Maui
Wave Climate

Jessica Podoski, PE
USACE Honolulu District

co-sponsored by:

State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Maui Wave Climate Overview

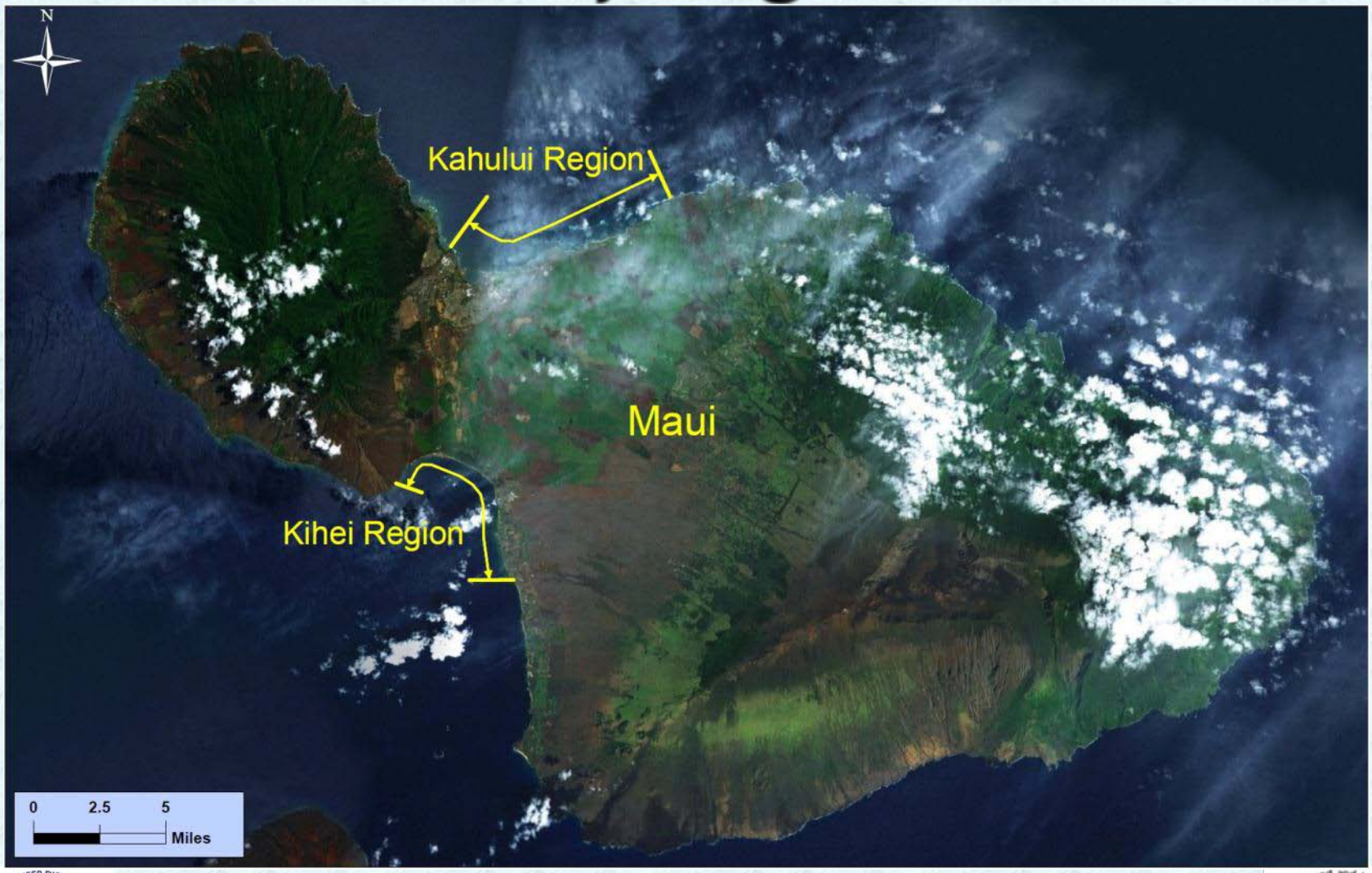
- Study Regions
- WIS Hindcast Data & Analysis
- Wave Transformation
- Nearshore Wave Climate

co-sponsored by:

State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Study Regions



co-sponsored by:

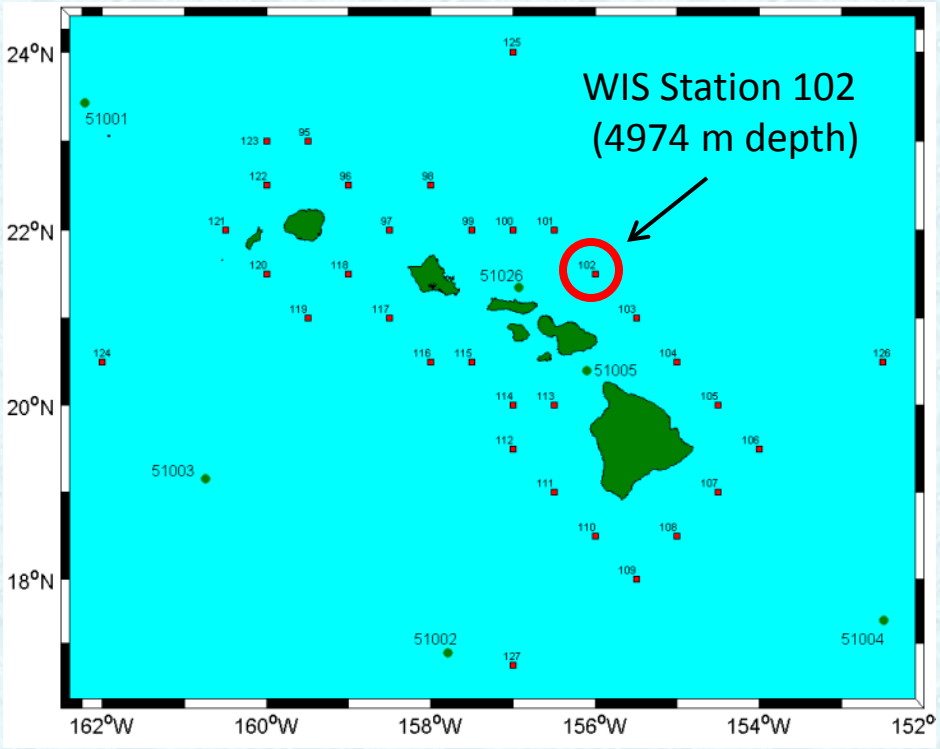
State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Kahului Wave Climate

Wave Information Study (WIS) Hindcast:

- Pacific Hindcast provides hourly wave parameters for 24 years (1980 – 2004)
- Generated using computer models and observed wind fields
- Compared with actual wave gage data for accuracy
- Provides a much longer term data set useful in establishing wave climate
- Station 102 selected for Kahului



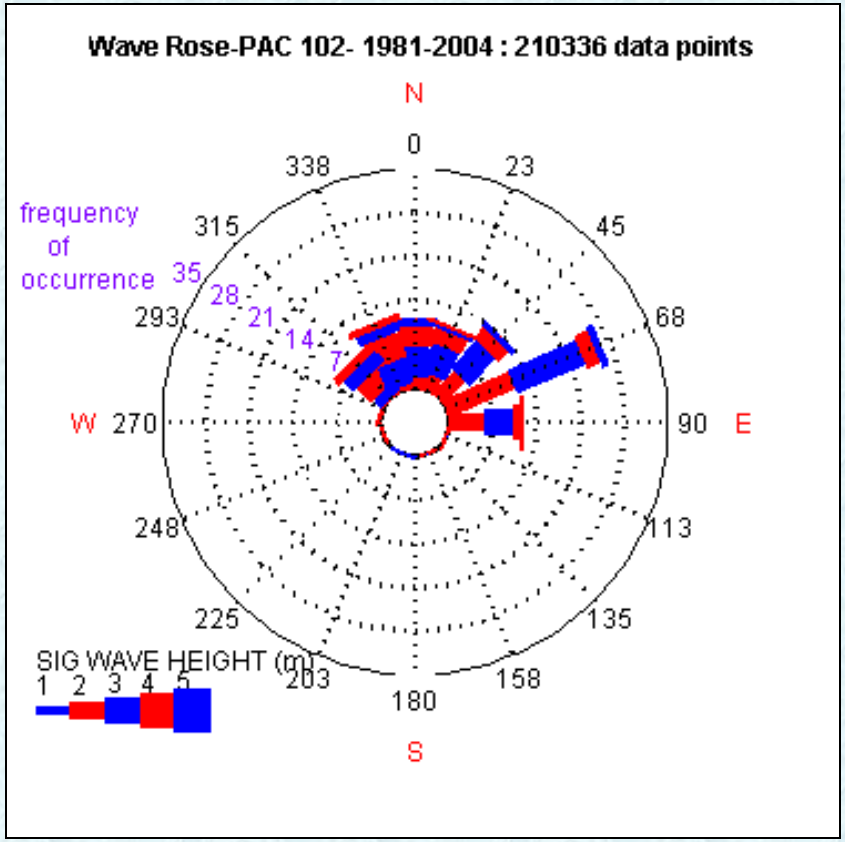
co-sponsored by:

State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Kahului Wave Climate

Kahului deep water WIS Station:



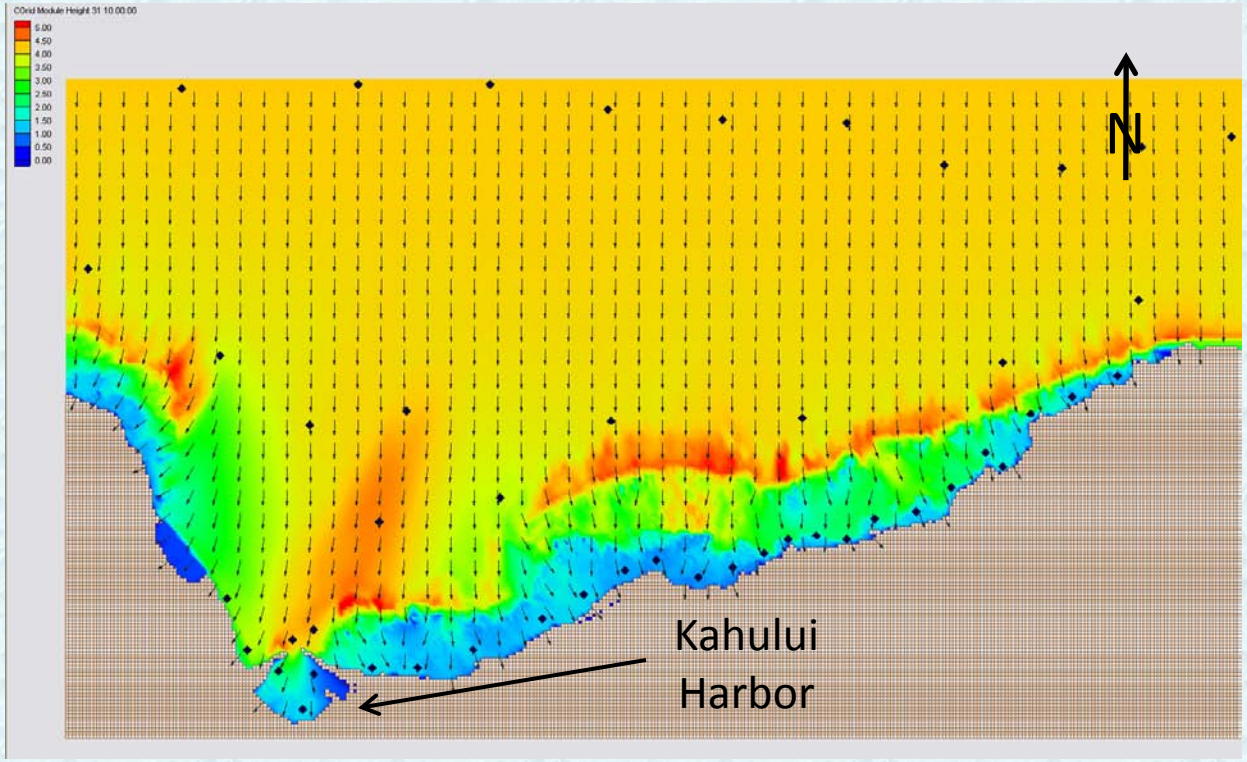
- Waves from 90° to 300 ° (WNW clockwise through East) and large waves (5-6m) from most directions
- Captures both tradewind seas (ENE direction) and long-period swells (N&NW directions)
- Data was truncated to capture only energy moving toward island (270 ° through 90 °)
- Three representative years (1984, 1992, 1994) transformed to 100m contour using linear shoaling & diffraction then analyzed for to select most common wave cases (H/T/θ)

co-sponsored by:

State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Kahului Wave Climate



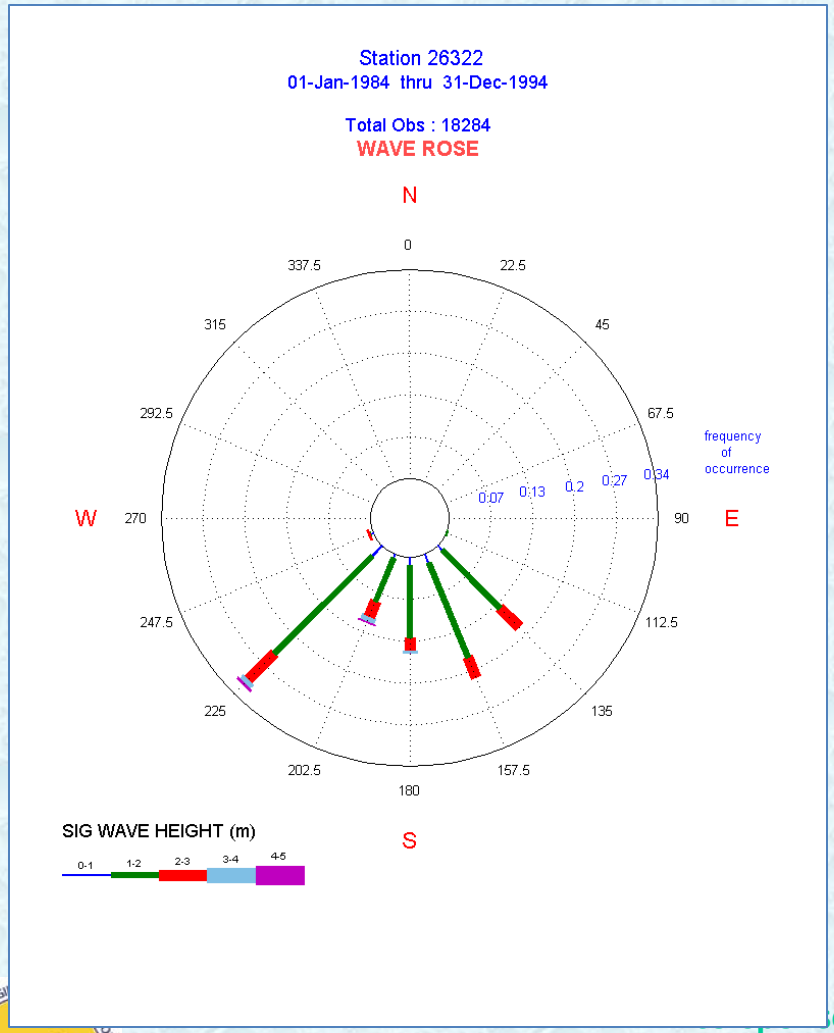
- Used STWAVE to transform selected wave cases to shoreline (422 discrete cases for Kahului)
- Wave data saved at specific nearshore "save points" along coastline at areas of interest
- Results used to develop relationship between offshore/nearshore wave conditions
- Nearshore time series created using WIS data for 3 selected years and STWAVE results

co-sponsored by:

State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Kahului Wave Climate



- Wave Rose developed for nearshore locations will help to determine dominant wave direction
- From this, we can estimate direction of longshore sediment transport at locations along the study region
- Will add information to sediment budget

Co-sponsored by:

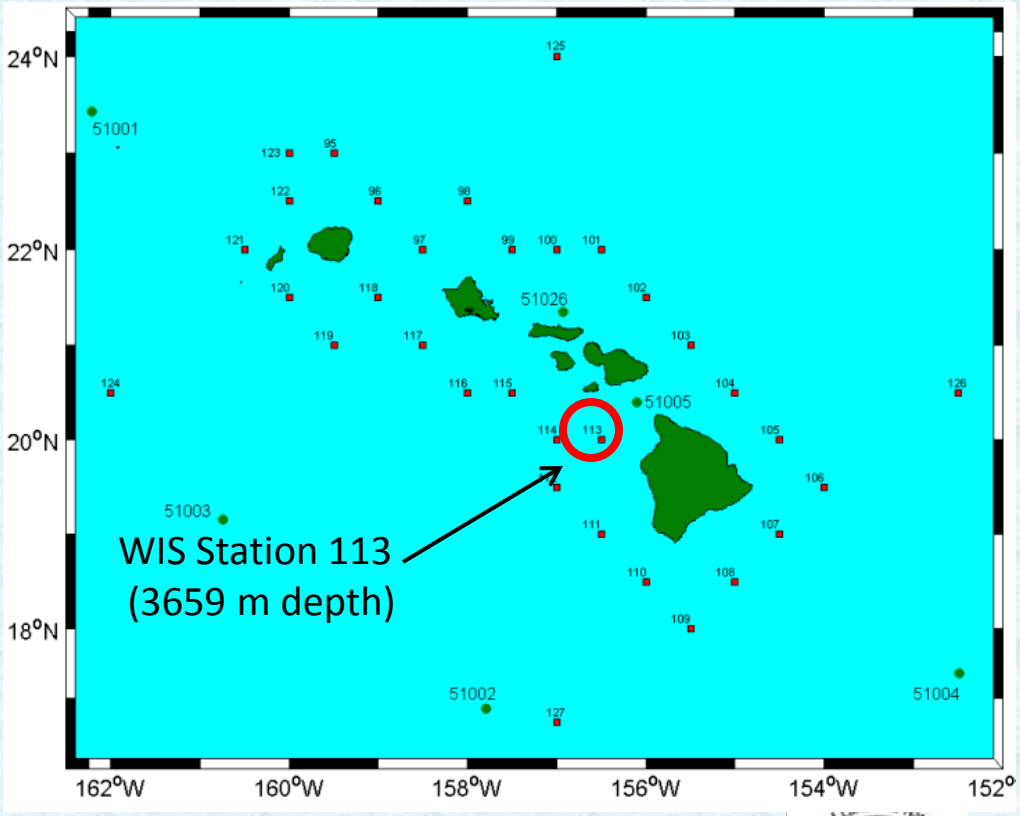
State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Kihei Wave Climate

Wave Information Study (WIS) Hindcast:

- Station 113 selected for Kihei
- Same 24-year period of record
- WIS station is much more exposed than Kihei area



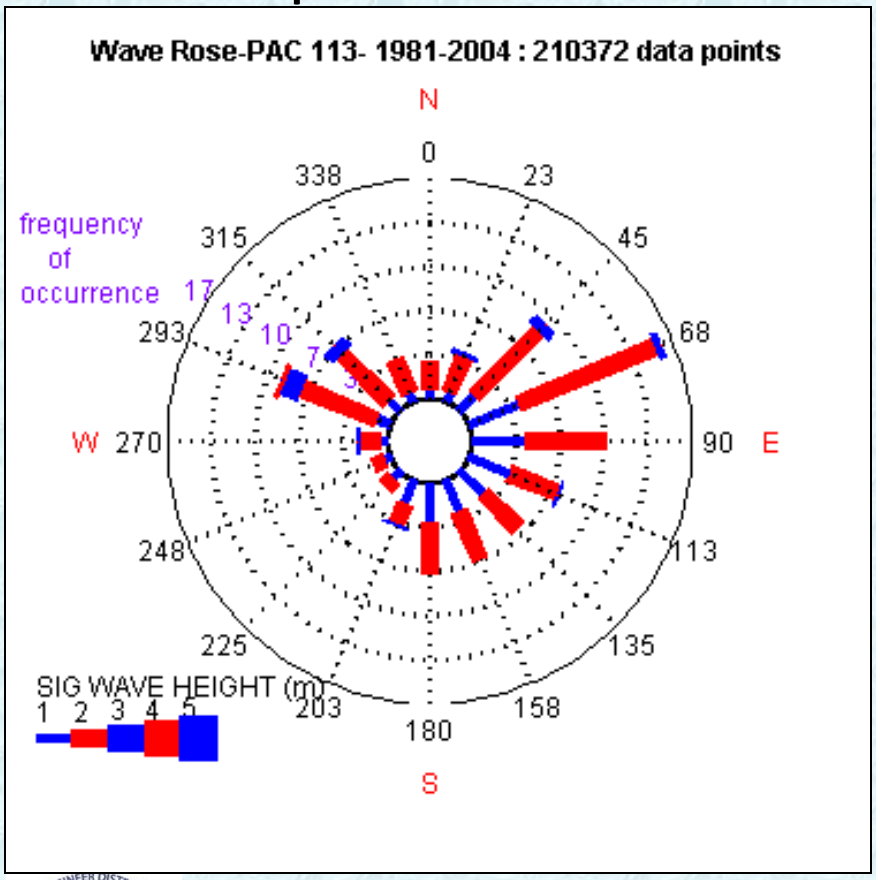
co-sponsored by:

State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Kihei Wave Climate

Kihei deep water WIS Station:



- Waves from all directions and mid-range wave heights (2-3m) from most directions
- Captures both tradewind seas (ENE direction) and long-period swells (N&NW directions and South)
- Data was truncated to capture only energy moving toward island (90 ° through 270 °)
- Three representative years (1984, 1992, 1994) transformed to 100m contour using STWAVE to capture sheltering by Kahoolawe

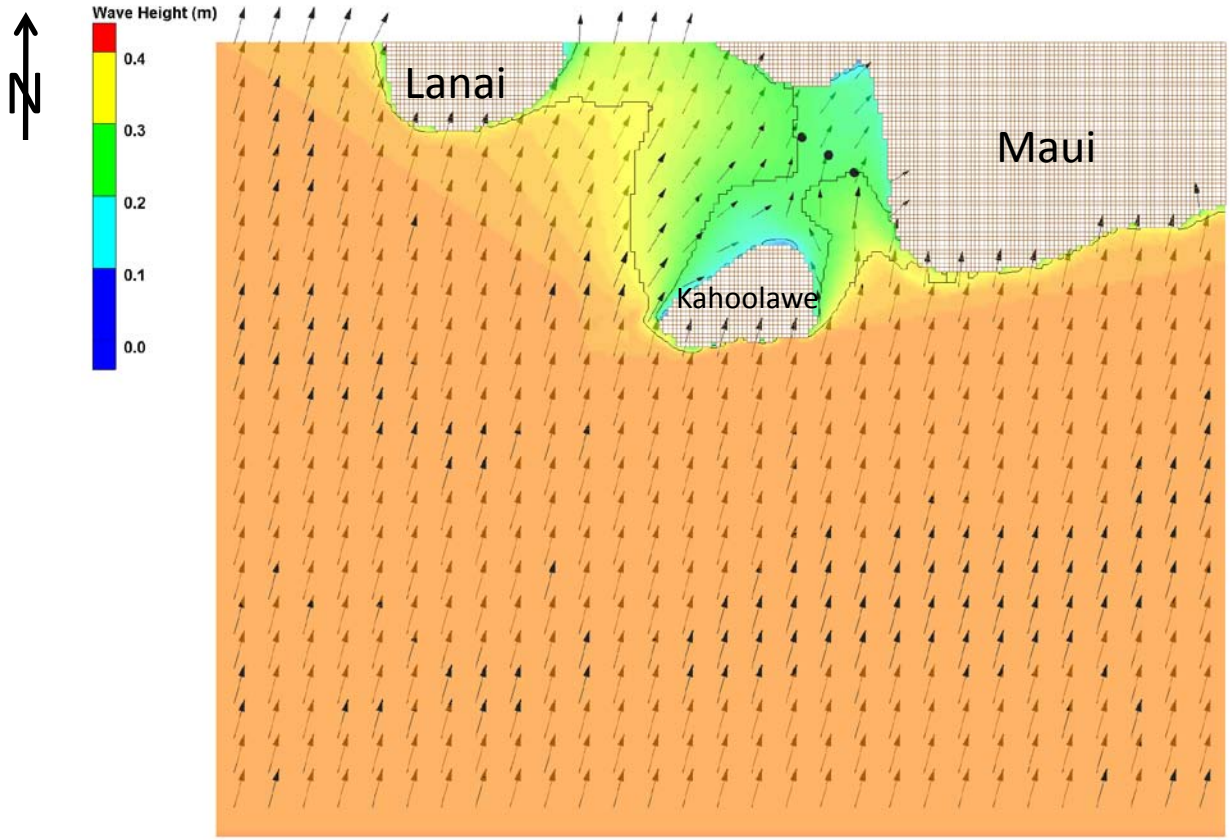
co-sponsored by:

State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Kihei Wave Climate

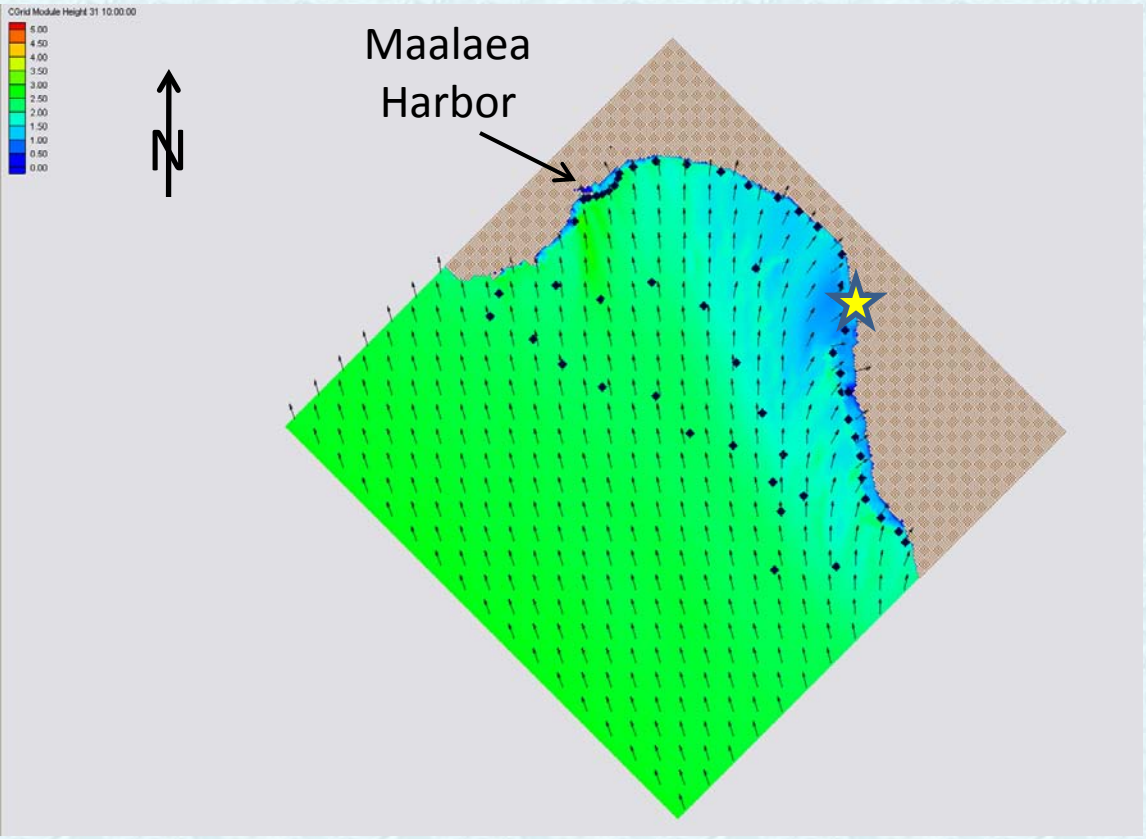
STWAVE Transformation from WIS Station to Intermediate Depth



State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Kihei Wave Climate



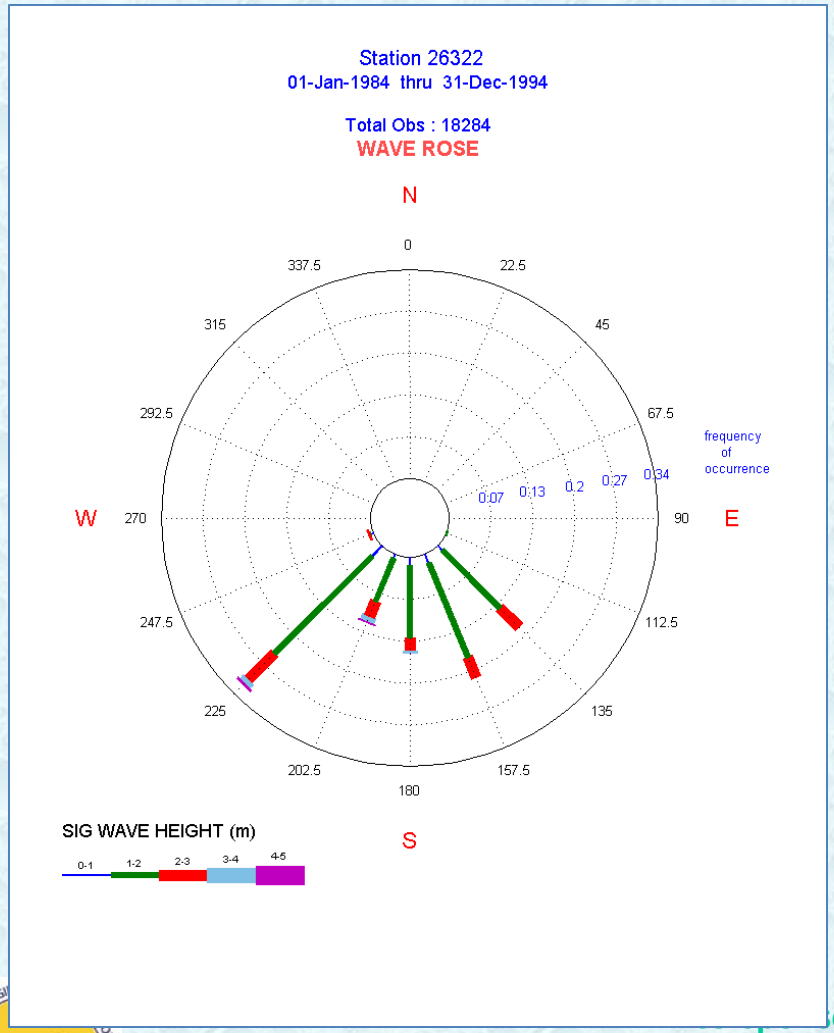
- Used STWAVE to transform selected wave cases to shoreline (118 discrete cases for Kihei)
- Wave data saved at specific nearshore “save points” along coastline at areas of interest
- Results used to develop relationship between offshore/nearshore wave conditions
- Nearshore time series created using WIS data for 3 selected years and STWAVE results

co-sponsored by:

State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District

Kihei Wave Climate



- Wave Rose developed for nearshore locations will help to determine dominant wave direction
- From this, we can estimate direction of longshore sediment transport at locations along the study region
- Will add information to sediment budget

Co-sponsored by:

State of Hawaii Department of Land and Natural Resources

US Army Corps of Engineers, Honolulu District