



Using real-time data loggers & dashboards

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Agribio, Bundoora

26/08/2020



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Serviced Supply Chains

- Joint project:
 1. Temperature monitoring
 - QDAF – citrus and mangoes
 - AgVIC. – stone fruit and table grapes
 2. Decision Aid Tools
 3. Sustainable Solutions
- To increase value & profitability of Australian horticulture
- Improving freshness, taste and consistency
- Demonstrate the benefits of temperature monitoring
- Encourage industry to adopt new technology
- USB data loggers – protocol markets / insurance



Temperature loggers

SIM card

Emerson	Frigga	Sensitech	Tive
			
GO Real-time	B9 series	TempTale®	Solo 5G

Wireless RF + control unit
Xsense



HiTags™





Bluetooth
Verigo







Pod One-90

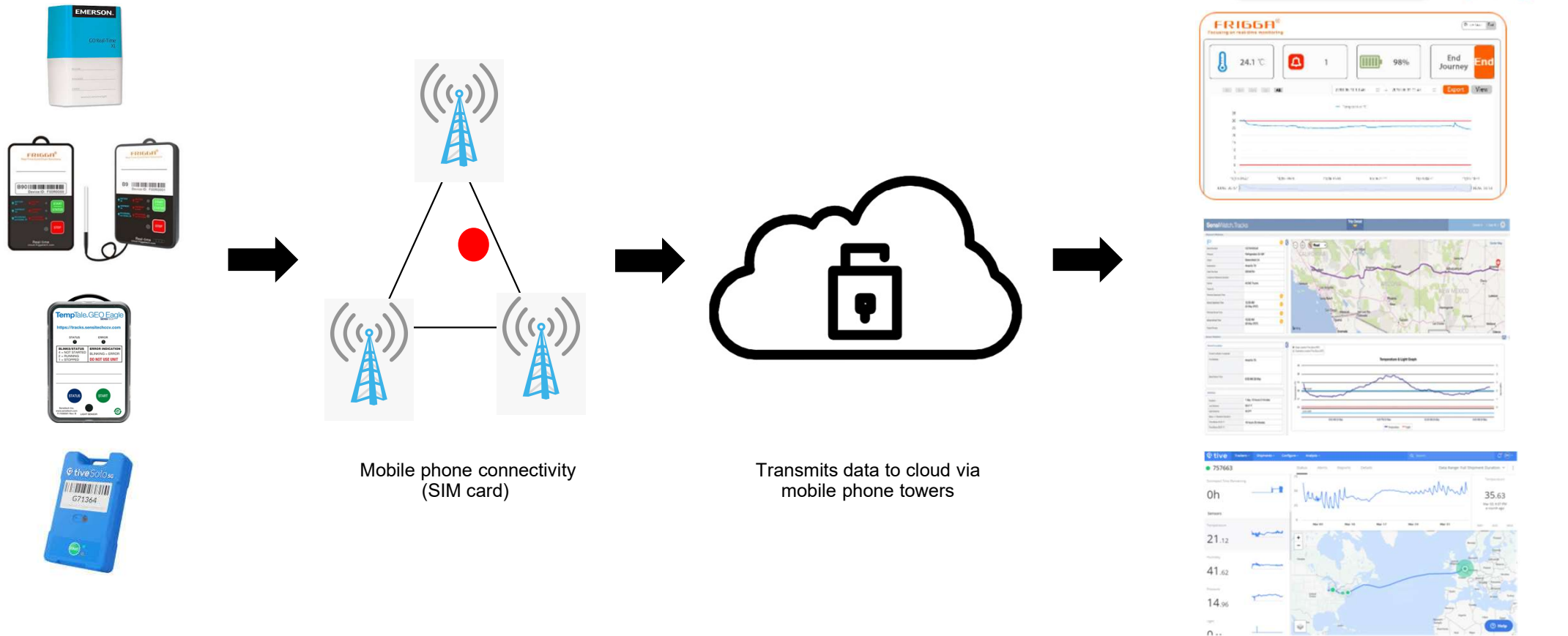
ALL – road, sea & air* (except Sensitech)

**Some restrictions*

	TECHNICAL SPECIFICATIONS			
				
Brand	Emerson	Frigga	Sensitech	Tive
Product	GO Real-time XL 2G/3G	B9 series	TempTale® GEO	Solo 5G
Dimensions - LWD (mm)	78 x 52 x 35	93 x 57 x 19	101 x 65 x 29	96 x 58 x 19.5
Weight (g)	155	100	139	100
Temperature	✓			
Location	✓			
Light	✓			
RH%	✓	✓		✓
Vibration / Shock		✓		✓
Motion				✓
Probe		1 or 15m cable		
Alerts - email / SMS*	✓			
* Additional charges				

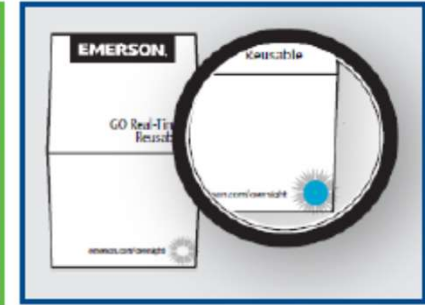
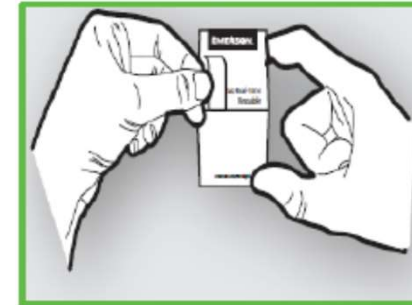
	TECHNICAL SPECIFICATIONS			
				
Battery life (days)	60			90
Cloud	Oversight	Frigga cloud	SensiWatch™	Tive cloud
Temperature range (°C)	-20 to 70	-20 to 70	-30 to 55	-20 to 60
Temperature accuracy (°C)	± 0.5 to 1.0	± 0.5 to 1.0	± 0.5 to 1.0	± 0.5
Sensing interval (minutes)	6	10 - 120	5 - 120	10 - 120
Data reporting interval (minutes)	60	20/30/60/120	15 - 480	?
Reporting	Excel, PDF, Word	Excel, CSV, PDF	Excel, PDF	CSV, PDF
Recycling	✓			

How do loggers work?



How to start loggers?

- Pull the white tab from the device or push green START button < 5 secs.
 - See LEDs flash
 - Hear beeping noises
- Start early (1-2 hours before deploying)
- Good mobile phone reception (open area)



Front of Housing
1. Status LED
2. Error LED
3. Status Button
4. Start Button
5. Light Sensor



After activating loggers

- Go to Logger home page and login
 - Enter serial # and additional code to activate logger
 - Create shipment and set up alerts
 - Email & SMS (additional charges)

The image shows two side-by-side screenshots. The left screenshot is the 'Create a Shipment' form in SensiWatch Tracks, featuring fields for Trip Template, Serial Number, Trip Name, Origin, Destination, and various optional fields like Planned Departure Time and Planned Arrival Time. The right screenshot shows the FRIGGA Pilot of Temperature Monitor interface, which includes a map of Africa and the Indian Ocean, a sidebar with navigation options (Overview, Devices, Device Setting, Reports, User Manage, Support), and a status bar at the bottom.

SensiWatch™

Create Shipment

From the Map view, click the Create Shipment button (1).



Enter Shipment Attributes

Manually type information into a free form field (3) or click a down arrow (4) to view a list of choices.

- *Serial No.:** Type the serial number (10 alphanumeric characters).
- *Program:** Click the down arrow to view and select a program. The program is the company that requested the monitor.
- *Product:** Click the down arrow to view and select a product.
- *Origin:** Click the down arrow to view and select an origin.
- *Destination:** Click the down arrow to view and select a destination.
- Order Number:** Optional.
- Customer Reference Number:** Optional field.
- Planned Departure Time:** Optional field.
- Planned Arrival Time:** Optional field.
- Carrier:** Click the down arrow to view and select a carrier. For carriers not listed, type in the carrier name, click the Add button.
- Trailer ID:** Optional field.
- Shipment Notes:** Optional field.
- Public:** No login required to view trip data.
- Private:** Login required to view trip data. *Private is the default setting.*
- Save:** Click the Save button.
- Exit:** Click the Exit icon to exit the Create Shipment view.

This screenshot shows the 'Create Shipment' form with numbered callouts (1-17) indicating specific fields and buttons. The form includes fields for Serial Number, Program, Product, Origin, Destination, Order Number, Customer Reference Number, Planned Departure Time, Planned Arrival Time, Carrier, Trailer ID, and Shipment Notes. It also features a 'Public/Private' toggle and a 'Save' button. The callouts correspond to the numbered list on the left.

Public / Private Option

The Public / Private option, if enabled, may only be set during the Create Shipment process.

Public - The Trip Detail may be viewed by entering the serial number into the Search field. No login is required.

Private - The Trip Detail may only be viewed if logged into SensiWatch Tracks.

* Indicates a required field.

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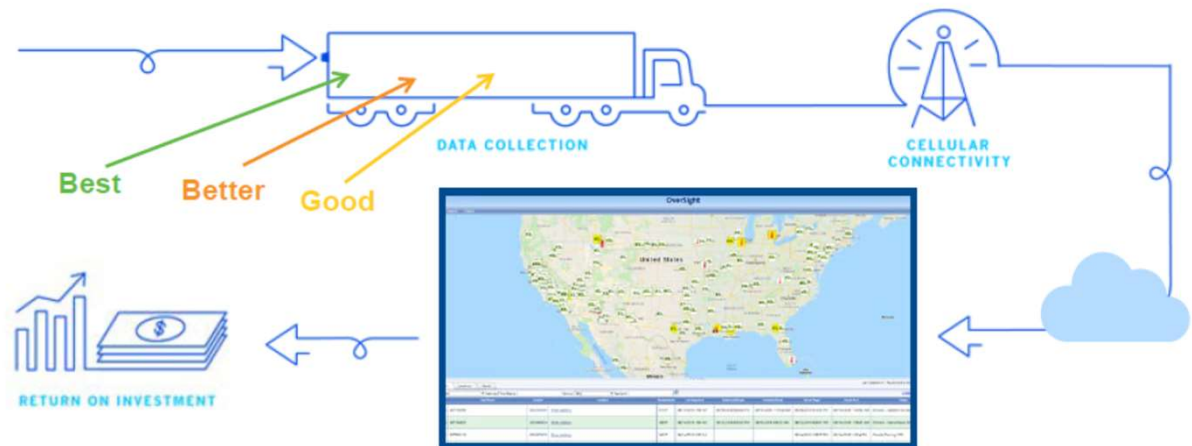
www.sensitech.com

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Where to place loggers?

- Place logger in/on top of the last pallet closest to the doors
- Not inside the carton or between pallets
- Not on wall or floor



Screen shot from Emerson Training Guide – GO Real-Time trackers, 2018

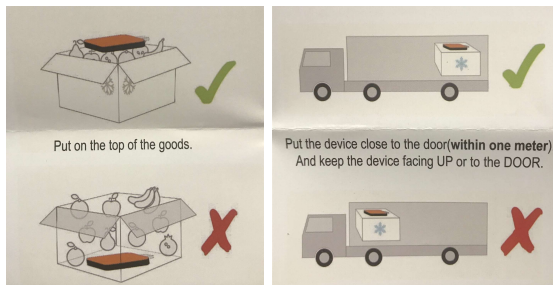


Image taken from Frigga instruction leaflet, 2020

Air freight



Airline approved		In discussions
AeroMexico	Emirates SkyCargo	Aer Lingus
AeroUnion	LATAM Airlines	Air Malta
Air Canada	Korean Airlines	American Airlines
Air New Zealand	Philippine Airlines	DHL
Air Tahiti	Polar Atlas	Iberia
Asiana Airlines	Singapore Airlines	Qantas
ANA Cargo	Swiss Airlines	
Avianca Airlines	Turkish Airlines	
British Airways	Vietnam Airlines	
Cargolux	Virgin Airlines	
Cathay Pacific	WOW Air	

List updated on 27th July 2020



Airline approved
Cathay Pacific
Korean Air
Malaysian Air
Qatar



Airline approved
Air NZ
Virgin Au

Flight mode

- Two independent methods of disabling transmission while in flight:



- Shipment definition – “Geo-fencing”

Stop 1

Location Name: ?
Select Location
Create New Location

Location Address: ?

Air Freight:
☐ Airport Arrival
☒ Airport Departure
 Contact Details

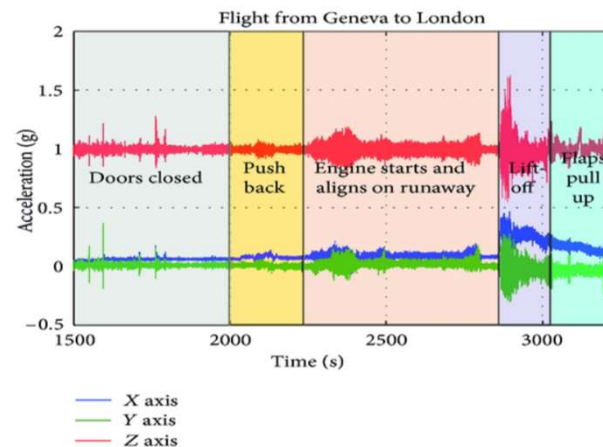
☒ Add stops (OPTIONAL)
 *Select/ Enter Destination Name? Enter/Select Location Address?

Select Arrival Date/Time?

Estimated Flight Minutes: Enter a Number
Estimated Flight Minutes Required

Estimated Loading Minutes: Enter a Number
Estimated Loading Minutes Required

- Accelerometer – Speed and height



FRIGGA®
Real Time Cold Chain Solutions

Set up your device | New cargo profile | My cargo profiles | En | Glenn Hale | Exit

Overview
Devices
Device Setting
Reports
User Manage
Support

Shipment | Alert Threshold | Summary

* Location Name: Melbourne airport

Refine Location: Please plot a location on the map

Alert E-mail: glenn.hale@agriculture.vic.gov.au

Location Alerts: +86 Mobile Phone number

Auto Flight Mode: ☒ Within 5 KM of the above position, the device enters the flight mode automatically.
After 24 hours, the device will quit flight mode automatically, if the device is not in the area.


In flight mode, the monitoring data can still be recorded and stored in the device, but the data is no longer uploaded and the alarm and location functions are suspended. After exiting the flight mode, all data will be reuploaded to the platform.

Summary

- Pros:
 1. Entire supply chain is more visible
 2. 'Real-time' monitoring
 3. Alert settings – temperature & location
 4. Full access to the data (T=0 mins.) & download sensor reports (24/7)
 5. Can be used for road, sea and air* transport
- Cons:
 1. Signal maybe compromised
 2. Air-freight – 'flight mode'
 3. Higher unit costs & minimum order
 4. Accidentally start
 5. Time to program them - dashboard
 6. Dashboards – data / information limited (< 6 months)
 7. Battery shelf-life ~ limited (< 6 months)


Sea-freight





Queensland Government

Department of Agriculture and Fisheries



Hello, Glenn Hale

Dashboard

Manage device

Manage shipment

Settings

Dashboard

10 records per page

Search all columns:

#	Shipment ID	Logger Brand	Logger position	Origin	Destination	Last record	Most recent location	Alert severity	View
1	SHP017	Frigga	Top	Melbourne	UK	2020-08-24 03:55:00	Victoria West Melbourne	✓	
2	SHP016	Frigga	Top	Melbourne	UK	2020-08-24 13:06:00	Victoria West Melbourne	✓	
3	SHP015	Tive	Middle	Miriwinni	Hong Kong	2020-08-24 13:18:45	2 Hampstead Road, Homebush West, New South Wales 2140, Australia	✓	
4	SHP014	Tive	Top	Miriwinni	Hong Kong	2020-08-24 13:14:27	87 The Crescent, Homebush West, New South Wales 2140, Australia	✓	
5	SHP013	Frigga	Bottom	Melbourne	Felixstowe, UK	2020-08-23 16:04:00	Western Australia Fremantle Ellen Street	✓	
6	SHP012	Frigga	Top	Melbourne	Felixstowe, UK	2020-08-23 17:07:00	Western Australia Mullaloo Meridian Drive	✓	
7	SHP011	Frigga	Top	Melbourne	Felixstowe, UK	2020-08-18 06:47:00	South West Singapore	✓	
8	SHP010	Frigga	Top	Melbourne	Laem Chabang, Thailand	2020-08-23 11:47:00		✓	
9	SHP008	Tive	Top	Bundaberg	Hong Kong	2020-08-13 17:43:10	926 Zengcha Road, Balyun Qu, Guangzhou Shi, Guangdong Sheng 510406, China	✓	
10	SHP007	Tive	Top	Bundaberg	Ho Chi Minh City	2020-07-30 16:30:06	Gateway Motorway, Sandgate, Queensland 4017, Australia	✓	

Showing 1 to 10 of 16 entries

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Hello, Glenn Hale

Dashboard

Manage device

Manage shipment

Settings

Shipment details

Edit Shipment

Shipment ID: SHP003

Shipment description: Container 3

Origin: Robinvale

Destination: Surabaya

Notes:

Location radius: 3 km

Location name:
Oliver Rogers Road, North Haven SA
1 Cliff Street, Fremantle WA
Pasir Panjang Drive 8, Singapore
Perak Utara, Surabaya City, East Java, Indonesia

Logger ID
ABCD1234

Logger number: | ABCD1234

Logger type: Frigga

Goods: Fresh fruit

Departure: 28/05/2020 04:45:45 pm


ETA: 15/06/2020 04:45:45 pm

Notification email ID: Andrew.Macnish@daf.qld.gov.au,neil.white@daf.qld.gov.au

Temperature threshold: -1°C to 4°C

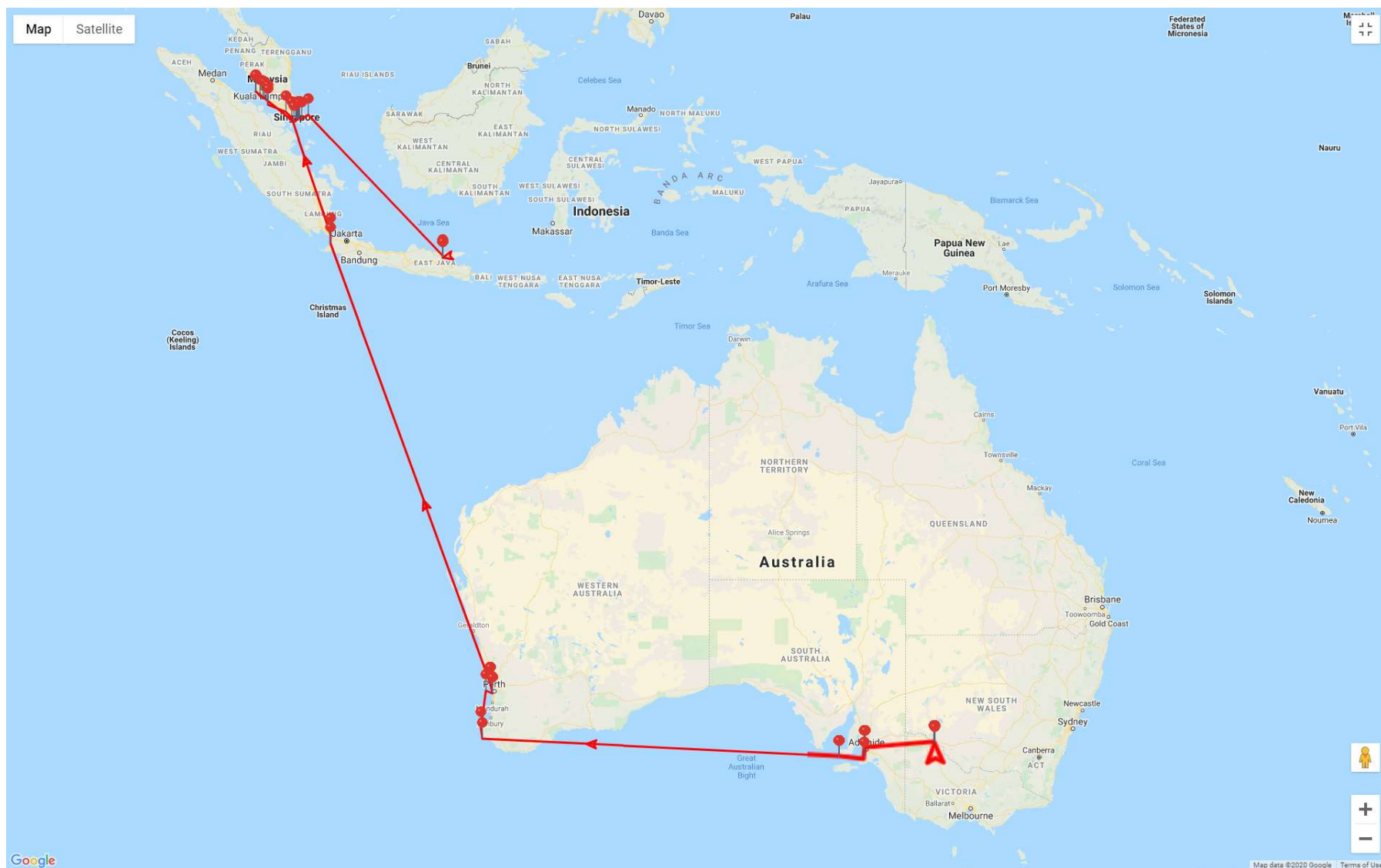
Map

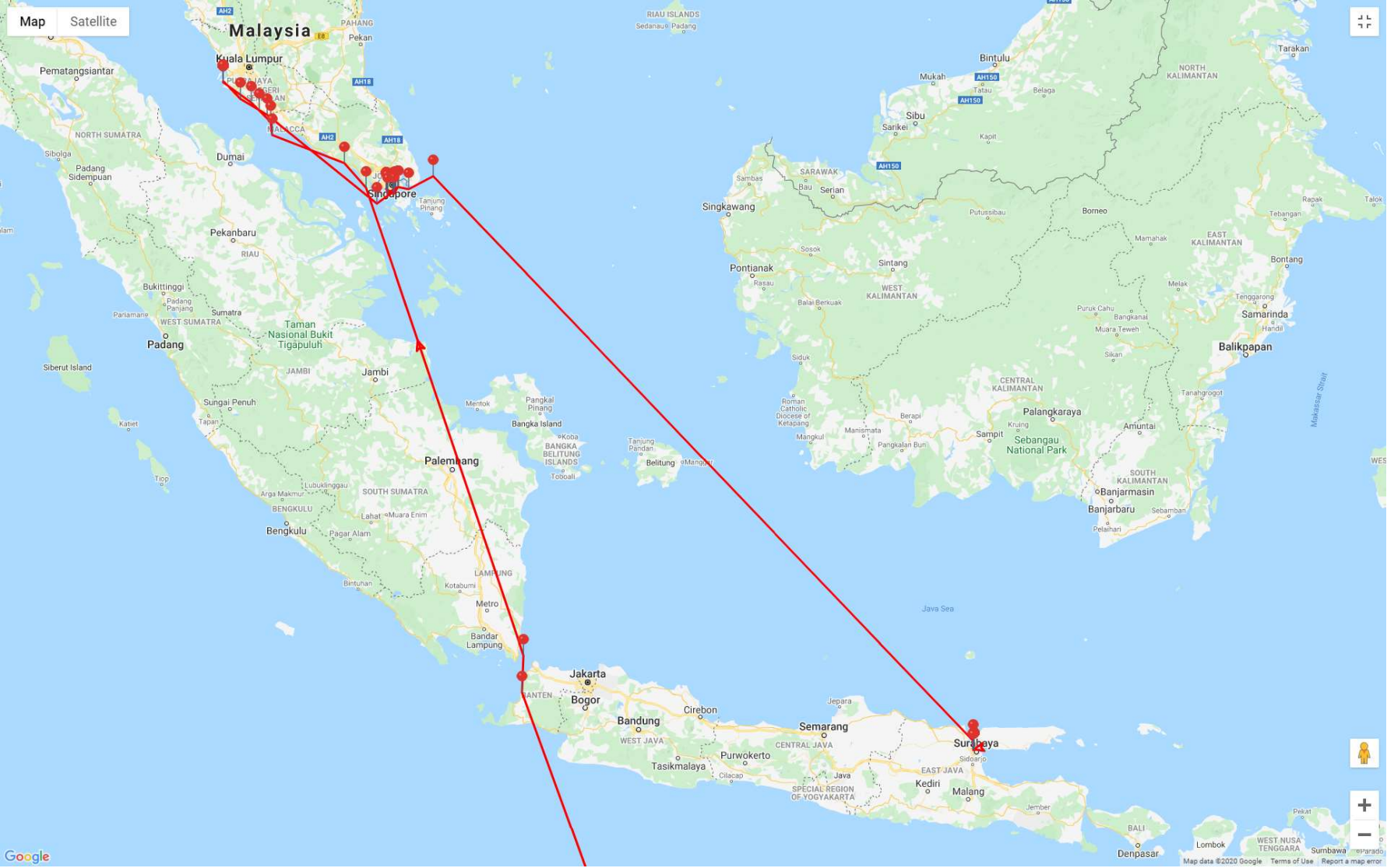
Map Satellite



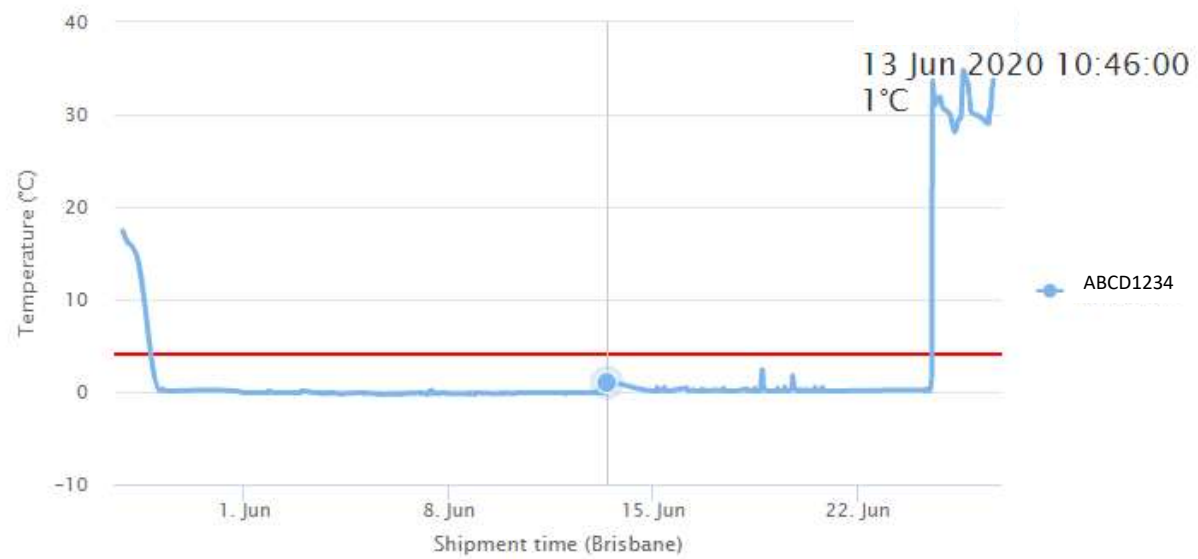
Map data ©2020 Google, INEGI | Terms of Use







Temperature graph



Transport and logistics

Real-time temp loggers tell the story

By Glenn Hale, John Lopresti and Dario Stefanelli

The Serviced Supply Chain (SSC) project aims to increase the value and profitability of Australian horticulture by improving the freshness, taste, consistency and reputation of Australian exports into Asia. In Victoria, this project will work closely with the summerfruit and table grape industries to demonstrate the benefits of supply chain monitoring and the use of predictive tools to help improve the cold chain management and quality of export fruit to Asian markets.

The project will test different types of temperature loggers to determine their practicality and functionality (i.e. ease of use, cost, accuracy, reliability, single use or reusable and if it has SMS/email notifications) that may be of benefit to both growers and exporters. Many exporters currently use USB temperature loggers that are generally discarded, or the data never accessed unless there is a dispute, thus there is no feedback of information to the exporter.

"Ideally, mature table grapes should be stored at a pulp temperature of -1.0 to 0.0°C and 90 to 95% RH which will limit the rate of water loss from fruit stems and help extend shelf life."

A benefit of using 'real-time' temperature loggers is that the data is readily accessible 24/7 from cloud-based systems so that logistical and marketing decisions can be made in situ rather than having to wait for the consignment to arrive at the destination which could otherwise be too late. Users can elect to receive SMS or email alerts notifying them when product temperatures deviate from pre-determined limits.

By monitoring the export cool-chain growers can determine the best route to market and highlight where temperature fluctuations are occurring. Improvements can then be made that enable fresh produce to arrive in Asian markets in the best possible condition further enhancing Australia's reputation and lead to increased sales and profits in the future.



Figure 1. A Sensitech GEO Eagle temperature logger (inset) used to monitor a sea freight consignment of Crimson Seedless table grapes and its route from Mildura to Adelaide, Fremantle, Singapore and Hong Kong followed by road transport to China.

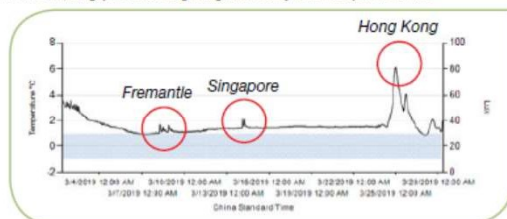


Figure 2. Temperature profile of Crimson Seedless table grapes exported from Mildura to Adelaide, Fremantle, Singapore, Hong Kong and Mainland China.

Temperature monitoring

As part of the temperature monitoring component of the SSC project, Agriculture Victoria recently monitored a sea freight container from Australia to China using a Sensitech TempTale® GEO Eagle temperature logger (Figure 1).

The advantage of this logger is that it is relatively inexpensive (~ A\$75 each) and the shipment information (time, temperature and location data) can be accessed in 'real-time' on the cloud-based SensiWatch™ as it contains a 3G-enabled SIM card that works off triangulation with mobile phone towers. Although no data is transferred when the logger is out of range (i.e. at sea), the logger temporarily stores the temperature data so that when it comes back into range the on-line data is updated.

The logger was deployed in a carton of Crimson Seedless table grapes at a packhouse in Mildura (north-western Victoria) and the route and temperature monitored along the entire trip to Adelaide, Fremantle and Singapore, Hong Kong and China.

The logger successfully tracked the shipping container and provided updates in Adelaide, Fremantle, Singapore, Hong Kong and China (Figure 1). Transit time from Mildura to Hong Kong was approximately 24 days (Figure 2).

The temperature profile shows a relatively 'good' cool-chain of between 1.0 to 1.5°C with the occasional temperature spike to approximately 2°C due to trans-shipping in Fremantle and Singapore. Air temperatures quickly recovered once power was restored (Figure 2).



Visual inspection and quality assessment of Crimson Seedless table grapes in Guangzhou, China.

The larger spike in temperature was attributed to unloading at the port in Hong Kong and the subsequent road transport to the importers warehouse in Guangzhou, China.

Ideally, mature table grapes should be stored at a pulp temperature of -1.0 to 0.0°C and 90 to 95% RH which will limit the rate of water loss from fruit stems and help extend shelf life. Therefore, the temperature of the monitored consignment was slightly higher than optimal.

Fruit quality

Scientists from Agriculture Victoria inspected another consignment of fruit that was stored at approximately 4°C for up to 13 days at the importers warehouse. This fruit was part of a packaging trial and had recently been removed from the cool room prior to measuring the grape surface temperature with a handheld infrared digital sensor.



Measuring the surface temperature of Crimson Seedless table grapes with a handheld infrared digital sensor.

so that response functions can be developed to help predict changes in fruit quality and remaining shelf-life.

Acknowledgements

The Serviced Supply Chains project is funded by the Hort Frontiers Asian Markets Fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation with co-investment from the Department of Agriculture and Fisheries, Queensland; Department of Jobs, Precincts and Regions (Victoria); Manbullo (mangoes); Montague Fresh (summerfruit); Glen Grove (citrus); and the Australian Government plus in-kind support from The University of Queensland and the Chinese Academy of Sciences.

For more information about the project or temperature loggers and monitoring please contact Glenn Hale (Horticultural Scientist at Agribio, Bundoora).

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Glenn Hale, John Lopresti and Dario Stefanelli are Horticultural Scientists at Agriculture Victoria Research.



The quarterly journal for the Australian table grape and dried fruits industries
Volume 15 - Issue 3 - July - September 2019



Are we a step closer to minimum maturity standards?

INSIDE STORIES:
• D&A history grant
• Australian Software launch

• On the high seas with real-time temp loggers
• Spray application cost calculator



'The Vine'
July to Sept, 2019



Keeping your temperature monitoring real

By GLENN HALE, Research Scientist - Agriculture Victoria

&

ANDREW MACNISH, Team Leader, Supply Chain Innovation – DAF, Queensland

Horticultural exporters need an efficient and reliable supply chain for their fresh produce to arrive in international markets in premium condition. Temperature plays a big role in maintaining freshness and quality of the produce.

In the past, many growers and exporters deployed USB data loggers to monitor sea freight temperatures as they are cheap, small, lightweight, reliable and easy to use. However, if importers are too busy to retrieve them and download the data then there is no feedback to the exporter. So generally, exporters only hear about poor temperature management when there is an insurance claim and by then it is too late.

Several companies such as Emerson, Escavox, Fresh Key, Frigga, Sensitech and Tive have developed new generation wireless SIM-based data loggers that are capable of monitoring different parameters such as temperature, light, relative humidity, shock and location in real-time. These innovative loggers have global coverage and work similarly to a mobile phone in that they connect to the nearest phone tower via 2/3/4/5G and autonomously upload data to cloud-based systems that can then be viewed on a handheld device or PC.

Real-time alerts via SMS or email can also be set up to notify users when product arrives at, or

departs from pre-determined locations, and if consignment temperatures fluctuate outside set limits. These features come at a cost (e.g. a higher unit price and extra time to set them up compared to USB loggers) however, as export manager for Montague, Mark Bailey said "the main drawback of these loggers is that the entire supply chain is more visible and in real-time so that potentially if there are any

"If we receive an alert and see the temperature increasing then we can contact the transport or shipping company and ask them to go and check it out".

When deploying real-time loggers, it is recommended to start them 1 to 2 hours prior to positioning them in or on the top carton of the pallet closest to the door end of the shipping container so that there is minimal communication interference from the motor and water mass of the fresh produce. Temperature data and location may be updated en route depending on the location of the container on the vessel. If the shipping container is stacked in the middle of the vessel or

when the vessel is out at sea, then the signal may be compromised. Information will be stored on the device until it comes into range with the next available mobile tower where data will be uploaded to internet cloud servers and accessible to approved users.

As part of the Serviced Supply Chains project, scientists at Agriculture Victoria recently deployed a real-time device (Frigga B9B) that successfully logged temperature and location data of a 'Crimson Seedless' table grape shipment and provided updates in Australia, Malaysia, Singapore and Indonesia (Figure 1). Transit time from packing in Robinvale (northern Victoria) to Surabaya (Indonesia) was approximately 28 days. Sea freight temperatures were maintained at approximately 1 °C with only minor fluctuations at the port in Singapore, but well within export limits. Another advantage of these loggers is that sensor reports can be downloaded at any time in either PDF, CSV or Excel format so users will always have access to the data.

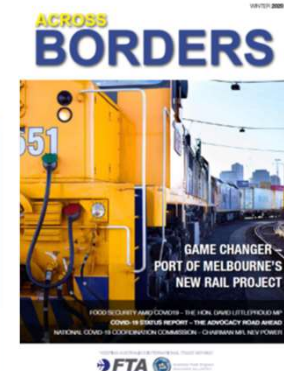


Figure 1. A real-time temperature logger (inset) used to monitor a sea freight consignment of 'Crimson Seedless' table grapes from Australia to Indonesia. Map is a screen shot of the vessels route, which was taken from a dashboard developed by DAF, Queensland. Photo courtesy of Glenn Hale.

The Serviced Supply Chains project is funded by the Hort Frontiers Asian Markets Fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation with co-investment from the Department of Agriculture and Fisheries (DAF), Queensland; Department of Jobs, Precincts and Regions (DJPR), Victoria; Manbulloo (mangoes); Montague (Summerfruit); Glen Grove (citrus); and the Australian Government plus in-kind support from The University of Queensland and the Chinese Academy of Sciences.

For more information contact:

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'Across Borders'
Spring Ed., 2020



Thank you



Any questions / comments?

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<http://www.hin.com.au/current-initiatives/serviced-supply-chain>

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