

Obtaining Data on Behavior from Argos Tags

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Wildlife Computers



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Introduction

- Data loggers can incorporate large amounts of data from a variety of sensors
- Common sensors
 - Depth
 - Temperature
 - Light level
- Others
 - Acceleration
 - Stomach Temperature
 - Magnetic Fields



Getting the data back

- Challenge is recovering the data
 - Data loggers must be physically recovered
 - Not always possible
- Data can be transmitted
 - Although other technologies exist (e.g., cellular, Iridium), Argos is most commonly used

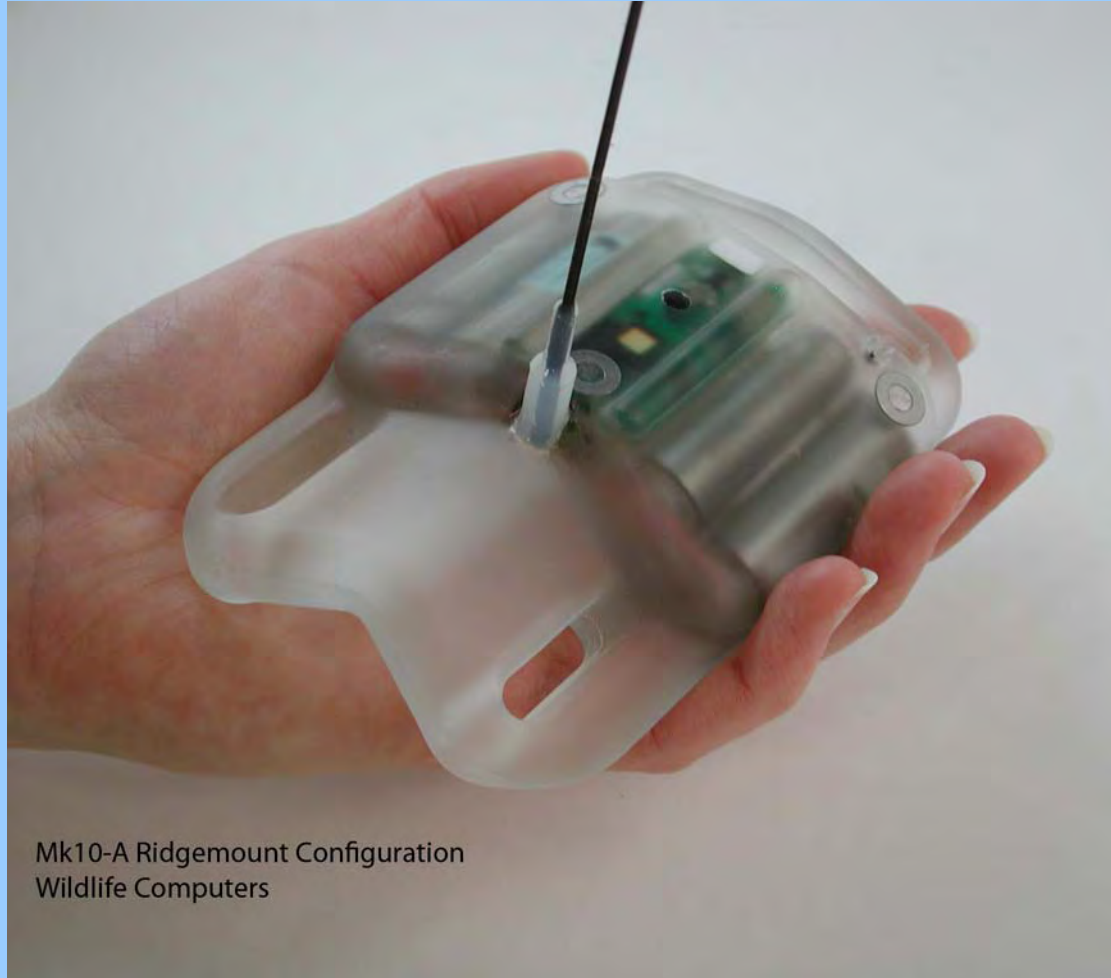


Why Argos?

- Low-orbiting satellites
 - Less power required to transmit the data, therefore smaller tags are possible
- Global coverage



Tags can be relatively small



Mk10-A Ridgemount Configuration
Wildlife Computers



Kara Dodge, LPRC, UNE



Limitations of Argos

- Limited data throughput
- Generally 31 bytes every 45 seconds
- Satellites in view only a limited amount of time in the lower equatorial latitudes



Solution

- The microprocessor and memory used in satellite tags gives the tags the same computing power as a desktop PC
- Set the goal to take full advantage of the 31 bytes of data that are transmitted to the Argos satellites
- Have the tag performs onboard processing of the collected archival data and transmit summarized data
 - Smart summarization strategies can pack a lot of information into each transmission

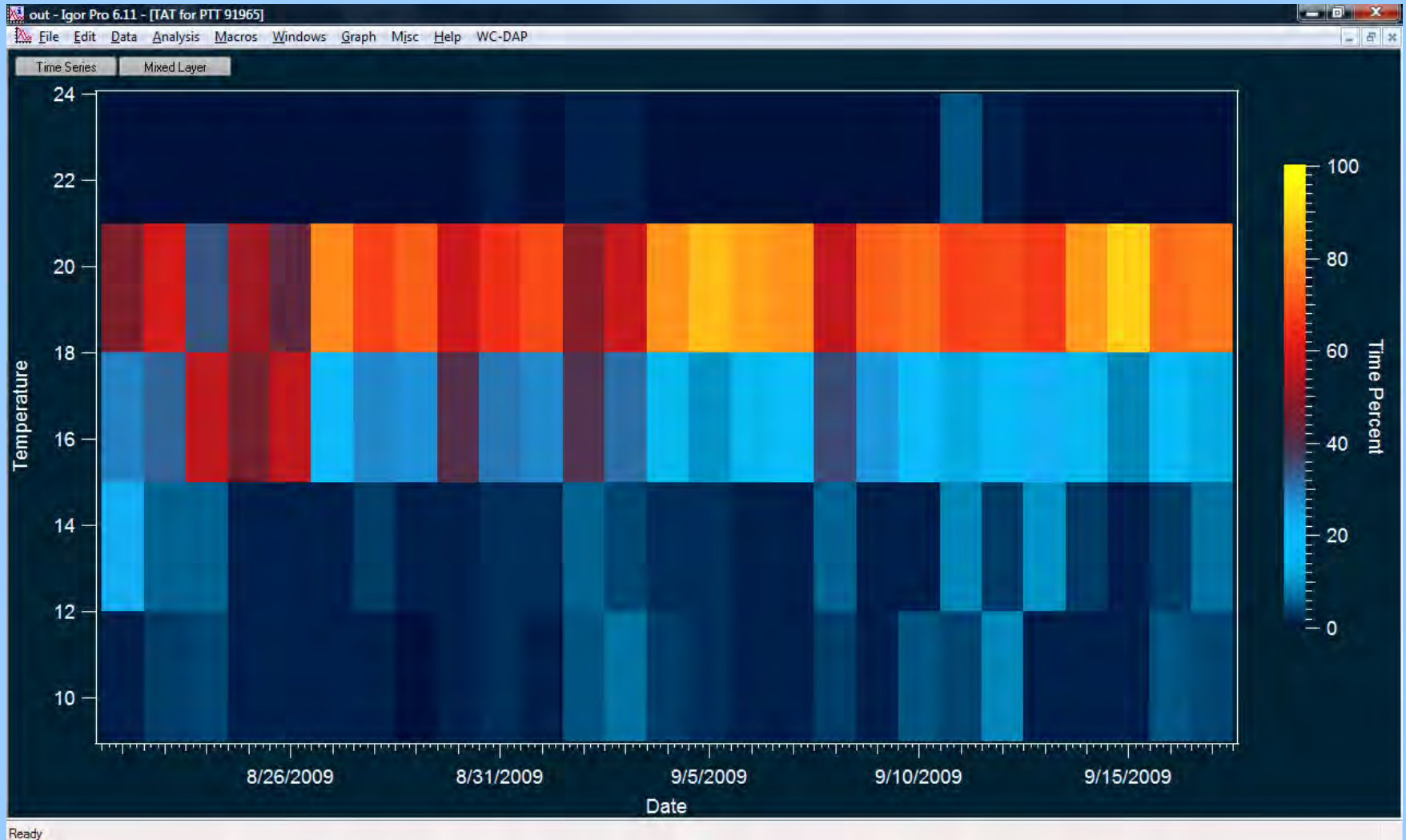


Histograms

- Maximum Dive Depth
- Dive Duration
- Time-at-Depth
- Time-at-Temperature



Time-at-Temperature Histograms





Depth-temperature Profiles

Gives you a picture of the water characteristics
the animal was in





Other data currently available

- Dive Profiles / Behavior Logs
- Timelines of periods of haulout
- Timelines of percentage of time spent above a threshold depth (for aerial survey corrections)

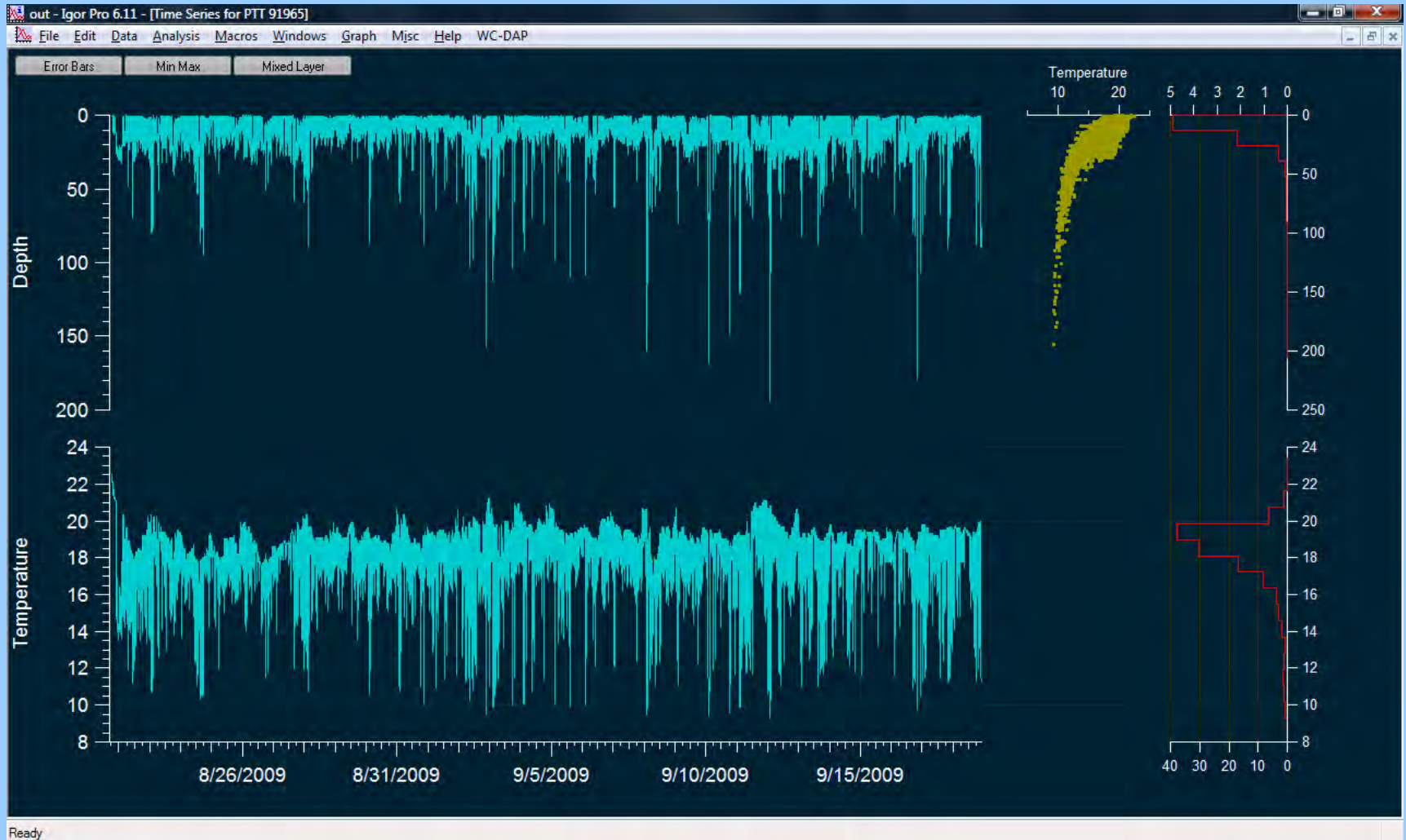


Detailed Behavior

- Time-series data
 - Smart subsampling of the archival data
 - Highly compressed
 - Also gives true minimum and maximum so you are aware of the amount of aliasing of the data

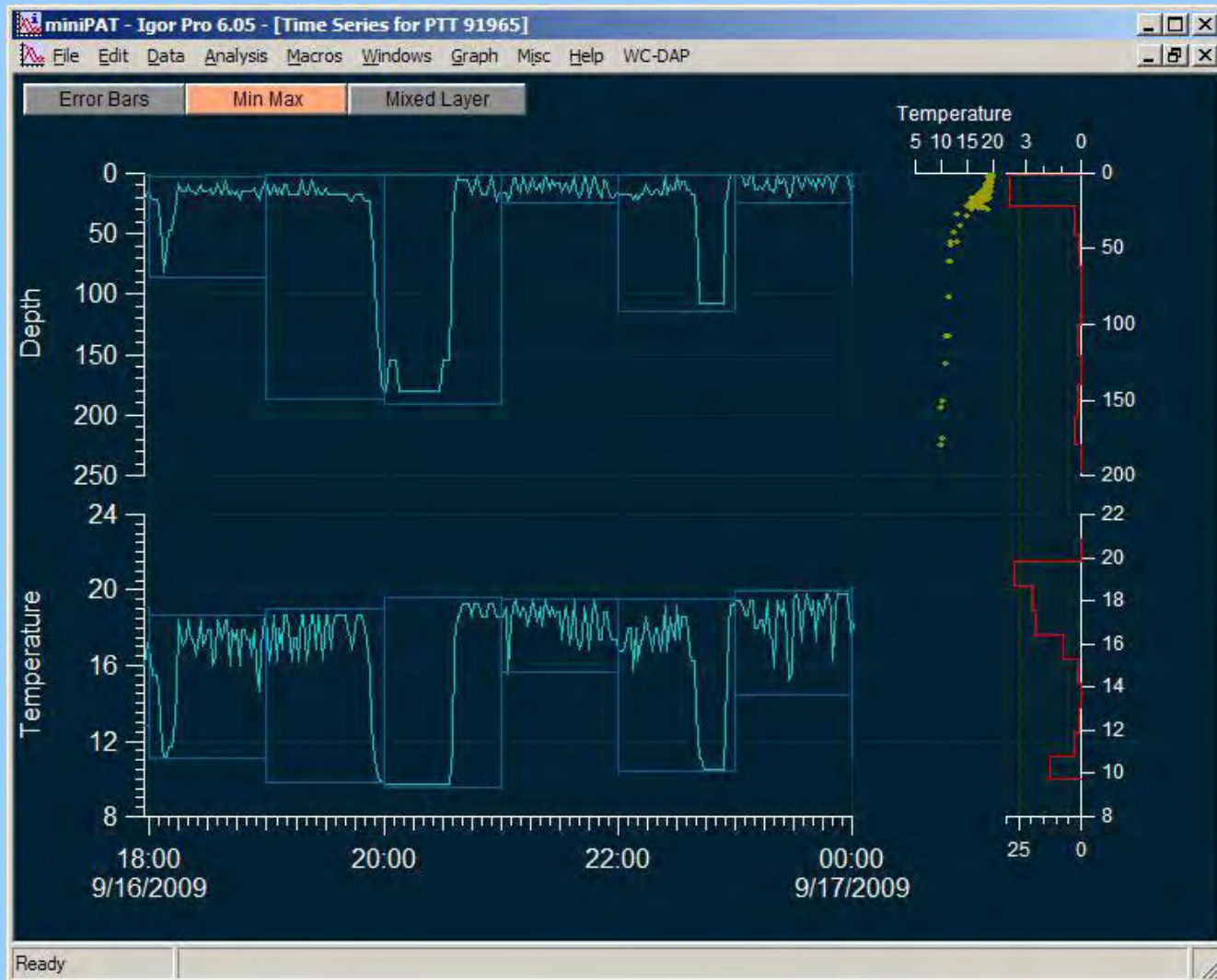


Time-series Data- full deployment





Close-up of the Time-Series data





Pop-up Tags

Wildlife Computers Mk10 and mini PAT tag

- Designed to track the movements and behavior of pelagic fish, but have been used on other species
- Combines archival and Argos capabilities
- Records light level, depth and temperature just like an archival tag
- Releases itself on a user-defined release date:
 - Transmits to the Argos satellites
 - light-level data
 - summarized depth and temperature data
- Pop-up location is generated by Argos
- Animal's track is determined using light-based geolocation methods



Pop-up tags and mortality

- Tag will release if the turtle sinks below a threshold depth of 1800m
- Tag will begin transmission if the depth remains constant (e.g., floating at the surface, sitting at the ocean floor)
- Collected data can give insight to cause of the mortality
 - Predation
 - Fishing interactions



Sheryan Epperly, NOAA/NMFS



Considerations of a Tagging Project

- What questions are being asked
- How will the technology answer your questions
 - What scale do you need for horizontal movement
 - What resolution of data do you need
 - How does your animal's behavior affect the data collection and/or transmission



Have a plan of attack to analyze the data

- Know what analysis tools are available
 - From the manufacturer
 - From other sources