support of the International Polar Year project.
- The Amundsen transmitted approximately 10,000 observations in FM-13 format during that time period.



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Main Conclusions of Amundsen Pilot Project

- While the ship was north of 51 degrees, **90% of the expected observations were received. The remaining 10% data unavailability was mostly due to problems unrelated to the Iridium transmission. Therefore it was concluded that the Iridium transmission in the Canadian Arctic is near perfect.**

- Testing and verification of the software to receive FM13-SHIP messages via email at the Canadian Meteorological Centre (CMC) in Montreal was successful.

- The software was developed to parse FM13 message received as email attachment from Iridium service provider (Stratos).

- The Pilot project utilized an Iridium transmitter that demanded a SIM card (Sailor ST4120), this system had one significant failure due to vibrations on the icebreaker (SIM card was dislodged).....since then EC has gone with model 9601 with no SIM card.

- In addition, some minor improvements were made to the software.

Main Factors in moving to Iridium for the AVOS Network within Environment Canada

- Improved reliability in data sparse northern waters.
- Significant cost savings will be achieved, with initial retrofit costs realized in less than 3 years.
- SBD transmitters cost approx. one half of existing INMARSAT transmitters.
- Iridium removes requirement to process binary messages from INMARSAT.
- Environment Canada will have more control over end-to-end processing of AVOS data, which is an important issue for both Canadian Coast Guard and Commercial ships within Canada.
- Iridium supports 2-way communication, which will be a key aspect of next generation AVOS payload.

Next Steps – Important Changes to EC AVOS Network

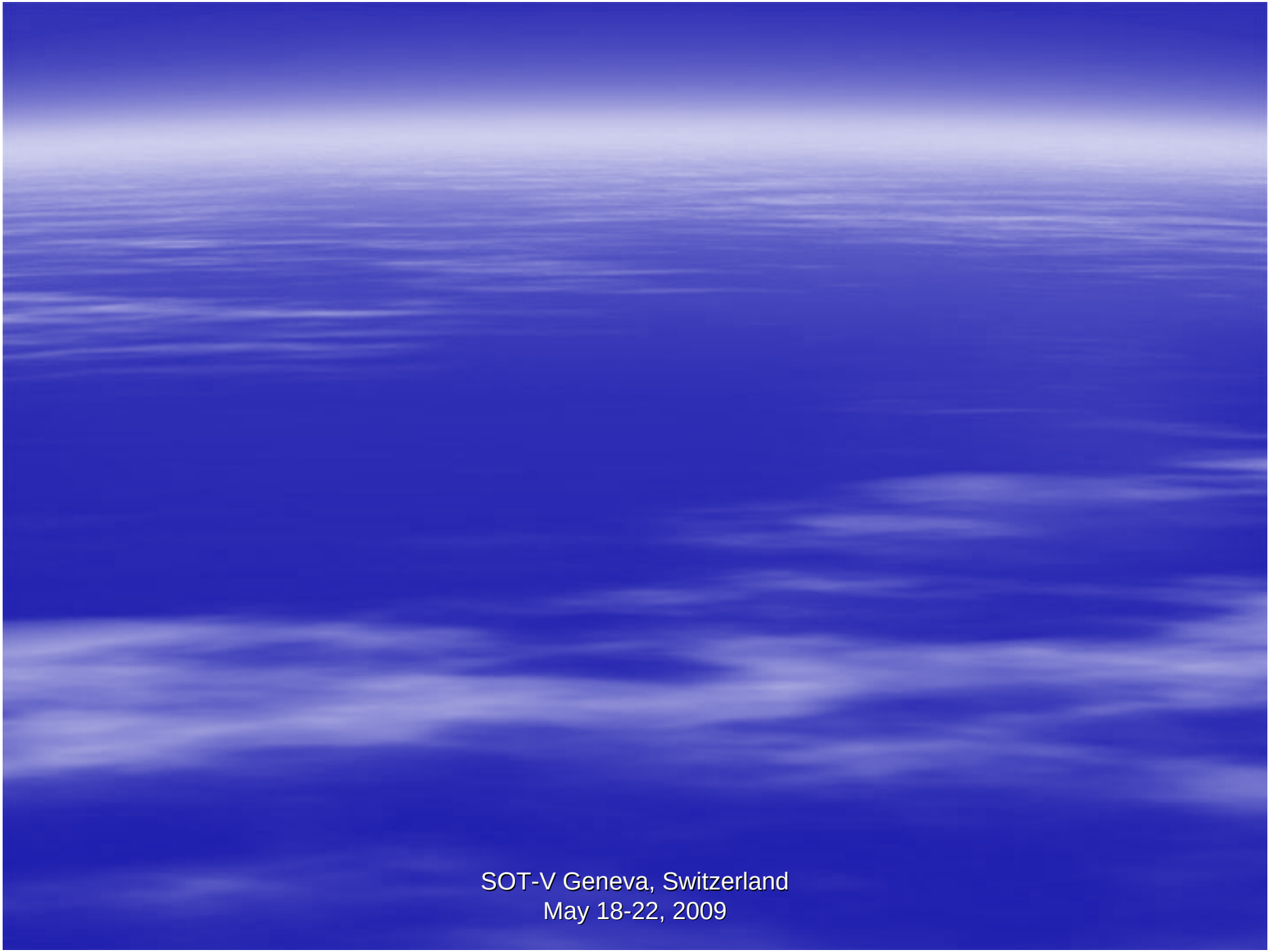
- Based on favorable results of AVOS Iridium pilot project, as well as telecommunication cost savings, Environment Canada is working to retrofit existing fleet of 47 AVOS's with Iridium transmitters.

- FM13 messages will be routed via email (eventually plan to move to IP solution), and processed by the Canadian Meteorological Centre (CMC). Messages will be routed to the GTS by CMC.

- Working to complete Iridium AVOS retrofits by the early 2011, after which time no Environment Canada AVOS messages will be routed via INMARSAT and NOAA.

- Iridium equipped AVOS **will transmit observations each hour regardless of position** (i.e. even in waters south of 51 degrees north).

- Please refer to "Iridium Pilot Project Report – Data Collection Performance and "Iridium Pilot Project Report – Position Data Accuracy" for more details on the pilot projects as well as cost estimates.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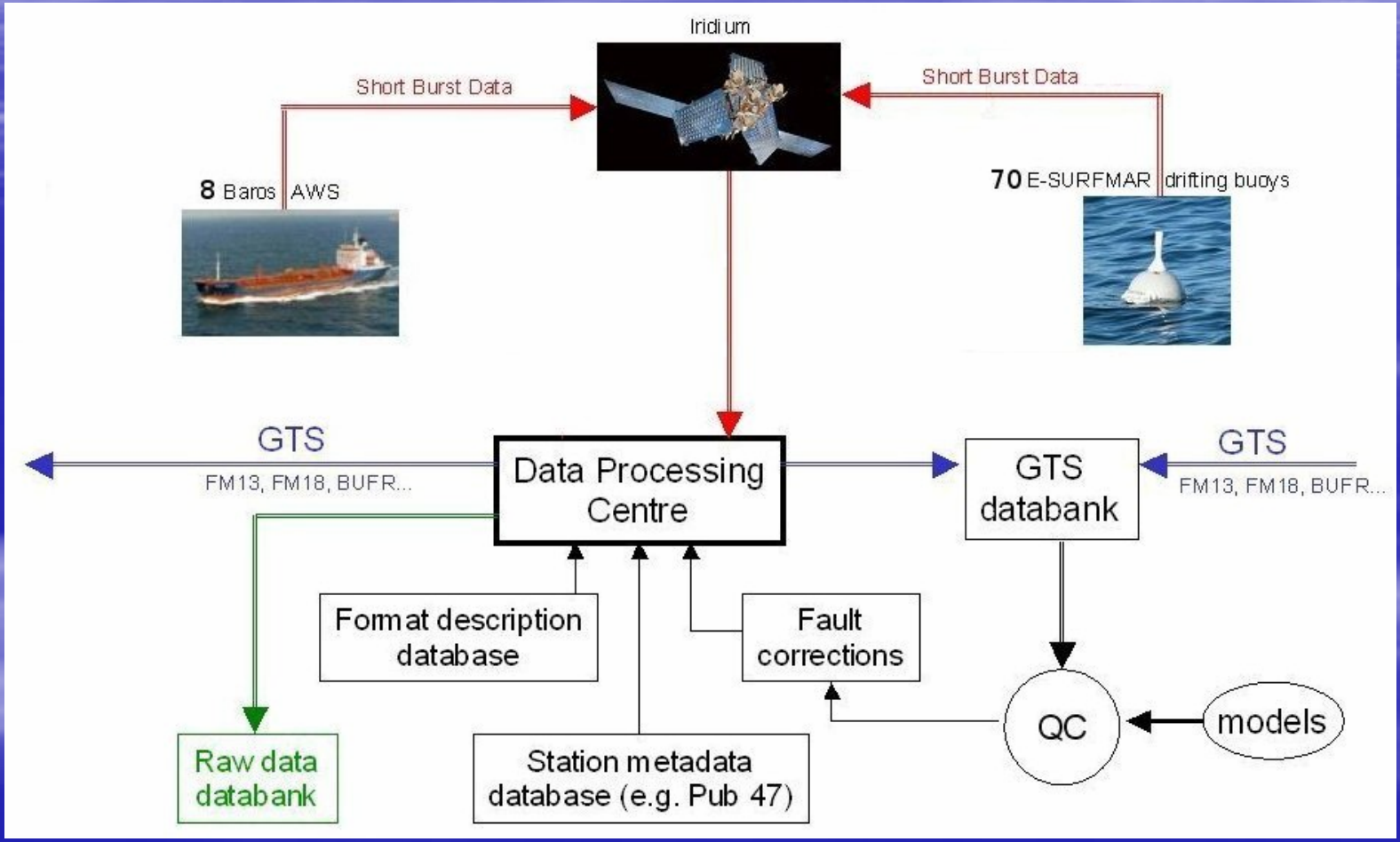
Use of Iridium SBD in E-SURFMAR

18th-22nd May 2009, Geneva

Pierre Blouch

E-SURFMAR Programme Manager

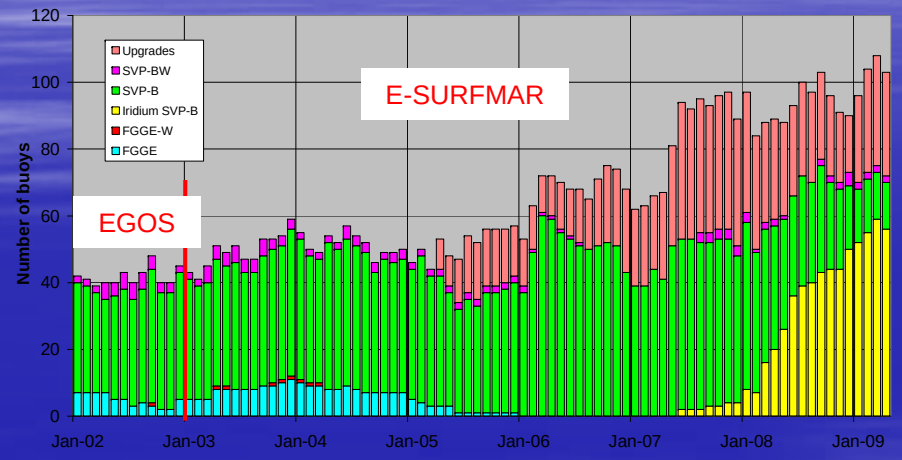
Data Flow


Iridium
Short Burst Data
Short Burst Data
8 Baros AWS
70 E-SURFMAR drifting buoys
GTS
FM13, FM18, BUFR...
Data Processing Centre
GTS databank
GTS
FM13, FM18, BUFR...
Format description database
Fault corrections
Raw data databank
Station metadata database (e.g. Pub 47)
QC
models

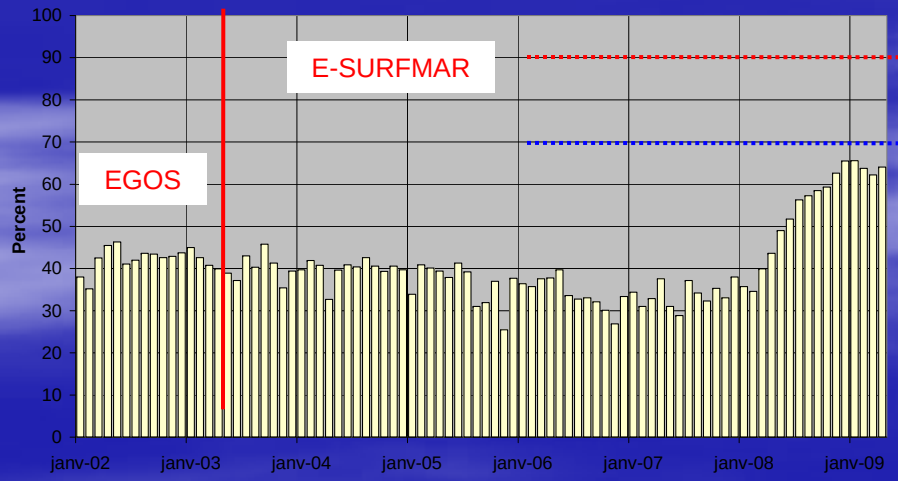
Features

- Platforms report raw binary data (not restricted to conventional parameters)
- Metadata and format templates are known by the processing centre
- Each parameter refers to a BUFR identifier if it exists => Makes easier the conversion to FM96-BUFR through shorter message lengths
- Baros AWS and E-SURFMAR drifting buoys messages are shorter than 30 bytes but may be extended up to 200 bytes (?)
- Bi-directional transmission is used by the Baros AWS: status request, barometer height setup,…
- Data availability and timeliness are excellent: 95% of reports sent onto the GTS within less than 10 minutes.
- Iridium SBD seems to be the cheapest but reliable system of the moment for the volume of data required by ship borne AWS and drifting buoys

Impact of Iridium on the timeliness of buoy reports



Number of operating buoys

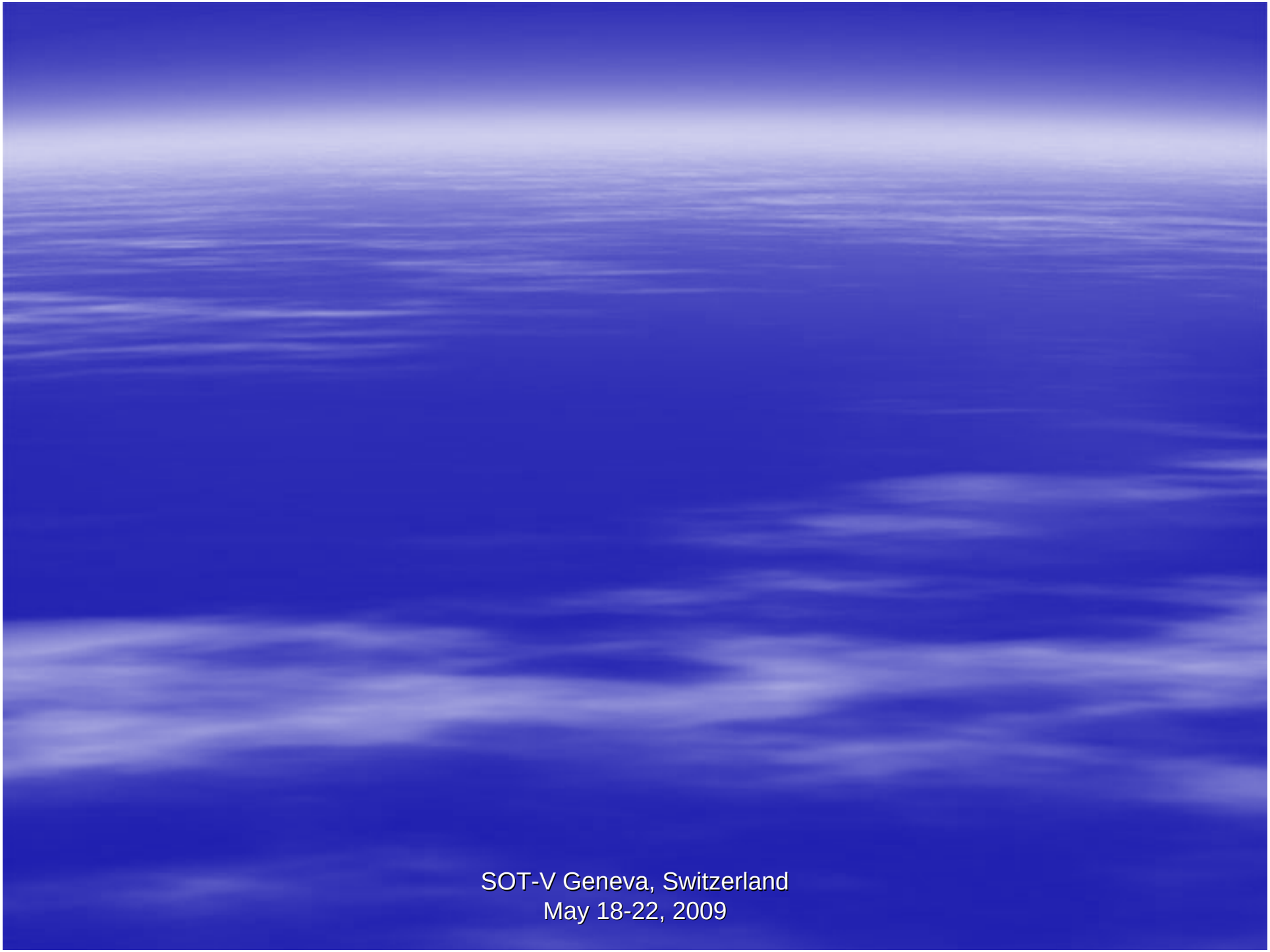


Long term target : 90%

Short term target : 70%

Percentage of reports sent onto the GTS less than 50 minutes after the observation


Questions ?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Summary of the NOAA/AOML – USA Iridium Trail
Provided by: Derrick Snowden

- NOAA/AOML has been experimenting with using Iridium telecommunications to transmit Ship of Opportunity data to shore
- This application differs as the typical XBT and TSG message size is much larger than the typical data buoy message or weather message
- The increased size necessitates using a different communications protocol
- The protocol that NOAA/AOML is experimenting with is the Direct Internet Connection protocol
- The Direct Internet Connection protocol is a dial-up internet connection similar to a terrestrial land line dial-up service in which connection to an Internet Service Provider is negotiated through a modem
- The Direct Connection protocol provides for larger data throughput, which allows for the transmission of XBT and TSG messages as attachment to email.

Summary of the NOAA/AOML – USA Iridium Trail

Telecommunication Costs

- Expected costs to transmit an XBT profile is approx 1.50 USD and is based entirely on the advertised throughput of the Iridium data system
- The actual cost, including taxes, overhead and monthly service fees, is between 2 and 5 USD – large variation due to difficulties in maintaining the connection during transmission of the large XBT file

Summary of the NOAA/AOML – USA Iridium Trail

LESSONS LEARNED – things that may help lessen the cost

- Configuring the data collection software to attempt transmission only when the signal strength is full
- Keeping the cable run between the Iridium modem and antenna as short as possible
- AOML built a weatherproof package with a 6” connecting low loss cable, and are researching future off-the-shelf options of an integrated modem /antenna package
- Power cycling of the Iridium modem at least once per day (digital timers used to automatically power cycle the systems)
- Ensuring that Windows auto update is off on any computer connected to an Iridium transmission system


Questions ?