IGMAC 2014

Surficial Geologic Mapping
STATEMAP past to future

presented by Drew Phillips,
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SURFICIAL GEOLOGIC MAPPING: PAST

Completed Aug 2014

NE Illinois Project:
- Illiana Heights
- Rantoul

S Illinois Project:
- Maunie
SURFICIAL GEOLOGIC MAPPING: PRESENT

NE Illinois Project:
- Sag Bridge,
- Frankfort

S Illinois Project:
- Keyesport

Started Sept 2014
SURFICIAL GEOLOGIC MAPPING: FUTURE

Proposing FY2015

NE Illinois Project:
Mokena, Manhattan
Mahomet

S Illinois Project:
Mt Carmel, Keensburg
Illiana Heights
Surficial Geology: Results

- Upland sediments similar to Beecher-Steger STATEMAP project. 6-15 m of silty diamicton overlies 10-15 m of stratified sand, which in turn overlies discontinuous silty and clayey diamicton.

- Kankakee River valley: Deposits previously mapped as eolian sand reinterpreted as thin, sandy fluvial deposits covering near-surface Silurian dolomite.

- Kankakee River valley: 3-12 m of silty and clayey lacustrine sediment lies below 3-9 m of fine sand. Lacustrine sediment thins westward as the bedrock surface rises to near the ground surface. This sediment lacks ostracodes, snails, or other organic matter that could be used for dating or paleoenvironmental interpretations.
Will County Project
Three-Dimensional Geologic Mapping Program

Olivier Caron
Illinois State Geological Survey
Champaign, Illinois
Surficial Geology in Willowbrook area: Progress

- Evaluation of existing datasets, previous mapping, and synthesis of existing interpretations of the geologic framework
- Validation and integration of the soil map
- Drill 9 boreholes (Σ ~850 ft)
- Outcrop study
- Gamma logging program across County
Will County
Three-Dimensional Geologic Mapping Program: Field Work
SURFICIAL GEOLOGIC MAPPING: PAST

Completed Aug 2014

NE Illinois Project:
- Illiana Heights
- Rantoul

S Illinois Project:
- Maunie
Rantoul Surficial Geology: Results

- Confirmed geologic model from Mahomet Aquifer project
- 6.5 miles of electrical earth resistivity
- Compiled and analyzed >200 geologic logs from the former Chanute Air Force Base
- Cosmogenic terrestrial nuclide dating on 4 samples
SURFICIAL GEOLOGIC MAPPING: PAST

Completed Aug 2014

NE Illinois Project:
- Illiana Heights
- Rantoul

S Illinois Project:
- Maunie
Maunie Quadrangle
Surficial Geology:
Results

Geomorphonic map from recent LiDAR

Glacial Lake Carmi
Outwash

Bedrock, till, loess

Dunes
Meandering stream deposits
Maunie Quadrangle Surficial Geology: Results

NEHRP project studied tectonic origin of the Meadow Bank
New mine maps DO NOT show faulting below the Meadow Bank.
Sedimentology and chronology DO NOT show faulting

The Meadow Bank has erosional, not tectonic, origin
STATEMAP mapping developed these themes:

- drilling in fossiliferous slackwater lake deposits and the lateral transition from deltaic to lacustrine facies
- Eolian dune and outwash or lacustrine substrate sampled for OSL & \(^{14}\)C dating
- Meander fills sampled to date cutoff and sedimentation rates
- U-Pb series date on IL Ep. granite boulder = 1139.7 ± 12.8 Ma. Provenance in the Grenville Province?
- 4 km EER surveys imaged valley fill
SURFICIAL GEOLOGY MAPPING: FUTURE

aka Proposing

NE Illinois project:
- Mokena & Manhattan
- Mahomet

S Illinois Project:
- Mt Carmel & Keensburg
Mokena & Manhattan Quadrangles: Setting

- Rapid growth and urbanization in Will County/south Chicago
- Near proposed Illiana Expressway and 3rd airport
- Connects previous mapping
- Manhattan re-proposed from FY2014

Olivier Caron & Andy Stumpf (PIs)
Groundwater supply and protection: geometry of water-bearing units

Material Resources: sand and gravel, dolomite

Wetlands / stream ecosystem protection

last glacial chronology; Chicago outlet history; till characterization
Mahomet Quadrangle: Setting

- Builds on Mahomet Aquifer studies
- Supports Critical Zone Observatory (upper Sangamon watershed)
Mahomet Quadrangle: Setting (cont.)

- > 300 ft Quaternary sediment
- Last glacial (Wisconsin Ep.) landscape
- Woodland, agricultural, small town, growing suburban landscape, Lake of the Woods Park
Mahomet Quadrangle: Importance and Targets

- Mahomet Aquifer: supply and protection; aquifer connectivity
- Aggregate resources (terrace deposits and active pits)
- Geologic framework for Critical Zone Observatory
  - spatial variability of surficial materials relevant to hydrology and sediment transport
  - flooding and alluvial history in the Sangamon river valley
- Moraine & glacial history: association of moraines with till units is unclear
- Last glacial chronology
- Outcrops along Sangamon

Mid-America Sand and Gravel pit

Bank of the Sangamon
Mt Carmel & Keensburg Quadrangles: Setting

- Illinois Episode glacial margin
- Wisconsin Episode outwash, slackwater lake environments
- Wabash Valley Seismic Zone
- Geologic framework for UI river res.
Mt Carmel & Keensburg: Importance and Targets

- Groundwater in Wabash V. fill - PES
- Meander cutoff timing and process: aggregate, ecosystems
- Paleoliquefaction
- Slackwater lake deposits
- Wisconsin-Holocene transition
PROPOSED SURFICIAL GEOLOGY MAPPING

**NE Illinois project:**
- Mokena & Manhattan
- Mahomet

**S Illinois Project:**
- Mt Carmel & Keensburg
SUMMARY -- Proposed Surficial Geologic Mapping

NORTHEASTERN ILLINOIS PROJECT (Wisconsin Ep. glacial terrain)

- **Mokena and Manhattan**
  - **Societal needs:** groundwater, smart growth issues, aggregate
  - **Scientific research:** age of Chicago outlet discharges, glacial chronology

- **Mahomet**
  - **Societal needs:** groundwater, aquifer protection, aggregate
  - **Scientific research:** moraine-till correlations, late Pleistocene chronology, CZO framework

SOUTHERN ILLINOIS PROJECT (Illinois Ep. glacial and Wisconsin Ep. proglacial terrain)

- **Mt Carmel and Keensburg**
  - **Societal needs:** groundwater, flooding, aggregate, seismic hazard, river ecology
  - **Scientific research:** slackwater lake chronology and ecology, glacial-postglacial transition, river meandering framework