Northern Israel
Geological map

- Predominantly Cretaceous Marine Sediments
- Younger Sediments
- Cretaceous Volcanic Rocks
- Neogene Basalts
- Cretaceous to recent Alluvials
Shefa Yamim is exploring for Gem Mineral Deposits

Current SY Exploration (869B4) and Prospecting permits (837A8 and 899A3) are shown

Digital Earth Model- Hall, 2005.
Geological map- Sneh et al., 1998
Area Explored through Heavy Mineral Prospecting

SY sampling locations (total of 1,127 samples to date)
(background geology adapted from Sneh, et al., 1998)
Source to Sink Geological Model

Geological model in 3D view. Note the 3 fold division of the Kishon catchment. The model is a guideline to placer exploration in the Kishon catchment.
Shefa Yamim Alluvial Geological Model
- Map view of model extent
Placer Sample Locations

- Kishon River
- Large Diameter Drilling
- Core Drilling
- Geologically Logged
- Bulk Samples
- Minerals Recovered
Kishon River Drainage
Kishon Bulk Sample
Kishon Large Diameter Drilling
Kishon River Placer Minerals

- **Economic Mineralization Targets**
  - Diamond, Natural Moissanite, Corundum (DMC)

- **Accessory Heavy Minerals**
  - Garnet, Ilmenite, Zircon, Rutile, Pyroxene, Amphibole, Olivine, Spinel, Kyanite, FeTi Alloy

- **Likely Derived from Mafic Volcanics**
  - Volcanics contain Mantle Xenoliths
  - Indications of Deep, High Pressure Phases
Recovered Minerals

- Natural Moissanite 4.1m
- Garnet (Pyrope)
- Natural Moissanite
- Ruby
- Sapphire
- Diamond
- GPX
- KIM
Mt. Carmel Corundum

- Ruby
- Sapphire
- To 5.8 carats so far
- Xenocrysts in Volcanic Pipes and in Basalts
- Inclusions are being studied and may give clues as to origin
Volcanic centers as sources for alluvial corundum

(Shaliv, 1991; Segev et al., 2006; Baer et al., 2006)
Sapphire
Ruby
Sapphire and Ruby analyses by Laser Ablation – Inductively Coupled Mass Spectrometry (LA-ICPMS)

- Sarah Gain & Bill Griffin
Sapphires - variations by colors

• Average trace element concentrations (ppm ± 1σ):
  – FeO = 1.04% ± 0.29
  – Si = 1478 ± 133
  – Ti = 280 ± 251
  – Cr = 260 ± 586
  – Ga = 158 ± 69
  – Mg = 88 ± 93
  – V = 61 ± 118
  – P = 29.7 ± 3.8
  – B = 2.0 ± 0.5
  – Mn = 1.2 ± 1.0
  – Zn = 1.0 ± 1.3
  – Cu = 0.14 ± 0.07
Natural Moissanite

• Primarily known as microscopic grains as inclusions in other minerals – less than 0.5mm
• Discrete Grains extremely Rare
• No Commercial Value to these tiny Grains

UNTIL

• New Discovery of Abundant & Large Grains
  – Carmel Mountain area of northern Israel
Carmel Mtn. Moissanite

• Hardrock in Volcanic Rocks
• Valley Deposits in Alluvium derived from rock
  – Placer Deposits identified and sampled
  – Drill and Pit Sampling
• Discreet Grains <0.5 mm to 4.1 mm
  – *World Record Sizes*
• **Gem Quality**, mostly deep Blue, some Green
• Confirmed by modern Gemological techniques
Moissanite
Natural Moissanite 4.1mm
Mt. Carmel, Israel
Moissanites
Diamonds recovered (77 diamonds in total mostly alluvial), including 0.88 carat Gem (middle) Diamond. One Micro-Diamond in-situ

One micro diamond in-situ in volcaniclastic rock (De Beers, MiDa 2004)
Rakefet Volcaniclastic Complex

- Vents and Pyroclastic Deposits
- Kimberlitic in appearance
- Kimberlitic Indicator Minerals
- Source for High Pressure Minerals & Gem Minerals
Convergent Margin Volcanic Emplacement of Deep Minerals at Mt. Carmel
CONCLUSIONS

• New Gem Occurrence being developed
• Important discovery of true Natural Moissanite – “large” & abundant
• Minerals carried from depth in convergent plate arc volcanics, eroded into Alluvial environment deposits
• Shallow Peridotitic lithosphere and Deeper Eclogitic component?
• Paragenesis is being studied